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# The Evolution of Linear Business Models: AI as a Tool to adopt Platform Thinking in Established Firms

TESI DI LAUREA MAGISTRALE IN MANAGEMENT  
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## ABSTRACT

# ABSTRACT

This thesis examines how established companies can reinvent their traditional linear business by integrating AI to develop platform-based business models, a method to address the increasing need for change to ensure the organization's sustainability.

It contributes to two streams of research: platform thinking and business model innovation. It proposes a deeper segmentation of main typologies of platforms into subgroups, while, regarding BMI, it highlights how AI can be adopted to trigger the process and outlines the main implications if this tools. Furthermore, the research investigates the determinants of a multi-sided platform-based business model that differentiates it from linear models, addressing similarities and differences to enhance understanding of the topic and support the process of business model innovation.

Cases are selected from the S&P 500 ranking, leveraging on AI to generate different alternatives for each firm related to platform thinking, with the goal of identifying future directions. The multiple case study, developed relying on a three layers coding system and a structured database, ensures findings' reliability and the efficient retrieval of information. Study's conclusions and results are related to the deployment of Transactional Platforms, Innovation Platforms, Orthogonal Platforms CaaS (Client as a Source), and Orthogonal Platforms CaaT (Client as a Target) into subclusters, demonstrating how these types of business models are macro-categories containing different clusters and they are related to innovation.

These findings partially answer the research questions by providing different options through which incumbents can manage the transition. Furthermore, the research investigates the determinants that these new entities have in common to distinguish them from linear businesses and what could be the sources of overlap between the two streams. Therefore, it contributes to the field of business model innovation by clarifying how to develop a platform-based business model in terms of innovation and highlighting the sources of overlap with a linear model, setting the stage for management to drive their organization into the future.

Finally, the thesis concludes by investigating the role of AI and the conditions necessary for its successful adoption in the field to maximize the associated benefits.

**Keywords:** Platform Thinking, Business Model Innovation, Artificial Intelligence, Incumbents

## ABSTRACT IN LINGUA ITALIANA

Questa tesi esamina come le aziende consolidate possano reinventare i modelli di business lineari integrando l'Intelligenza Artificiale al fine di sviluppare modelli a piattaforma per affrontare la crescente necessità di cambiamento e garantire la sostenibilità dell'organizzazione.

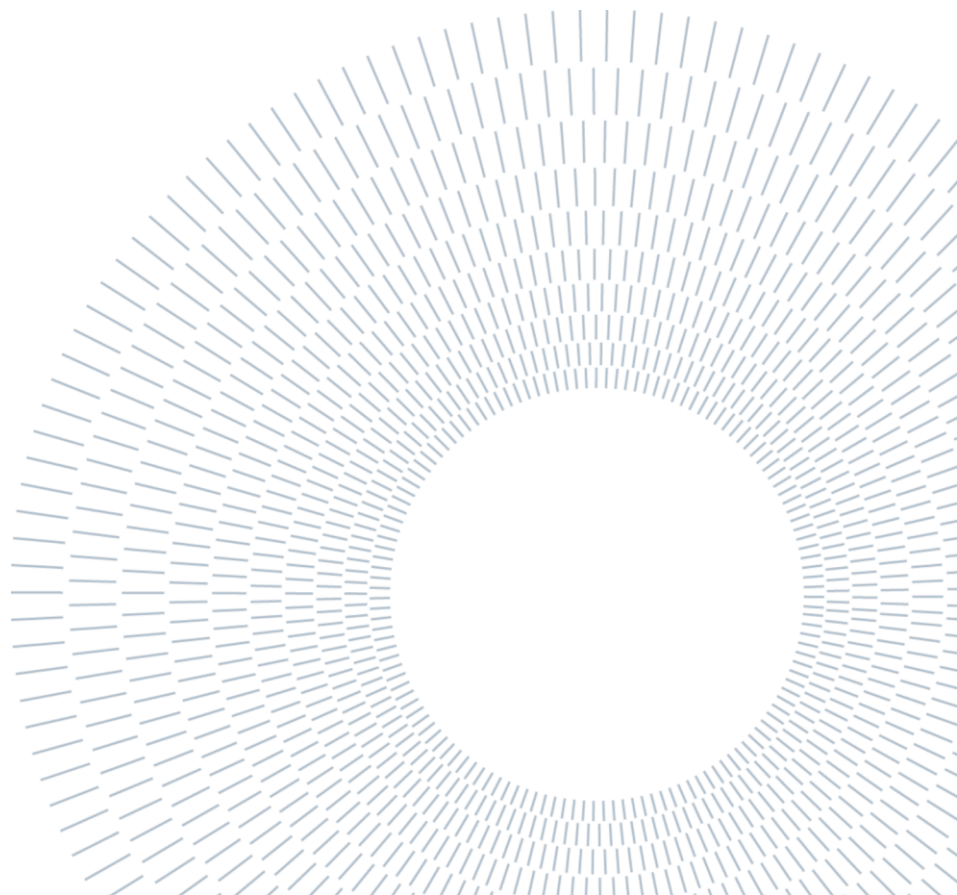
A livello teorico, questa ricerca contribuisce a due aree di ricerca: il pensiero basato su piattaforme (Platform Thinking) e l'innovazione dei modelli di business. Lo studio propone una segmentazione più dettagliata delle principali tipologie di piattaforme. Per quanto riguarda l'innovazione dei modelli di business, evidenzia come l'AI possa essere adottata per innescare il processo e delinea le principali implicazioni che devono essere considerate nell'interazione con questa tecnologia. Inoltre, vengono esaminati i fattori distintivi di un modello multisided platform rispetto ai modelli lineari, evidenziando somiglianze e differenze che arricchiscono la comprensione dell'argomento e sostengono il processo di innovazione del modello di business.

I casi sono selezionati dal ranking S&P 500, sfruttando l'intelligenza artificiale per generare diverse alternative per ogni azienda relative al platform thinking, con l'obiettivo di identificare direzioni future. Il multiple case study, sviluppato affidandosi a un sistema di codifica a tre livelli e a un database strutturato, garantisce l'affidabilità dei risultati e il recupero efficiente delle fonti. In particolare, partendo da Transactional Platforms, Innovation Platforms, Orthogonal Platforms CaaS (Client as a Source), e Orthogonal Platforms CaaT (Client as a Target) vengono identificati vari sottogruppi, dimostrando come questi tipi di modelli di business siano macro-categorie contenenti diversi cluster e come questi siano connessi all'innovazione.

Questi risultati rispondono parzialmente alla domanda di ricerca fornendo diverse opzioni attraverso cui le aziende consolidate possono gestire la transizione. Inoltre, questo studio analizza i fattori comuni tra queste nuove entità e le imprese lineari, al fine di identificare elementi caratterizzanti e distintivi. Nel campo dell'innovazione del business model, chiarifico come sviluppare un modello a piattaforma sia in termini di innovazione, sia evidenziando le fonti di sovrapposizione con un modello lineare.

Infine, la tesi si conclude analizzando il ruolo dell'intelligenza artificiale e le condizioni necessarie per la sua adozione nel campo della business model innovation, al fine di massimizzare i benefici associati e riconoscere i suggerimenti non corretti.

**ABSTRACT IN LINGUA ITALIANA**





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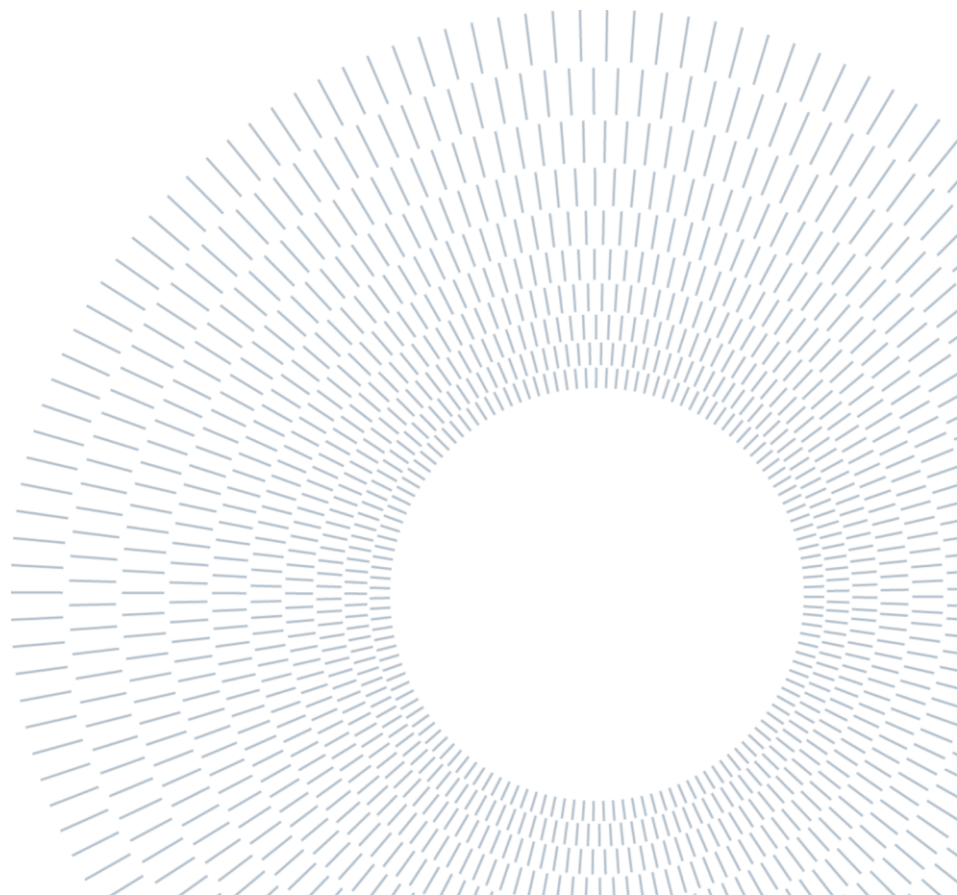


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# INTRODUCTION

## 1. INTRODUCTION

To understand the relevance of this research for both practitioners —professionals who actively engage in a particular occupation, applying their knowledge in practical settings to solve problems and improve outcomes— and researchers involved in the academic field, it is important to start from the analysis of the current landscape.

The median age of companies in the Standard & Poor's top 10 has declined from 85 to 33 years between 2010 and 2018, indicating that long-established firms are encountering significant challenges in maintaining their market dominance (Hillenbrand, et al., 2019). Many venerable firms struggle to achieve organic growth, while younger companies are proving to be more competitive and outpacing their older counterparts.

**Organic growth has eluded many long-standing companies, and younger companies are outperforming these more established players.**

**The speed of disruption is accelerating ...**



**... causing a steady decrease in the tenure of S&P 500-listed companies**

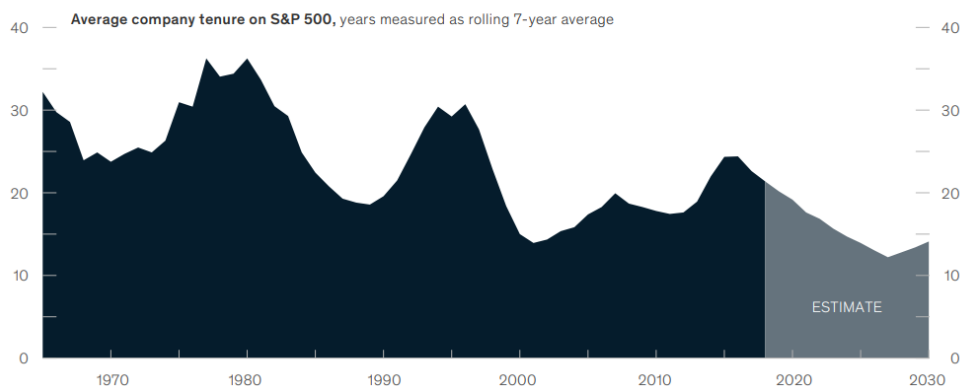


Figure 1.1: Long standing VS Younger companies (Hillenbrand, et al., 2019)

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Moreover, as illustrated by McKinsey research (Bughin, et al., 2019), top-performing companies across various industries allocate their capital evenly, striking a balance between transforming their core businesses and cultivating new ventures.

These data underscore the growing importance of **business model innovation** for survival, particularly for incumbent firms that are simultaneously struggling with competition from younger agile companies and dealing with internal rigidity that stems from established routines and past decisions that are challenging to reverse (Cunha, et al., 2019).

Besides, examples of market disruption, as highlighted by the cases of Uber and Airbnb (Geissinger, et al., 2020), illustrate the impact of **platform**-based business models. These platforms are not only establishing new markets, but they are also reshaping numerous traditional industries, extracting value from participants in innovative ways. Their reach and influence are remarkable: at the end of 2022, five major platform companies—Microsoft, Apple, Amazon, Alphabet, and Meta—collectively represented more than 24% of the S&P 500 market capitalization, underscoring the dominance of this business model in the global economy (Guo, et al., 2020).

As a consequence, the Platform Thinking framework was developed to offer substantial guidance for established firms (Trabucchi, et al., 2023) that struggle to address the increasing need for flexibility and adaptability. This framework delineates how businesses, traditionally based on a linear value chain, can transition towards a more intricate, two (multi)-sided business models, leveraging on their existing resources, assets, and relationships to adapt their configuration to the market demand.

Finally, these concepts are connected with **Artificial Intelligence**. This industry is experiencing rapid growth, with its market size projected to expand from \$86.9 billion in 2022 to \$407 billion by 2027. This growth signifies its increasing integration into the economy, which is expected to contribute to a 21% net increase in the United States GDP by 2030 (Haan, et al., 2023). The growing trend of adoption, along with the future direction envisioned by nearly every firm, underscores the potential of AI technology to disrupt several industries. (Girasa, 2020).

For both practitioners and scholars, this research can be useful as it integrates the concepts of platform thinking for established firms, emphasizing the need for business model innovation to ensure long-term sustainability and to manage the escalating competition from both incumbents and new entrants. In facilitating this transition, management can capitalize on the potential of AI as a supportive tool, guiding the organization towards its new configuration. As consequence, this study can represent a baseline to understand how incumbents can innovate their business model towards a platform-based configuration through the support of AI.

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The final part of this Introduction [Chapter 1] is dedicated to explaining the structure of the research and exploring the topics presented in each section.

The Literature Review [Chapter 2] provides a comprehensive and interconnected exploration of business models, platform dynamics, and the influence of artificial intelligence on innovation. It begins with a foundational overview of business models, highlighting their core concepts, structures, and dimensions through the lens of the Business Model Canvas and its role in creating competitive advantages. Subsequently, the focus shifts to the transformative dimension driven by business model innovation, especially under the influence of technologies like Artificial Intelligence. This transition leads into an exploration of platform-based business models, dissecting various types such as internal, industry-wide, and multi-sided platforms, and culminates in a comprehensive overview. The narrative then delves into Platform Thinking, a crucial concept for established firms adapting from linear to platform-based models, offering strategies for strategic innovation during this transition. The chapter concludes by identifying gaps in the literature and articulating the research question.

The Research Methodology chapter [Chapter 3] shifts focus to the underlying research approach. It begins by introducing the chosen qualitative research design, detailing the rationale behind selecting a multiple case study methodology. This chapter breaks down the research process into discrete steps – from setting the problem and defining objectives to data collection and analysis – providing a clear roadmap for the research journey. The chapter then presents the theoretical frameworks underpinning the analysis, introducing the criteria adopted to select cases from the S&P 500 and the coding system based on three layers. Furthermore, it highlights how alternatives are generated and the process that leads to answers to the research question in terms of available alternatives and business model innovation. The Research Methodology concludes with a section on evaluation and assessment, presenting the criteria used to evaluate the results.

The Results section [Chapter 4] of the research is structured into three distinct layers, each examining different aspects of the research topic. The first layer focuses on platform dynamics, analysing how various alternatives are distributed among platforms, digital services, and other options. The second layer delves into category analysis. Here, the results of the previous tier are broken down into distinct categories, allowing for a more granular understanding of the findings and providing elements of novelty to the literature about platforms. Finally, the third layer takes a closer look at sectors or services, highlighting how different sectors leverage platforms and new business models to drive innovation.

The Discussion section [Chapter 5] in the document synthesizes the research findings, weaving together their theoretical and practical implications. It begins by investigating the concept of platforms, consolidating the knowledge of the topic and the differences

## INTRODUCTION

from linear business but also highlighting their transformative impact on the modern business landscape. The second part shifts the focus to the interplay between platforms and innovation. It explores how platforms act as catalysts for innovation, facilitating new forms of value creation and market disruption. Finally, the third part addresses the role of artificial intelligence in this ecosystem, critically examining how AI can be adopted as a driving force to reshape the landscape of platforms and innovation.

The Conclusions section [Chapter 6] of the document provides a comprehensive summary of the key findings and their broader implications. It starts with a section on the theoretical contributions, emphasizing how the research enhances the existing knowledge on platforms (especially through the second layer of the coding system), business model innovation (demonstrating how platforms contribute to various streams), and the role of AI (identifying critical conditions for its use). The chapter then shifts to discussing the practical implications, focusing on how the findings can be applied in real-world business scenarios, and offering guidance for practitioners. It concludes by presenting the limitations of the study and suggesting avenues for future research, indicating how the results could be validated and expanded upon.

# 2. LITERATURE REVIEW

## 2.1 BUSINESS MODEL

### 2.1.1 Business Model Introduction

Nowadays, the Business Model is considered a fundamental instrument in the field of management as it supports managers and entrepreneurs in making important strategic decisions. The Business Model of a firm represents a significant source of competitiveness, defining the company's strategy, its positioning in the market relative to competitors and uncertainty, as well as the structure of the organization.

Indeed, considering in today's rapidly evolving landscape the linear relationship between wait time expectations and customer satisfaction, where waiting shorter than expected always increases satisfaction, and waiting longer than expected always decreases it (Maister, 1984), the transformation is no longer a luxury but a necessity for businesses to remain competitive and relevant. In this scenario, Business model innovation offers a potential approach to deliver the required change through re-conceptualising the purpose of the firm and the value creating logic, and rethinking perceptions of value.

**Business Model Innovation** represents the art of enhancing advantage and value creation by making simultaneous changes both to an organization's value proposition to customers and to its underlying operating model (Boston-Consulting-Group, 2023). The definition highlights how changing the business model has an impact on both the internal structure and on how the firm deals with stakeholders, demonstrating the potential effects that this strategic decision could have on firm performance, such as increased efficiency, organizational capabilities, and revenue growth (Mohammad-Ali, et al., 2021).

This chapter will propose a comprehensive overview of the related literature, useful to highlight the relevant aspects in the research topic and how it is central in determining the success of some firms. Therefore, the following section will explore:

- The Business Model Concept
- A Common Structure: The Business Model Canvas
- Competitive Advantage



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- Business Model Dimensions
- Business Model Innovation
- The Impact of Artificial Intelligence on Business Model Innovation
- How To Capture a Higher Value: Platform

### 2.1.2 The Business Model Concept

The evolution of the business model concept over time can be traced back with the term being initially coined during the 1957 (Osterwalder, et al., 2005).

In the following years, the notion has been consistently adopted in the context of information technology, primarily utilized as an operative activity for the process of system modelling (Bernd, et al., 2016). As technology progressed and digital business started to gain “momentum”, the concept evolved from being solely an operational strategy to a comprehensive representation of a company’s organization. As a result of this transformation, the business model has emerged as a prominent conceptual tool for aligning business strategy with processes, serving as an intermediary theoretical layer that contributes to a company’s success by informing the decision-making process (Al-Debi, et al., 2008).

To confirm the significance of the subject, from 1995 to 2011 there have been at least 1,177 articles published in peer-reviewed academic journals in which the notion of a business model is addressed (Zott, et al., 2011).

As presented in the article: “Business Models: Origin, Development and Future Research Perspectives” (Bernd, et al., 2016), the technology was the primary perspective linked to research until early 2000s. However, since 2005, organization theory and strategy dimensions have increasingly gained significance in the field, highlighting how studies, publications and practical implications have evolved over time, ranging from technology to organization and strategy (Figure 2.1: Evolution of the Business Model Concept).**Error! Reference source not found.**

## LITERATURE REVIEW

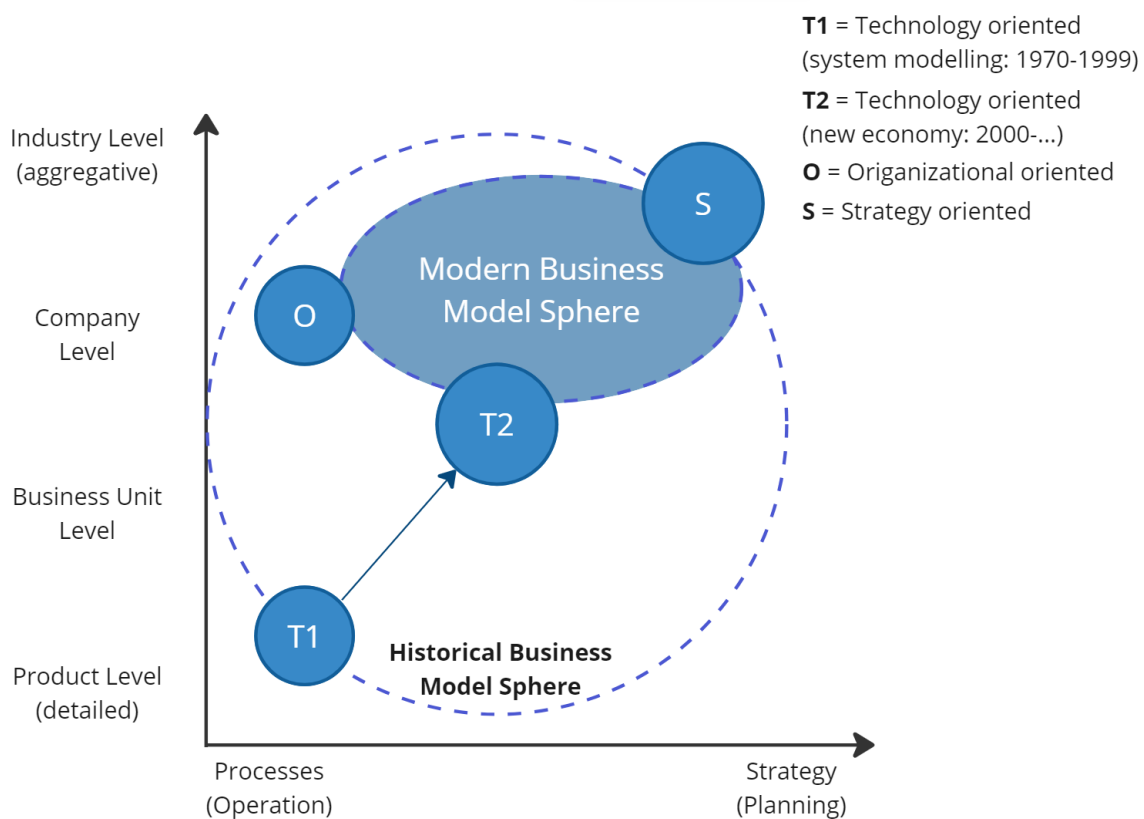


Figure 2.1: Evolution of the Business Model Concept (Bernd, et al., 2016)

As the concept has matured over time, the evolution of the term “business model” has attracted significant attention in various studies. These investigations have uncovered the diverse range of definitions associated with this term.

In particular, a trend toward a more holistic perspective has emerged, emphasizing the significance of value creation, delivery, and capture within the business model, along with the interconnectedness of activities both inside and outside the firm (Table 2.1: Business Model Definitions).

Starting from the 1990s, scholars have been attempting to define the term “business model”. Initially, the focus was primarily on an economic perspective that considered how the products or services offered by a company could benefit or affect stakeholders, with the ultimate goal of maximizing profits (Timmers, 1998).

In 2001, Gary Hamel, a business thought leader, was one of the first to shift the focus from a single product/service family to the overall firm. In an interview conducted to present his book “Leading the Revolution” (Hamel, 2001), he emphasized that the business model represents the architecture required to create and deliver value to stakeholders, which is the core element of the concept.

In 2002, Joan Magretta in the publication “Why business models matter” remarks the central role of the **value proposition** and highlights that a good business model should

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remains essential to every successful organization, whether it is a new venture or an established player (Magretta, 2002). Therefore, it should include those processes and resource that truly generate value, serving as the key drivers of success.

The real step further in the definition of the business model was proposed by Osterwalder & Pigneur in 2010 (Osterwalder, et al., 2010) with the publication of: *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*.

Collecting the contributions of 470 practitioners, the authors realized that the economic perspective was insufficient. Therefore, they offered a new definition for the business model concept, emphasizing the importance of a holistic approach that encompasses all aspects of the business:

*A business model describes the rationale of how an organization creates, delivers, and captures value.*

Their contributions indicated a shift away from just focusing on financial aspects, initiating a line of research where the economic perspective was enhanced and complemented by three logics related to value.

Hence, the traditional perspective on business models, primarily centered on profit generation, has evolved to encompass a wider array of dimensions oriented toward creating, delivering, and capturing value: three complementary and interdependent elements centered around the customer experience.

In particular, they enhance:

- **Value Creation:** in a business context, creating value means providing something that customers perceive as valuable and are willing to pay for. This could be a product or service that meets their needs or solves their problems in a better than existing alternatives.
- **Value Delivery:** once the firm has created a valuable outcome, it needs to transfer the value towards its customer. The process of delivery involves identifying the most effective and efficient methods for getting products or services to customers in a way that satisfies their needs and expectations.
- **Value Capture:** finally, the organization needs to establish a set of processes that generate revenue from the value created by the business. Practically speaking, monetizing the value created by the business model and converting it into financial returns.

Advancing in the timeline, during the same year David J. Teece published an article entitled: "Business models, business strategy and innovation" (Teece, 2010) in which the business model was defined as a dynamic system of interdependent elements, highlighting the structural dimension of the tool.

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Having introduced a framework to represent the tool added clarity and organization to a company's operations, ensuring that the business model aligned seamlessly with the organization's broader goals. The systematic design supported effective decision-making, empowering leaders to evaluate how changes affected various elements and identify areas where the company could stand out in the market.

Furthermore, David J. Teece's contributions supported the establishment of key performance indicators (KPIs) for each component, simplifying the measurement and evaluation of various aspects of the business.

Hence, following the evolution of the organizations, in the years later the concept was developed further going beyond the boundaries of the firm (Gassmann, et al., 2014). In fact, as firms have understood the relevance of a pluralistic approach to their stakeholders beyond their focus on shareholders, along with the rise of the sustainability and environmental perspective over the purely economic one, described in the triple bottom line framework (Elkington, 2013), the business model has been adapted. It became a supporting tool that helps the firm define the mechanisms needed to achieve both internal and external goals. These goals are no longer just focused on profit, but they are ultimately oriented towards improving the quality of society as a whole.

The evolution of customer preferences reveals that for-profit organizations face a competitive disadvantage compared to those that prioritize societal well-being (Abzug, et al., 1999). As a survey conducted by Cone Communications revealed, the 87% of consumers are more likely to purchase a product from a company that supports social or environmental issues they care about, and 76% will refuse to buy a product if they discover a company supports an issue contrary to their beliefs (Cone-Communications, 2017). This trend shows how customers are increasingly seeking out businesses that demonstrate a commitment to social and environmental sustainability, generating a challenge for purely for-profit organizations, as they may be perceived as being solely motivated by profit and not by a broader purpose.

In conclusion, over the years, thanks to the different perspectives of analysis that contribute to the literature, it can be stated that an increasingly converging view or a similar conceptual understanding in the about the business model concept and its purpose has been established (Bernd, et al., 2016).

With the objective of supporting businesses to navigate an increasingly complex and dynamic marketplace, the evolution of the framework underscores the significance of adopting a comprehensive and holistic perspective on the firm. Such approach transcends mere process optimization, technological advancements, or the singular value creation process, becoming the foundation in addressing the evolving needs and objectives of organizations across diverse internal and external domains.

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Definition	Reference
A business model is an architecture for the product, service, and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of the sources of revenues.	(Timmers, 1998)
A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams.	(Hamel, 2001)
A business model is a framework for how a firm will create value and make money within the context of the marketplace and available resources.	(Chesbrough, et al., 2002)
A business model answers the question of how a company makes money. It is an integrated set of choices that form a coherent whole. It describes the customer value proposition, the profit formula, and the key resources and processes needed to deliver that value proposition and achieve the desired profits.	(Magretta, 2002)
A business model is the system of activities, including resources and processes, that creates and captures value through the fulfilment of a set of customer needs.	(Casadesus-Masanell, et al., 2010)
A business model describes the rationale of how an organization creates, delivers, and captures value.	(Osterwalder, et al., 2010)
A business model is a dynamic system of interdependent elements, which are conceptual and/or empirical, that describes and explains the nature and logic of a firm's value proposition, organization, strategies, operations, and outcomes in creating and sustaining long-term competitive advantage.	(Teece, 2010)
A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.	(Zott, et al., 2011).
A business model is a system of interdependent activities that transcends the focal firm and spans its boundaries.	(Gassmann, et al., 2014)

Table 2.1: Business Model Definitions

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## 2.1.3 A Common Structure: The Business Model Canvas

*A shared language for describing, visualizing, and changing business models.*

Considering the business model as the representation for how an organization creates, delivers, and captures value (Osterwalder, et al., 2010), it is crucial to translate this theoretical concept into a practical tool that helps entrepreneurs, business owners, managers and practitioners to visualize, design, and analyse their business.

In 2005 Alexander Osterwalder proposed for the first time *The Business Model Canvas*: a strategic management template utilized with the purpose of developing new business models and documenting existing ones (Barquet, et al., 2011).

The Business Model Canvas is a one-page framework (Figure 2.2: The Business Model Canvas), consisting of nine building blocks, that captures the essential elements of a business. The **value proposition** is located at the centre and serves as a starting point to identify potential areas for improvement, evaluate new opportunities, and communicate the business model to stakeholders.

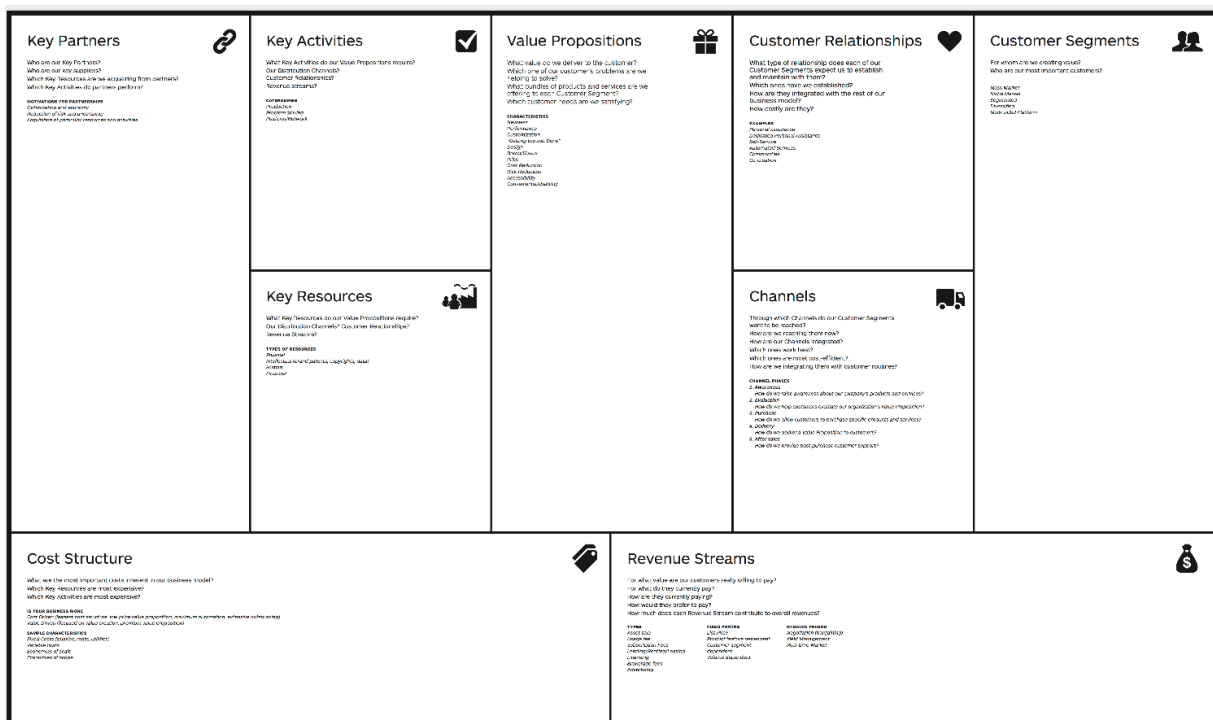


Figure 2.2: The Business Model Canvas

The 9 building blocks, as described in the “Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers” (Osterwalder, et al., 2010) are represented by:

1. **Customer Segments (CS):** different groups of people or organizations for whom an enterprise is creating value.

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2. **Value Propositions (VP):** bundle of products and services that create value for a specific Customer Segment. The Value Proposition solves a specific problem, satisfies a customer need, benefits the stakeholders providing a unique reason why customers select a firm over another.
3. **Channels (CH):** how the firm reaches its Customer Segment to deliver a Value proposition. Channels are touchpoints through which the firm communicates, distributes, and sets a contact with its customers.
4. **Customer Relationships (CR):** types of interactions and collaborations a company establishes with each Customer Segment.
5. **Revenue Streams (R\$):** cash inflow generated from each Customer Segment. Revenues streams represent the different ways through which the firm transfers value to its customers in exchange for a form of payment that could be generated from several mechanisms.
6. **Key Resources (KR):** most important assets exploited to create and deliver the Value Proposition.
7. **Key Activities (KA):** fundamental actions taken to have success and run the business model.
8. **Key Partners (KP):** network of suppliers and partners which enable to the firm to optimize its business model, reduce the risk, and acquire resources.
9. **Cost Structure (C\$):** main costs inherent to the business model.

As it emerges from the description, *The Business Model Canvas* is a powerful framework which emphasizes the interconnections between the different components of a business model. By analysing how each element relates to the others, it emerges how a choice in one area may impact other domains, providing the right insights to make more informed decisions about how to optimize the overall strategy.

The structure of the tool allows for the establishment of an organized decision-making process, where the decision-maker has the opportunity to assess the impacts of a strategic move and better evaluate potential opportunities and threats that could affect the outcome by identifying the critical areas specific to the choice.

Therefore, the model provides a big-picture perspective, highlighting how a company creates (left side), delivers (right side), and captures value (bottom elements). It promotes a holistic view that can be particularly valuable for those businesses looking to adapt and refine their business models in response to changing market conditions or customer needs.

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### 2.1.4 Competitive Advantage

The concept of competitive advantage represents the differential between two competitors on any possible dimension that allows one to better create customer value than the other (Ma, 2000).

This definition finds its roots on the book written by Michael Porter in 1985 (Porter, 1985) where the author provides a comprehensive analysis of how companies can achieve and sustain a competitive advantage in their industries through either cost leadership or differentiation, and discusses the different strategies and tactics to pursue these goals.

Porter explored the role of technology in creating a competitive advantage and discussed the challenges that companies faced in managing it. Furthermore, he emphasized the importance of understanding the industry structure and the role of stakeholders in the success of a firm, provided a framework for analysing these forces, and suggested strategies for competing effectively against them.

Recently, researchers have suggested that companies need not spend relatively less time, resources, and energy in the development of new products and services because they are bound to be imitated (Bashir, et al., 2017). Instead, business model innovation can establish a sustainable competitive edge since replicating an entirely new system is significantly more challenging for competitors than imitating a product or service. According to a study by IBM in 2006 based on interviews with 765 CEOs across geographies and industries (IBM, 2006), the more profitable companies put twice the focus on business model innovation (Figure 2.3: Innovation Type Selections for Out and Under Performers).

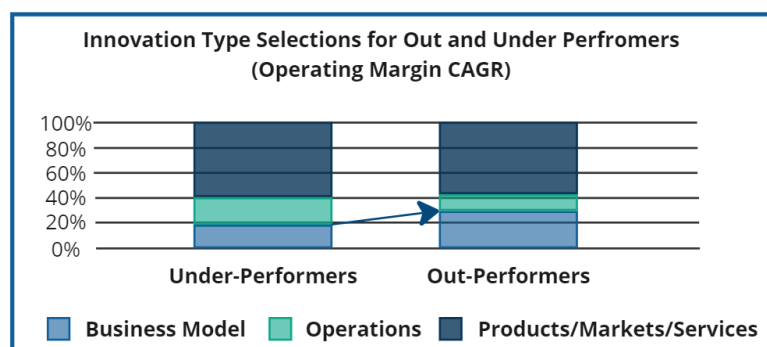


Figure 2.3: Innovation Type Selections for Out and Under Performers

In 2012, a similar survey was conducted, which highlighted that executive favoured business model innovation as a source of competitive advantage over product innovation (Economist-Intelligence-Unit, 2012).

Hence, to achieve a competitive advantage over time, companies must develop, implement a **sustainable business model** (Nidumolu, et al., 2009), namely, a business



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models that incorporate pro-active multi-stakeholder management, the creation of monetary and non-monetary value for a broad range of stakeholders, and hold a long-term perspective (Geissdoerfer, et al., 2018).

This definition highlights and emphasizes the robust aspects of the business model, including its multistakeholder perspective, holistic view of firms, and both internal and external focus (

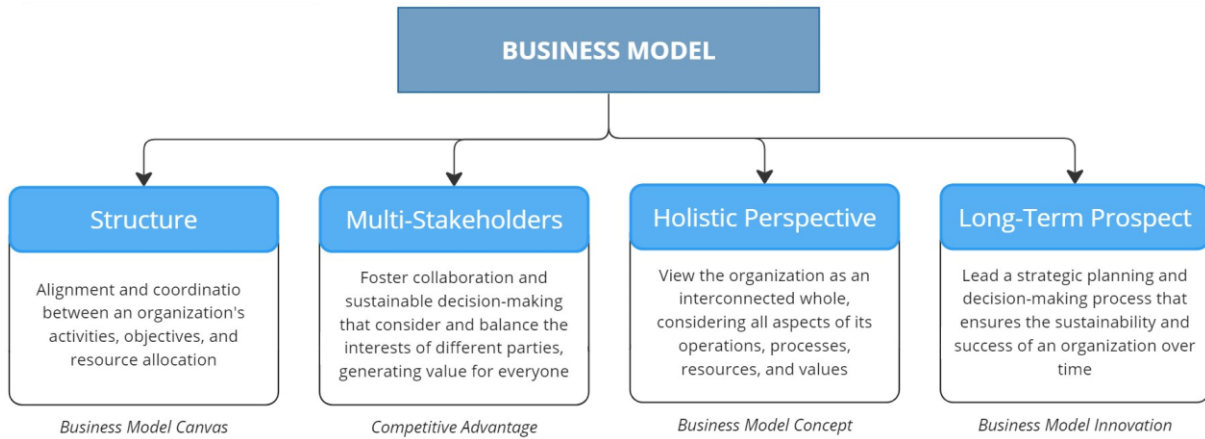


Figure 2.4: Business Model Features).

Furthermore, it introduces another fundamental dimension: the long-term perspective. This requires the capability to adapt to external environmental and technological changes while consistently improving the value proposition, with a central focus on customers and stakeholders.

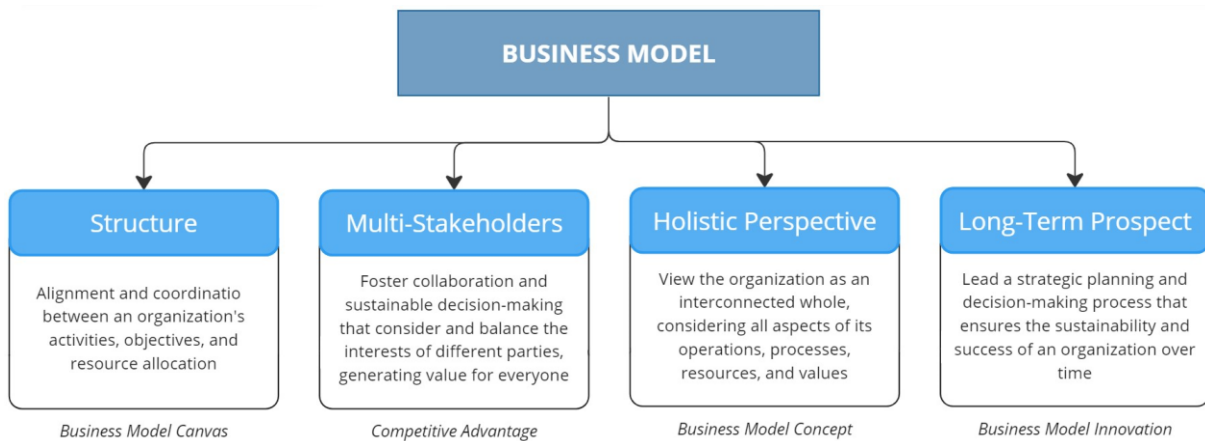


Figure 2.4: Business Model Features

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### 2.1.5 Business Model Dimensions

The complexity of the external environment, coupled with continual changes in various internal factors such as organization, people, processes, and technology, has led to the emergence of numerous business models over time. However, only those that have proven their effectiveness in the market have managed to survive.

As the definition suggests, business models can vary along multiple dimensions, with a primary focus distributed among three key aspects: value creation, value delivery, and value capture.

#### Value Creation

The first differential factor that determines if a firm is reaching a superior performance compared to others is associated with its ability to leverage on key activities, resources, and partners to create value for the final customers (Osterwalder, et al., 2010).

By relying on a structured decision-making process, companies can gain a competitive advantage determining which business activities to keep in-house (integration) and which ones to outsource to third-party providers (strategic outsourcing). Balancing vertical integration and outsourcing (Rothaermel, et al., 2006) depends on several factors, such as: company's core competencies, availability and cost of external providers, characteristics of product/service realized, level of control required, and the degree of risk that a firm accept.

Making the decision of balancing vertical integration and strategic outsourcing is not a binary choice, nor the two alternatives are mutually exclusive. A company must determine its position on a continuous spectrum by analysing the value-added activities – any action taken to increase the benefit of a good or service to a customer – that should be kept, and those operations that should be eliminated because classified as waste (Sundar, et al., 2014).

From the first category of VA activities, the company must decide which activities to keep in-house and which ones to outsource, in order to focus on the core elements of its business. Even in this case, this decision is not black and white: a company can opt for Taper integration, which implies that some activities are pursued in a parallel manner, both in-house and in outsourcing (Harrigan, 1984). Making the right choice between make or buy helps in optimizing the firm's portfolio, contributing to the establishment of a competitive advantage and thereby increasing the final performance (Sundar, et al., 2014).

Over time, the market determines the best practice of the value creation mechanisms, highlighting which were the best business model according to the features of the firm and the product. In this view, different alternatives emerge, ranging from the economies of scale and the long tail business model (Anderson, 2006), where firms focus on offering a large number of niche products, each of which sells relatively

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infrequently, to the mechanisms of franchising, in which a company (the franchisor) grants the right to use its brand name, products, and processes to another individual or company (the franchisee) in exchange for a fee or royalty (Gillis, et al., 2012).

In both scenarios, the company leverages one or more significant resources, such as competencies, internal operations, or partnerships, to fortify its market positioning and establish a lasting competitive advantage over its competitors.

Finally, once the organization generates a valuable outcome, it should be able to transfer the advantages to customers, namely by fostering value delivery.

### Value Delivery

The second source of differentiation is represented by the ability of a firm to deliver the value created to its customers.

Self-determination theory is a psychological framework that explains the different types of motivation that can drive human behaviour (Ryan, et al., 2020). According to this theory, intrinsic motivation describes the internal driver to engage in an activity for its own sake, while extrinsic motivation is prompted by external factors like rewards or punishments. Intrinsic factors refer to the inherent value of an object regardless of external evaluation, while extrinsic factors are external to the object under analysis and may include rewards such as money, status, or praise.

Regarding business, once a company realizes a product or service, it possesses both intrinsic and extrinsic values. The intrinsic value lies in its characteristics, performance, and functionality, whereas its extrinsic value is determined by external factors like branding, marketing, packaging, and pricing.

Understanding the difference between these two kinds of values can help companies create effective marketing and positioning strategies for their products or services, increasing the value delivered to customers and the likelihood of success.

To do so, companies should first establish the right segmentation, targeting, and positioning (STP) strategy to reach the right market segments and position themselves in the minds of customers. Then, based on the selected target audience, the firm should determine the appropriate channels to reach its customers and the type of relationship it wishes to establish with them.

Finally, organizations should be able to combine their core products/services with delivery techniques, being able to maximize the overall benefits provided, serve better their customers, and gain a competitive advantage in the market.

The performance of the value delivery process is intricately linked to customers and the firm's capacity to maintain a consistent flow of deliveries. Without customers, a firm has no revenues, no profits and therefore no market value. Thus, customer metrics like CLV (Customer Lifetime Value) – the long-run profitability of an individual

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customer – and CE (Customer Equity) – the combined CVL of all of the firm’s customers – provide a good basis to assess the market value of a firm (Gupta, et al., 2006).

In the absence of a continuous flow of value delivery, organizations encounter challenges in sustaining high levels of engagement and delivering long-term value. Therefore, businesses have developed different models such as Razor-Blade and Bait & Hook whose primary objective is to maximize CLV. By attracting customers with a special offer that generates lower profits, and sometimes even negative, the firm is able to acquire new customers. Once the main purchase is made, which typically incurs high switching costs for the client, it is possible to sell additional complementary products to establish a constant interaction and maximize profits.

Similarly, As-a-Service models shift the value delivery logic from a single and static transaction to a continuous exchange between customers and the firm. In this model, customers pay a periodic subscription to access the service, while the firm continuously improves the service offered with updates and releases of new features.

Despite of that, developing new and innovative ways of delivering value to customers is not enough. To ensure the sustainability of these models, firms must also focus on capturing the value they create. This can involve implementing pricing strategies, as well as identifying and addressing any potential cost drivers or inefficiencies in the value chain.

### Value Capture

The financial performance of a firm depends on what the firm does and its ability to convert the value generated into an economic return. The latter aspect is related to the firm’s ability to capture the value which is transferred to customers, influencing their behaviour and increasing their willingness to purchase the product or service offered (Figure 2.5: Framework for Customer Metrics and Their Impact on Firms’ Financial Performance ).

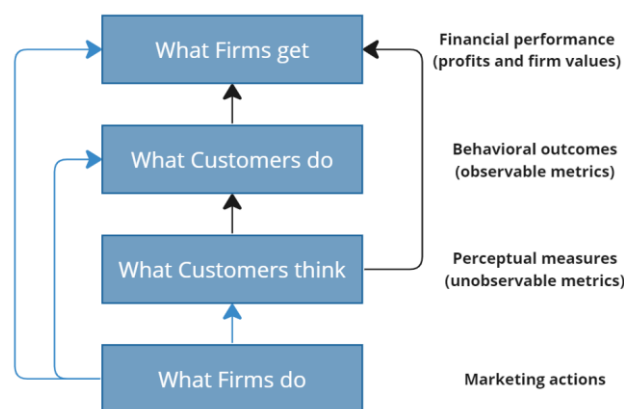


Figure 2.5: Framework for Customer Metrics and Their Impact on Firms’ Financial Performance (Gupta, et al., 2006)

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To foster behaviours such as the purchase or consumption of a product or service (observable measures), the firm needs to translate customer perceptions, attitudes, and behavioural intentions (unobservable constructs) into decisions, and offer its customers the right means to engage with the product or service.

With this goal in mind, firms are continually exploring innovative methods to capture value and enhance financial performance. The array of available value-capturing mechanisms is vast, encompassing classical rent and pay-per-use models, as well as approaches such as advertising and free-based models.

The *freemium model* offers a product or service for free but charges for premium features or additional services. This model is commonly used in the technology industry, where users can access a basic version of a product for free and upgrade to a premium version for additional functionality.

*Subscription-based* models, which involve charging customers a recurring fee for access to a product or service over a specified period of time, have become increasingly popular in industries such as media and entertainment.

*Leasing*, in which a lessor allows a lessee to use an asset in exchange for regular payments and, at the end of the lease period, the lessee may also have the option to redeem the asset is commonly used for cars, equipment, and property.

Overall, each firm should set the right value capturing mechanism and evaluate their effectiveness in generating revenue. By understanding the strengths and weaknesses of each one, and analysing the kind of product offered, firms can make informed decisions about which approach is best suited to their business and customer needs.

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### 2.1.6 Business Model Innovation

As it was mentioned in the introduction, Business Model Innovation refers to the process of creating, adapting, or reconfiguring the fundamental structures and strategies by which an organization operates, generates value, and captures profits (Massa, et al., 2013). It represents the practice of understanding and facilitating the transformations from one business model to another, enhancing an organization's resilience in a dynamic environment and establishing a sustainable competitive advantage (Mitchell, et al., 2003).

The concept of business model innovation is not a recent development. In 2006, IBM generated over \$90 billion in revenue, with more than half of this income originating from IBM Global Services—a business that had not even existed 15 years prior (Chesbrough, 2007). This phenomenon finds its foundations in the uncertainty associated with future returns on investments. In fact, solely innovating products, services, and processes is insufficient to survive and ensure long-term sustainability.

On the other hand, business model innovation is an expensive and time-consuming process that requires a significant upfront investment in every component, ranging from R&D to new equipment, and even entire new business units with their respective management and resources (Amit, et al., 2012). The reason why firms, especially incumbents, should pursue this direction lies in the concept of the success paradox

#### Understanding Failure Statistics: The Success Paradox

The **success paradox** refers to the situation where successful incumbents often experience rapid and unexpected failure or disappearance. Hesitant to make substantial investments, many companies are increasingly exploring business model innovation as an alternative or complement to product or process innovation. Designing and developing a valuable business model is an essential prerequisite for a firm to establish a successful market position. However, it does not guarantee immediate or sustained success. It is a matter of timing.

**Timing** refers to the selection of the most appropriate moment or period for taking action or carrying out a particular activity. It involves evaluating the circumstances, conditions, and opportunities to choose the optimal time to start or execute something.

The dynamic and competitive nature of the market requires continuous efforts to adapt, innovate, and respond to changing customer needs. Even with a well-designed business model, companies must continuously evaluate and improve their strategies, offerings, and value proposition to maintain a competitive advantage and secure long-term success in the market.

Since 1965, the average company lifespan of Standard & Poor's 500 firms, which refers to the time period between a company's establishment and its closure or cessation of operations, has decreased from over 30 years to slightly above 15 years (Clark, 2021),

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demonstrating an elevated difficulty of sustaining a superior market position over time.

Furthermore, analysing the composition of the Fortune Global 500 ranking from 1995 to 2022 (Table 2.2: Fortune - Global 500 evolution over time) it becomes evident that the majority of past leaders were unable to sustain their market position. In fact, 87% of the companies that held a leadership position in 1995 are no longer part of the top 500 in 2022, underscoring their inability to adapt to the evolving competitive landscape and changing customer demands.

	2015	2005	1995
<b>Firms in 2022 Ranking</b>	60%	16%	13%

Table 2.2: Fortune - Global 500 evolution over time

This phenomenon, known as the success paradox, emphasizes that factors or strategies that initially led to success can eventually become obstacles or constraints as circumstances evolve. In other words, as organizational members converge on a decision path (Cunha, et al., 2019), “strong performance promotes a defensive mindset that may lead to dysfunctional outcomes” (Amason, et al., 2008).

The success paradox typically arises from factors such as complacency, resistance to change, or an inability to adapt to a shifting business environment, highlighting the need for continuous learning, adaptability, and a willingness to evolve to sustain a competitive position.

In the field of innovation literature and theories on leadership effectiveness (Howell, et al., 1993), top managers are often portrayed as innate leaders capable of exerting significant positive influence on innovation, and increasing organization’s chances for survival and growth (Elenkov, et al., 2005). Besides, organizational ecology theory (Hannan, et al., 1977) suggests that environmental forces drive the evolution of firms, and populations of organizations survive or fail regardless of the actions taken by managers (Figure 2.6: Determinants of TM Innovation).

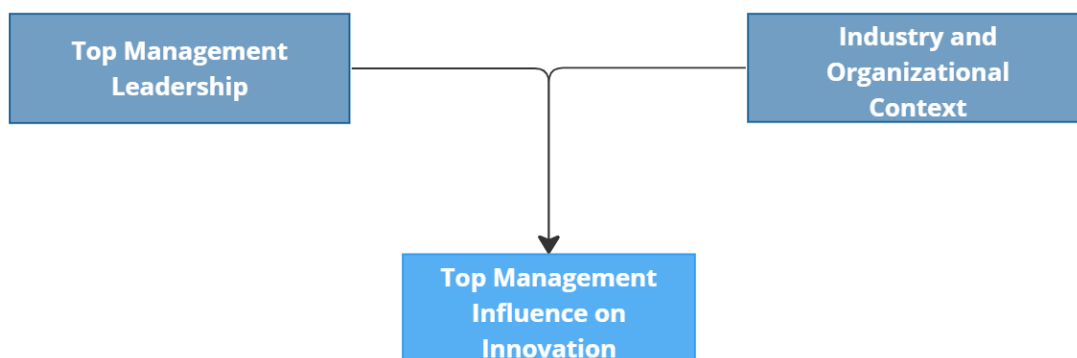


Figure 2.6: Determinants of TM Innovation

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The analysis conducted by Elenkov and Manev in “Top Management Leadership and Influence on Innovation: The Role of Sociocultural Context” (Elenkov, et al., 2005) reveals that leadership variables explained nearly half of the variance in top management influence on innovations:  $\Delta R^2 = 0.47$  for product/market and  $\Delta R^2 = 0.48$  for organizational innovations, highlighting the significance of a strong commitment coming from the highest levels of management.

Combining this result with Paradox Theory and Business Model Innovation yields an interesting insight: to achieve success and ensure the long-term sustainability of the firm, there is a need for innovation across the entire organization. This practice should be promoted and sustained starting from the highest levels of the hierarchy to be most effective—specifically, by individuals who possess a holistic view of the entire company and the ability to assess the impact of changes in the business model. Furthermore, because of its nature, fostering an innovation culture is essential. This encourages everyone to contribute with ideas, questions, and challenges, allowing the exploration of various alternatives and scenarios.

### Forces To Change the Business Model

As evident from the previous statistics, the decision to maintain the status quo becomes unsustainable over time, even for incumbents who hold leadership positions in their respective industries. Hence, in order to ensure long-term sustainability, firms need to be adaptive and learn how to invent radically new business concepts and models to create value (Hamel, 2001).

So far, it was described the importance of commitment from top-level management in establishing and fostering an innovation culture within the organization. However, drivers to change that lead to a redesign of a business model can be classified into two main areas:

- **Internal drivers:** factors such as ethics, shared values among employees, cost savings, profitability, growth, leadership, and quality are just a few examples of how the transformation process can be driven by factors originating within an organization.
- **External drivers:** external forces originating outside the organization exert pressure and influence on the necessity to change the business model. This category includes factors such as corporate brand and reputation, market expectations, trust, benchmarking against competitors, and customer satisfaction. These elements significantly impact the organization as they are influenced by stakeholders and the external business environment.

It is fundamental to recognize that the two categories are interconnected and influenced by the trends of the period — distinct directions of movement that wield the power to shape and influence the future.



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Trends often represent unconscious strategies adopted by consumers to navigate an ever-changing social context, reflecting significant shifts in societal values (Adam, 2019). These dynamics and forces that create global change are classified into three typologies according to their time orientation:

- **Megatrend:** long-term (25–30 years) and wide-ranging transformation processes that shape society and future market. They explain and depict the way the world will evolve.
- **Macrotrend:** medium-term change processes that shape how wants and needs of people will change. They mirror how the technological, social, cultural, and environmental forces affect people lifestyle and behaviour. The time orientation is 10–15 years.
- **Microtrend:** market-related trends which act in a rather short-term (5–8 years).

Considering the primary factors that have been driving business decisions over the past two decades, reshaping the boundaries of numerous industries and altering the power dynamics among market participants, two main megatrends can be identified: Digital Transformation and ESG (Environmental Social Governance).

**Digital Transformation** refers to the adoption of digital technologies to create new or modify existing business models and processes or to support the transformation of organizational structures, resources, or relationships with internal and external actors (Plekhanov, et al., 2022).

Although the number of studies on Digital Transformation has evolved over time, it was after 2014 that their numbers significantly increased (Reis, et al., 2018). The growing attention of researchers to this topic is motivated by the widespread adoption of digital technologies, including cloud computing, big data analytics, artificial intelligence, and the Internet of Things (IoT), which have driven digital transformation across nearly every industry.

The trend highlighted by scholars and experts finds evidence in the analysis of worldwide spending on digital transformation technologies and services from 2017 to 2026 (Sava, 2022). In 2021, spending on digital transformation reached 1.59 trillion U.S. dollars, reflecting a significant increase of 67% compared to 2017. Looking ahead, global digital transformation spending is forecasted to reach 3.4 trillion U.S. dollars by 2026, indicating a Compound Annual Growth Rate (CAGR) of 15.09% over the period (Figure 2.7: Digital transformation spending worldwide 2017-2026 )

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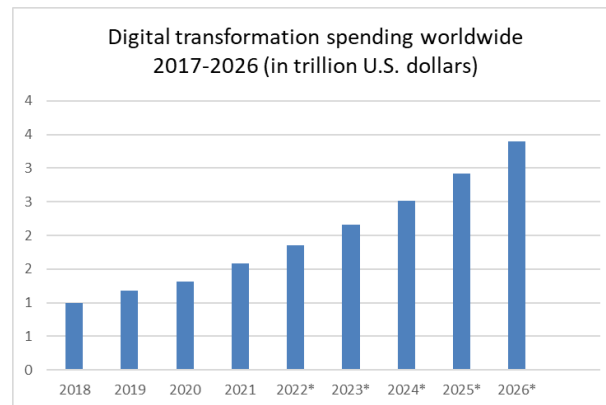


Figure 2.7: Digital transformation spending worldwide 2017-2026 (Sava, 2022)

The second fundamental trend is associated to themes as **Sustainability and ESG**.

The term ESG was first coined in 2005 in a study entitled “Who Cares Wins.” (Kell, 2018) and it represents a framework designed to consider the needs and ways in which to generate value for all organizational stakeholders (Wikipedia, 2023). Over time, growing concerns about climate change and social responsibility have led to an increased focus on sustainability and ESG factors, driving many business strategies and operations to meet changing consumer expectations.

Although the framework was proposed for the first time in 2005, the rising profile of ESG has been evident in investments in the last few years. In particular, ESG assets surpassed \$35 trillion in 2020, up from \$30.6 trillion in 2018 and \$22.8 trillion in 2016, highlighting a 15% of growth (Adeline Diab, 2022).

The analysis of these two megatrends highlights three important elements that are shaping how firms are competing and how they are addressing customer’s needs:

1. **The enabler – Digital technology:** digital technology has revolutionized the landscape of business operations and competition, serving as a powerful enabler to enhance organizations’ efficiency, agility, and capacity for innovation. With the support of digital tools, businesses can rapidly scale, reaching a vast customer base with personalized and tailored offerings. By leveraging digital technologies, companies are able to analyse and utilize customer data, gaining valuable insights to develop targeted marketing strategies. This ultimately allows them to effectively deliver their value proposition and capture the highest value.
2. **The boundaries – multi-sided perspective:** the boundaries of business strategies have expanded to encompass a multi-stakeholder perspective. As evidenced by the increasing adoption of the ESG framework, investors are increasingly supporting strategies that prioritize a broad range of stakeholders. This shift highlights the limitations of linear business models,

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which typically focus on value creation through a supply chain. They lack flexibility, struggle with change, and face challenges in addressing uncertainty. Consequently, companies tend to adopt a multi-sided approach, considering stakeholders as value recipients rather than constraints.

3. **The method – Business Model Transformation:** organizations are operating in a dynamic environment where customer expectations evolve rapidly and establish sustainable competitive advantage with a rigid organizational structure is becoming almost impossible. Starting a process of Business Model transformation means investigating the limitations of the current business model within a specific time frame, addressing the need for adaptability, dynamics of change, uncertainty, and emerging trends with the goal of evolving the value proposition and the mechanisms of value creation, delivery, and capture.

The forces described in this section have been instrumental in driving the business model innovation process forward in recent years. Hence, these megatrends have not only disrupted established industries but have also presented new opportunities for organizations to reevaluate, reinvent, and realign their strategies. Managers, business owners, and entrepreneurs must skilfully manage these streams, directing them in the right direction to drive their innovations and maximize the benefits derived from the development of new business models.

To conclude, considering the overview of the business model as a whole and its role as a competitive advantage tool provided in the first chapters, the importance of innovating the way in which the firm operates was presented. As stated, this is a process driven by both internal and external factors that result from the strategic direction envisioned by the management and the context in which the firm operates. Therefore, those responsible for driving this transition need tools and frameworks to effectively lead their organization into the future. In this context, the next section will introduce the impact of one of the most disruptive forces shaping the current scenario (Puaschunder, 2019) – Artificial Intelligence – which is consistently changing both the ways in which firms are internally managed and how they operate in the external market.

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### 2.1.7 The Impact of Artificial Intelligence on Business Model Innovation

Artificial Intelligence refers to the field of computer science and technology that focuses on creating systems, machines, or software that can perform tasks typically requiring human intelligence (ChatGPT, 2023).

Despite the notion of “Artificial Intelligence” was coined in 1956 by John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon during the Dartmouth Conference (Moor, 2006), in recent years, this topic has gained significant momentum, largely driven by the peaking popularity of machine learning and deep learning. Moreover, it has become notably more effective thanks to advancements in data availability and computational capabilities (Marr, 2019).

In the field of AI, a particularly revolutionary advancement in recent times has been the rise of Generative Artificial Intelligence, a type of AI that can generate text, images, audio, code, videos, and synthetic data (Davenport, et al., 2022) starting from a simple user interface and relying on Large Language Models as foundation: systems designed to process and generate human-like text based on vast amounts of text data it has been trained on.

The significance and potential of the topic become evident when looking at ChatGPT’s success. In just two months, it reached an impressive milestone of 100 million monthly users, solidifying its position as one of the fastest-growing consumer applications in history (Hu, 2023). This achievement becomes even more noteworthy when you consider that it took Instagram 2.5 years and TikTok 9 months to reach the same user base (Chow, 2023).

The emergence of AI as a dominant technology in the realm of business models innovation (Ferràs-Hernández, et al., 2023) is confirmed by scholars’ interest in creating and mapping the intersection of AI and corporate innovation, as evidenced by a significant growth in the literature over the past few years (Figure 2.8: Publication trends: AI and corporate innovation up to July 2022 ).

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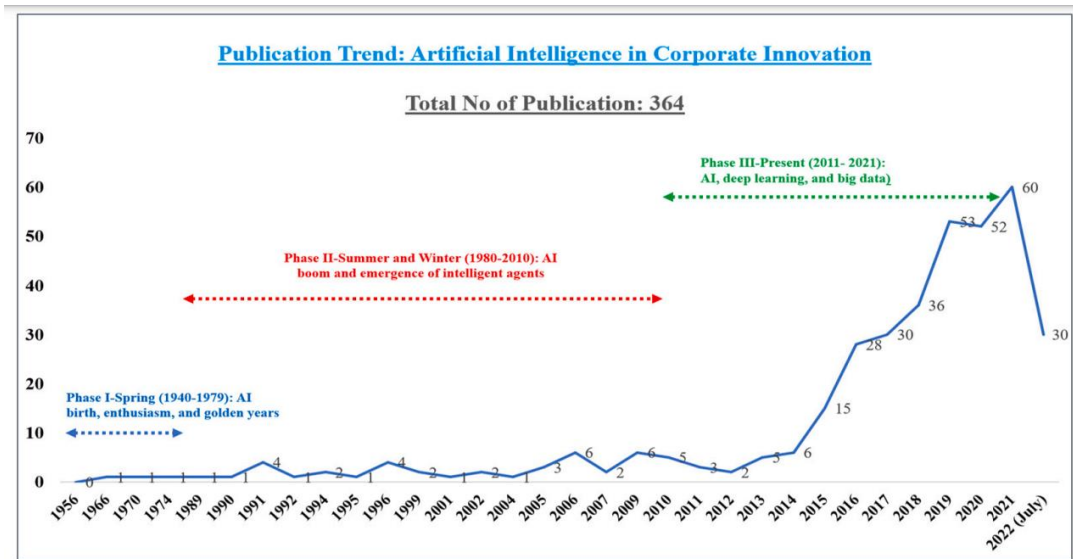


Figure 2.8: Publication trends: AI and corporate innovation up to July 2022 (Bahoo, et al., 2023)

Now should be clear that Artificial Intelligence represents a disruptive force (Puaschunder, 2019) that is revolutionizing industries across the globe. Its ability to analyse vast datasets, make informed predictions, and automate tasks is challenging traditional business models and practices. AI-driven innovations are enabling companies to optimize operations, deliver personalized customer experiences, and develop entirely new products and services. As firms adapt to the capabilities of AI, they face both tremendous opportunities for growth and the necessity to evolve to remain competitive. Focusing on how Generative AI impacts business model innovation, it has the most significant effects in the domains of value creation innovation, new proposition innovation, and value capture innovation (Kanbach, et al., 2023). In particular, three main implications emerge:

1. GAI provides access to expertise, technology, and resources to almost everybody. Thus, having specialized knowledge of a particular business area becomes less critical for achieving success in work and innovation. This shift is attributed to the democratizing effect of Generative AI, which levels the playing field by addressing educational disparities, language barriers, and individual limitations (Gimpel, et al., 2023).
2. Generative AI possesses the capability to accelerate innovation in product development and value enhancement by blending factual knowledge with creative thinking. Repetitive tasks are already automated or assigned to less skilled and more affordable workers. Consequently, GAI's most substantial value lies in empowering business creativity and supporting the workforce responsible for innovating business models, particularly in activities that

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demand a fusion of intricate knowledge and creative problem-solving skills (Kanbach, et al., 2023).

3. GAI has the potential to reshape revenue models and cost structures by lowering production expenses and creating innovative monetization approaches. It enhances the appeal of mass customization and freemium models while simultaneously reducing the marginal costs associated with content creation.

Considering that AI is in the phase of widespread commercial adoption, and AI products are making comprehensive inroads into the consumer market (Lu, 2020), this technology is influencing business models across various domains (Figure 2.9: The relationship between AI Innovation and Business Model Innovation ).

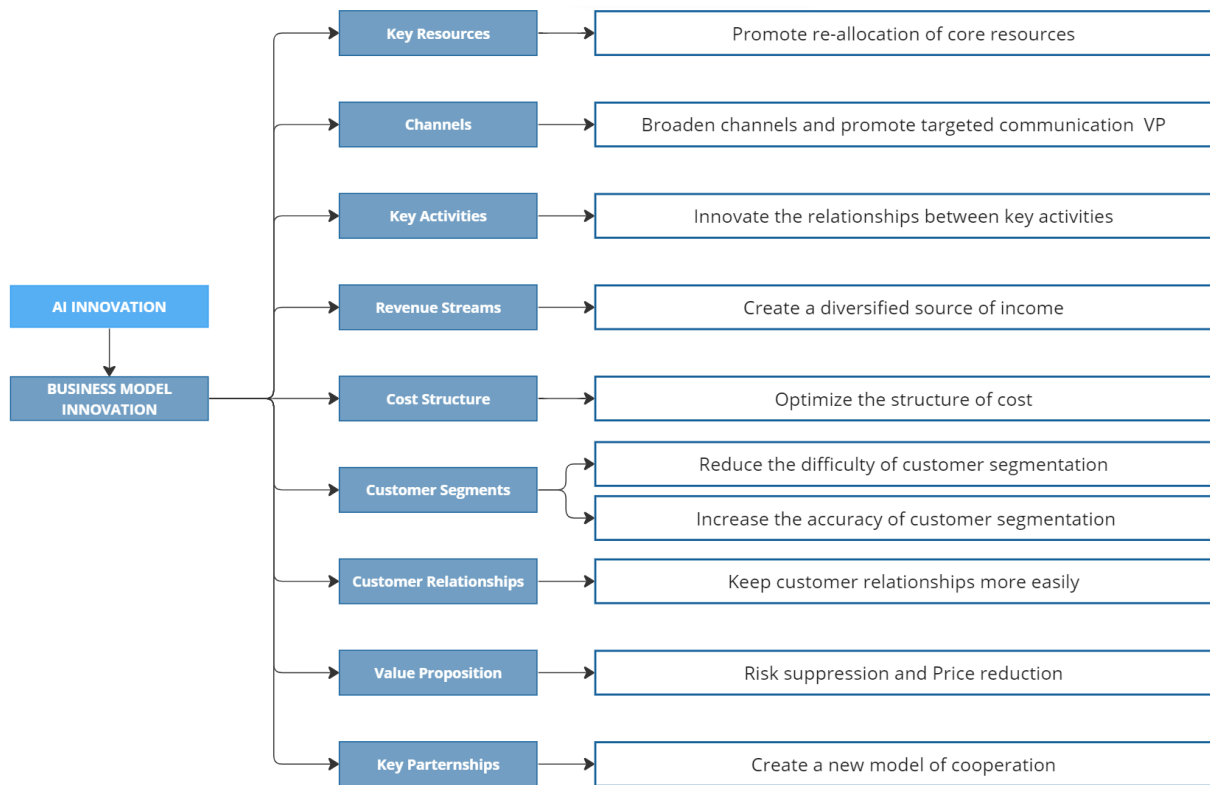


Figure 2.9: The relationship between AI Innovation and Business Model Innovation (Lu, 2020)

From the previous figure emerges how Artificial Intelligence induces corporates to re-design their innovation process under several perspectives. In particular, from a hybrid review of published literature (364 articles) spanning the last 56 years (1996 to July 2022) on the intersection of AI and corporate innovation, it becomes evident that the relationship between AI and business models will evolve along three distinct streams (Bahoo, et al., 2023):

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- **AI impact on business models:** it highlights the role and impact of AI technologies and techniques on corporate business models and how corporates have to overthink their BM due to AI technologies.
- **AI-based business models:** it emphasizes how AI can enhance corporate efficiency and foster innovation in products and services by leveraging digitalization and technologies such as IoT, robotics, and machine learning.
- **AI, business models, and innovation ecosystem:** this research sub stream investigates the influence of AI technologies and capabilities on business model innovation and the subsequent creation of value, a pivotal aspect in today's digital era. This last stream underscores the significance of innovation ecosystems in facilitating BMI through AI technologies, emphasizing their collaborative nature and information exchange, which fosters the generation of novel digital ideas.

As it is evident, the connection between AI and business model innovation is strong despite the recent emergence of this technology. Artificial intelligence, particularly Generative AI, serves as a potent tool that not only stimulates creativity but also aids managers and entrepreneurs in making intricate decisions.

Given that this study does not explore into the social implications of this technology for people or its connection to the substitution of humans' work, it is important to make a relevant consideration: AI is a supporting tool.

It means that the quality of the results provided is closely linked to the input given to the machine and the human ability to assess the outcomes suggested by the tool. This aspect is of particular importance when analysed in terms of the new competencies that need to be developed to maximize the quality of interaction between humans and machines. Additionally, it underscores the need to develop the capability to assess results and identify hidden aspects.

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### 2.1.8 How To Capture a Higher Value: Platform

Now it should be clear that firms, in order to fulfil their purpose and maximize benefits for both shareholders and stakeholders, must integrate and balance three distinct dimensions within their business model: value creation, value delivery, and value capture. Nevertheless, they must also identify the right models for each domain to meet customer needs and stakeholder expectations. Furthermore, given the dynamic environment they operate in, characterized by increasingly rapid breakthroughs and global competition, the management should foster and promote an innovation culture where everyone is encouraged to contribute and provide insights to initiate the process of business model innovation, ensuring a sustainable market position over time. Finally, taking into account the role of an enabler that Artificial Intelligence plays in the process of business model innovation, firms need to explore how they can develop new configurations that enable them to gain a competitive advantage and ensure long-term sustainability.

In recent years, one of the most effective types of business models that has gained significant traction, empowered by the widespread access to the web through smartphones and the diffusion of digital devices, is the *platform-based business model*.

Considering the first 100 firms of *Fortune Global 500 (2022)*, the annual ranking of the top 500 corporations worldwide measured by revenue, the top10 is composed of a variety of business models, ranging from linear value chains such as Saudi Aramco and Volkswagen to multisided platforms like Apple and Amazon.

Company	Fortune Global 500	Revenues (M\$)	Profits (M\$)	Assets (M\$)
Walmart	1	\$572,754	\$13,673	\$244,860
Amazon	2	\$469,822	\$33,364	\$420,549
State Grid	3	\$460,617	\$7,138	\$735,430
China National Petroleum	4	\$411,693	\$9,638	\$660,008
Sinopec Group	5	\$401,314	\$8,316	\$380,675
Saudi Aramco	6	\$400,399	\$105,369	\$576,134
Apple	7	\$365,817	\$94,680	\$351,002
Volkswagen	8	\$295,820	\$18,187	\$601,028
China State Construction Engineering	9	\$293,712	\$4,444	\$378,352
CVS Health	10	\$292,111	\$7,910	\$232,999

Table 2.3: Top 10 Fortune Global 500 (2022)



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The assessment becomes more interesting when considering the Return on Assets (ROA) as a Key Performance Indicator (KPI) and conducting a comparative analysis. The ROA, calculated as the ratio of net profit to total assets ( $\frac{Net\ Profit}{Asset}$ ), is a financial indicator used to measure a company's profitability and its ability to generate earnings from its assets. When comparing two firms with a similar asset value, a higher ROA indicates better asset management and profitability, while a lower ROA suggests inefficiency in utilizing assets to generate earnings.

Focusing only on corporations and applying a filter for an asset value exceeding \$100 million to compare similar firms (constituting 77% of the sample), the ranking undergoes significant changes.

Company	Fortune Global 500 – Platform Top 100		Revenues (M\$)	Profits (M\$)	Assets (M\$)	Asset Turnover	ROA
Apple	7	Yes	\$365,817	\$94,680	\$351,002	104%	27%
Meta Platforms	71	Yes	\$117,929	\$39,370	\$165,987	71%	24%
Alphabet	17	Yes	\$257,637	\$76,033	\$359,268	72%	21%
Microsoft	33	Yes	\$168,088	\$61,271	\$333,779	50%	18%
Saudi Aramco	6	No	\$400,399	\$105,369	\$576,134	69%	18%
Huawei Investment & Holding	96	No	\$98,725	\$17,623	\$154,747	64%	11%
Samsung Electronics	18	No	\$244,335	\$34,294	\$358,982	68%	10%
Berkshire Hathaway	14	No	\$276,094	\$89,795	\$958,784	29%	9%
Mercedes-Benz Group	38	No	\$158,306	\$27,201	\$295,428	54%	9%
Stellantis	29	No	\$176,663	\$16,789	\$195,298	90%	9%

Table 2.4: ROA Ranking

Business Model	Number of firms	Average Revenues	Average Profit	Average Asset	Average Asset Turnover	Average ROA
Platform	4	\$227,368	\$67,839	\$302,509	74.0%	23.0%
Others	6	\$225,754	\$48,512	\$423,229	62.0%	11.0%

Table 2.5: Platform and Others Business Models

The first four positions in the ranking are occupied by platform companies, which have a significantly higher Return on Assets (ROA) compared to most other corporations on the list. This benchmark underscores the platforms' profitability and ability to capture a greater value from their assets although the average revenues are similar between the clusters.

Additionally, platform companies require lower investments in assets. Leveraging on digital technologies they are able to generate higher value for shareholders compared to more traditional companies that rely on a diverse range of assets, including physical infrastructure, manufacturing facilities, and investments in various businesses.

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In summary, this chapter has provided a comprehensive exploration of the business model concept, its significance, and its evolution over time. It starts from the fundamental idea of a business model and its pivotal role in shaping an organization's strategy.

Then, the Business Model Canvas was introduced as a valuable tool for structuring and visualizing these models, allowing for the assessment of the firm from a holistic and systematic view.

Business model innovation took centre stage, unveiling strategies to navigate the Success Paradox and effectively harness the forces propelling the need for change. Various dimensions of a business model were explored, including value creation, delivery, and capture, recognizing their critical interplay.

Finally, the last two chapters provided an overview of the role that Artificial Intelligence plays as a supporting tool for managers and entrepreneurs responsible for making strategic decisions about the future of their firms. Additionally, the notion of platforms was introduced as a means to capture higher value from a business model perspective.

This last part serves as a foundation for the next chapter, in which a comprehensive overview of the Platform is presented.

## 2.2 PLATFORM

### 2.2.1 Platform Introduction

As the examples of Uber and Airbnb have shown, Unicorns with multi-billion valuation (Guo, et al., 2020), the choice of a business model seems to be key to the success of a platforms (Rochet, et al., 2003) that are becoming more and more relevant in the recent years.

These businesses, established with the purpose of linking two different groups of customers, in the literature have been defined as two-sided platforms, relying on the concept of two sided markets: markets with network externalities characterized by the presence of two distinct sides whose ultimate benefit stems from interacting through a common intermediary (Rochet, et al., 2003).

Two-sided platforms, often referred to as multi-sided platforms due to their involvement of at least two sides – but potentially more – are businesses characterized by three key determinants (Evans, 2003):

- There are two or more distinct groups of customers.
- Externalities among customers clusters emerge when they become connected or coordinated.
- An intermediary can internalize the externalities created between the groups.

Considering the massive popularity of companies like Uber or Airbnb, the concept of two (multi) sided platform has spread quite quickly and it raises the interest of several researchers, practitioners, and business leaders. Nevertheless, the notion of platform in the management literature has been subject to different interpretations (Trabucchi, et al., 2021).

Firstly, the section on platform will propose a review of the different types of platforms, ranging from product platform to innovation and two (multi) sided platforms.

Then, keeping the focus on this last category, the elements of success are presented in order to highlight the foundations of this business model.

This last chapter serves as foundation to introduce the last section of the literature review: Platform Thinking. It represents the underlying principle that forms the foundation for incorporating platform-based mechanisms at the core of digital business transformation (Trabucchi, et al., 2023).

Therefore, after a description of the underlying principle, the topic of PT is addressed by considering established firms as the unit of analysis. This choice is motivated by the study's purpose, which is to examine how traditional linear value chain-based firms can initiate the process of business model innovation to transition into platforms. This

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leads to the final chapter of the literature review, where the shift in the concept of business model towards a platform-based structure is applied to established firms, serving as a bridge to highlight the research gap.

### 2.2.2 Platform Types: Product (Internal) Platform

The concept of platforms was initially introduced by Wheelwright and Clark, who described it as a modular product that can be easily customized by adding or removing features (Wheelwright, et al., 1992). The underlying principle was clear: a core modular infrastructure that serves as a foundation upon which various extensions (derivatives) and variations can be built. Over time, this definition was attributed to the specific category of a product platform, also known as an internal platform. This type of platform is perfectly exemplified by iconic products like the Sony Walkman (Sanderson, et al., 1995), a standard infrastructure that remains stable over time and generates several derivatives from the same base.

Therefore, a *Product Platform* is a set of common components, modules, or subsystems that create a basic structure common to many products within a company or industry; a set assets organized in a common structure from which a firm can efficiently realize a stream of derivative products (Gawer, et al., 2014).

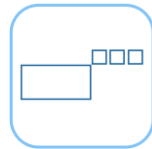


Figure 2.10: Product Platform Icon

The firm, rather than beginning the development process from scratch for each new product, can make a significant investment in developing the foundational architecture that serves as the basis for all subsequent models (*derivatives*).

By implementing an internal platform, a company can effectively create multiple products with distinct features and functionalities, while simultaneously minimizing the costs and time associated with designing, developing, and manufacturing each individual product.

The firm, leveraging a solid set of core features, can develop a wider range of products within a product family, thereby benefiting from economies of scope and enhancing both efficiency and effectiveness. This modular approach enables the organization to promptly respond to changes in customer preferences, predict technological trajectories (Schilling, 2000) and meet market demands, ultimately fostering innovation and an agile business acumen.

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### 2.2.3 Platform Types: Industry Wide (Innovation) Platform

Throughout the years, the concept of an internal product platform has expanded beyond the boundaries of individual firms, giving rise to a new innovation ecosystem. In particular, the decision to open the platform to external complementors lead scholars to define a new type of platform, known as industry-wide platform (Gawer, et al., 2014), which differs from the previous due to its focus on external actors.

An *Industry-wide Platform*, also known as *Innovation Platform*, is a set of products, services or technologies that act as common infrastructure that enable multiple firms to develop complementary products or services that are compatible with each other, potentially generating network externalities (Gawer, et al., 2014).

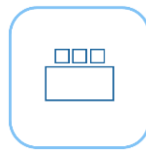


Figure 2.11: Innovation Platform Icon

Leveraging on the open environment set by the platform provider, several companies can collaborate and interact with one another, working towards a shared vision to develop innovative products and services. This shift has fostered the development of an ecosystem where collaboration and interconnectivity drive the co-creation of complex solutions that transcend individual organizational limitations.

Industry-wide platforms, as well as other types of platform that will be presented later, involve four main types of players: consumers, producers, providers, and owners (Van Alstyne, et al., 2016). Owners of platforms control their intellectual property (IP) and governance, providers serve as the platforms' interface with users, producers create their offerings, while consumers are those who are using the offerings (Figure 2.12: The Industry-Wide Platform Ecosystem .

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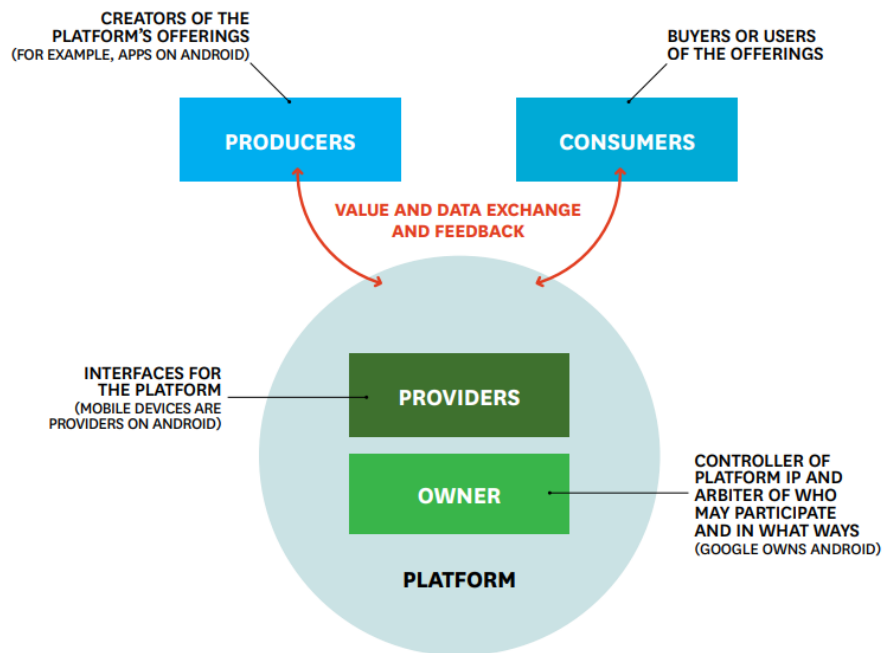


Figure 2.12: The Industry-Wide Platform Ecosystem (Van Alstyne, et al., 2016)

The platform ecosystem is extremely complex, involving multiple players with dynamic roles. Users can transition between being consumers and producers – as seen in the case of someone using Uber as a rider today and becoming a driver for the platform tomorrow – or certain actors, such as Apple in the context of the iOS system, assume multiple roles as both the owner and provider. Meanwhile, the platform remains open to developers (producers) and end users who participate in the co-creation of value with other players.

Although in some cases platform itself can function as a product, generating value for the company through sales (i.e., Sony – Play Station), the greatest amount of value is generated focusing on the external resources and creating value for the entire ecosystem. The keystone firm (Barnett, 2006) can establish a platform leadership position leveraging on its features to initiate a cycle of value creation: as more complementors – businesses or individuals willing to foster something new that add value to a platform's existing user base, such product or service development, by leveraging the existing base of a platform (Trabucchi, et al., 2020) – develop their services on a specific platform, more end users are likely to choose that platform over competitors, and vice versa. This creates cross-side or indirect network externalities, which can further increase the value of the platform.

External innovators are provided with the opportunity to work on a semi-finished product and utilize a basic structure that supports their work and enables them to

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reach end customers. Simultaneously, end customers can access a single, optimized platform offering various interesting services that share a common underlying logic.

All of these aspects allow the owner of the innovation platform to gain from both the sale of the platform as a product itself, as it happens with the gaming console, and the commission fees that are associated with the transactions that take place between the sides involved, as in the case of the Android ecosystem with the developers who leverage the resources offered by the provider to create and sell their applications

### 2.2.4 Platform Types: Multi Sided Platform Overview

Continuing the analysis, as mentioned earlier, one of the most popular and effective configurations of a business model is constituted by two (multi)-sided platforms. These platforms exist in industries where a central platform is required to act as an intermediary, matching two or more groups of customers who are influenced by cross-side network externalities (Katz, et al., 1985).

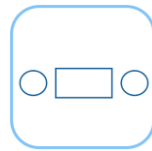


Figure 2.13: Two-Sided Platform Icon

Two (multi)-sided platforms play a crucial role in our everyday lives, transforming the way we communicate and consume content. Social media platforms such as Facebook and Twitter have revolutionized our ability to connect and share with others, platforms like Uber, Airbnb, and BlaBlaCar have disrupted the traditional transportation industry by offering new ways to travel and share rides. Furthermore, the entertainment industry has been greatly impacted by platforms like Spotify for music streaming and Netflix for on-demand movies and TV shows (Trabucchi, et al., 2021)

All these companies have designed a model that creates a meaningful matching experience for all parties involved by positioning themselves as intermediaries. They enable users who are willing to monetize underutilized resources such as cars, apartments, and free time, to connect with users who are seeking alternatives to traditional solutions.

The platform generates value by connecting and enabling interactions between the two sides, benefiting from network effects as more customers join and interact. As intermediaries, platforms facilitate the exchange of goods, services, or information without the need to directly own the physical assets required to offer the service. In fact, they leverage different kinds of network externalities to scale up, both in terms of

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users and value, experiencing exponential growth once the critical mass is reached (Trabucchi, et al., 2020).

Two (multi)-sided platforms have an intrinsic value that is close to zero when the value networks, representing the connections between individuals and corporations that benefit the platform provider, are absent. However, when the value network is consistent, the intrinsic value of the platform depends on its ability to capture the utility generated through interactions among participants. Therefore, it is evident that the viability and sustainability of this category of platforms as businesses heavily rely on their contextualization within the market.

Considering two-sided markets, they can be distinguished between two-sided transaction markets and non-transaction markets (Filistrucchi, et al., 2010):

- **Two-sided transaction markets**, such as payment cards, are characterised by the presence of a transaction between the two groups of users (Filistrucchi, et al., 2014).

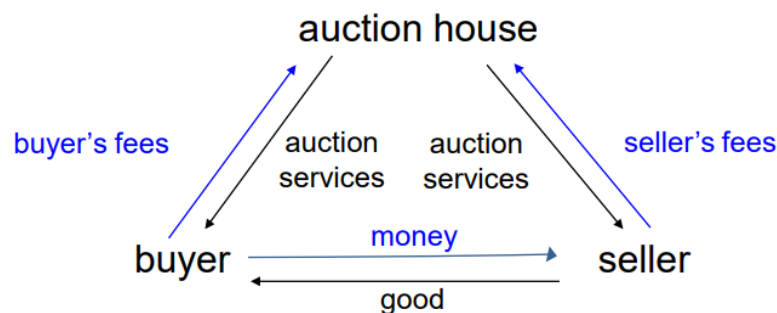


Figure 2.14: Two-sided transaction market

- **Two-sided non-transaction markets**, such as most media markets, are characterised by the absence of a transaction between the two sides and, even though an interaction is present, it is usually not observable (Filistrucchi, et al., 2014)

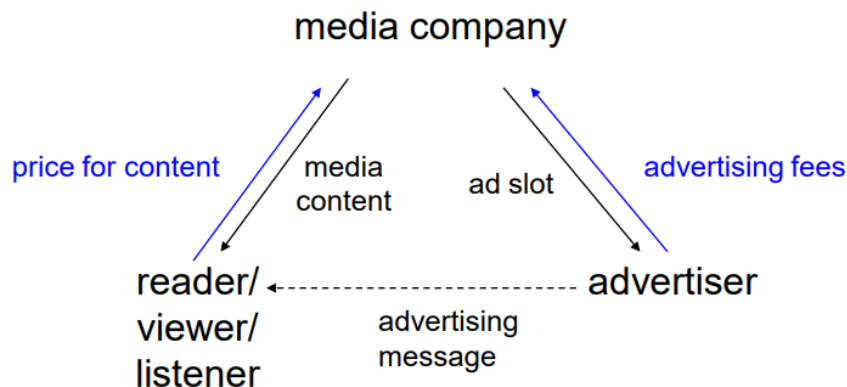


Figure 2.15: Two-sided non-transaction market



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Two-sided transaction markets are characterized by both membership externalities (or indirect network effects) and usage externalities, while non-transaction markets support only membership externalities. Indirect network effects arise from joining the platform (i.e., buying a newspaper, having a POS terminal), whereas usage externalities arise from using the platform (i.e., selling and buying a product at an auction) (Filistrucchi, et al., 2014).

Thus, combining the definitions of two sided markets with the three necessary conditions proposed by David Evans for a business to be considered a two-sided platform – (i) the existence of two or more distinct groups of customers, (ii) the presence of cross-side network externalities among these groups, and (iii) the platform provider acting as an intermediary internalizing externalities (Evans, 2003) – three categories of two (multi)-sided platforms emerge:

- Transactional Platform
- Orthogonal Platform
- Hybrid Platform

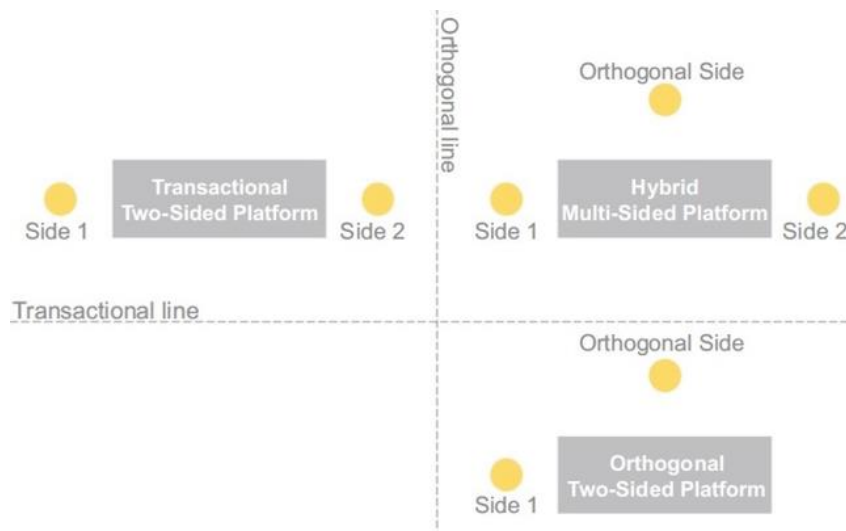


Figure 2.16: A comprehensive view of the different kinds of two-sided platforms (Trabucchi, et al., 2021)

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### Platform Types: Transactional Platform

A *Transactional Two (multi)-Sided Platform* can be defined as a product or service where two (or more) distinct customer groups interact through transactions that are facilitated by the platform provider, who earns a commission or fee for each transaction as their primary revenue source.

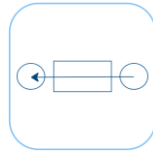


Figure 2.17: Transactional Platform Icon

The platform provider facilitates transactions and internalizes the network externalities that result from the interactions between the two customer groups. This type of platform is commonly referred to as a marketplace, where the platform provider may offer additional services such as payment processing, matchmaking mechanisms, suggestions, trust, and safety features.

### Platform Types: Orthogonal Platform

*Orthogonal two (multi)-sided platforms*, also known as non-transactional platforms, are products or services that rely on a unidirectional cross-side network externality, where one side depends on the central platform to receive a service. The first side benefits from being exposed to different services offered on the platform, while the second side is interested in the intrinsic value provided by the first side. Hence, there is no direct transactional interaction between the two sides.

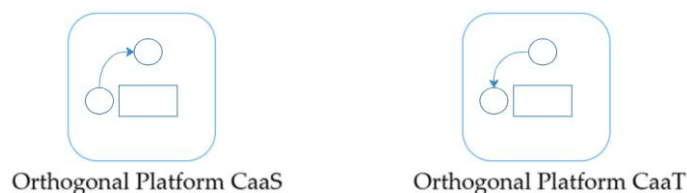


Figure 2.18: Orthogonal Platforms Icons

This kind of platform highlights how intermediaries do not directly connect the two sides to enable a transaction, but rather create a critical mass on the demand side (i.e., readers) that can be further exposed to stimuli from the supply side (i.e., advertisers), who are willing to pay to attract the attention or obtain data from the first side (Trabucchi, et al., 2017).

Orthogonal two-sided platforms represent businesses characterized by more traditional features that do not require a second side to create value. The two underlying principles that support this kind of business are:

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- **Client As A Target (CaaT):** the platform leverages the demand side as the target audience for the second side, which is interested in capturing the attention of the users belonging to the first side. This interaction between the two sides creates value for the platform and allows it to generate revenue by capturing the value created. Usually, a freemium model is offered to the first side to attract their attention, while the second side is willing to pay (and subsidize) to access and reach the audience of the first side.
- **Client As A Source (CaaS):** the underlying logic of this strategy is to capitalize on the user base that generates a valuable asset, which can be effectively utilized. While this asset can manifest in various forms, the primary source of value lies in data. They are obtained by monitoring user behaviours and aggregated to extract insights and statistics. By leveraging this data, the platform provider can furnish valuable information to third parties who are interested in the demand side. Additionally, the platform can offer supplementary services to the second side in order to capture a higher share of the value generated. (Trabucchi, et al., 2017).

### Platform Types: Hybrid Platform

*Hybrid multi-sided* platforms can be defined as platforms that combine elements of both transactional and orthogonal dimensions. These platforms exhibit characteristics and functionalities that facilitate direct transactions and interactions between the two sides, while also leveraging the value created by the unidirectional cross-side network externality. This combination allows the platform to capture value from both transactional activities and the indirect value generated through the exposure of one side to the other, thereby maximizing the value proposition offered by the comprehensive ecosystem.

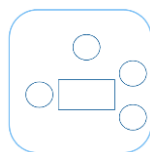


Figure 2.19: Hybrid Multi Sided Platform Icon

The evolution towards Hybrid Multi-Sided Platforms can originate from either a Transactional Platform or an Orthogonal Platform (Trabucchi, et al., 2021). Both have the capability to manage multi-value propositions in order to incorporate a new additional sides based on a distinct logic, thus expanding their scope and functionalities.

As the application of the *Deming cycle (Plan – Do – Check – Act)* is crucial for success in Agile Project Management (Highsmith, 2009), the foundation for the winning logic of

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the evolution process towards hybrid multi-sided platforms revolves around the implementation of three phases in a continuous cycle (Trabucchi, et al., 2020):

1. **Identify Idle Assets:** the platform provider recognizes an existing market friction and establishes a two-sided platform to alleviate it. By leveraging idle resources available in the market, the platform connects those who possess these resources with counterparts in need of them.
2. **Design Value Proposition(s):** the platform provider identifies and develop a compelling value proposition that entice both sides to participate. These value propositions are designed to address the specific needs and motivations of each side, ensuring mutual benefit.
3. **Get Players on Board:** The platform provider actively engages in the process of encouraging both sides to join the platform, fostering an environment where externalities can thrive. By effectively communicating the advantages and opportunities that arise from participation, the provider builds trust and encourages adoption.

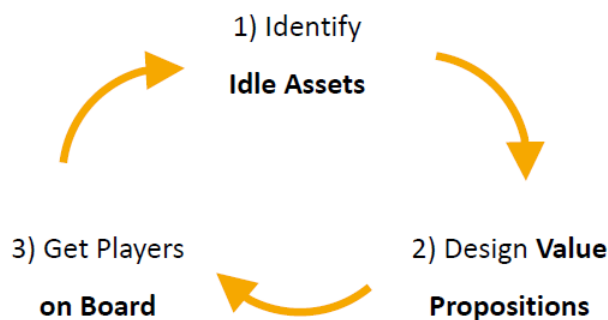


Figure 2.20: Framework to Exploit Idle Assets

It is important to highlight that an asset is not idle “per se”. The possibility of extracting value from an asset depends on the groups involved in the ecosystem and the ability of the platform provider to identify other interested parties. Once players are on board, it should seek out new and interesting parties (sides or players) that may be interested in the value generated and in offering additional services to current actors. In this way, the platform can continuously expand and improve its value proposition, leading to a stronger network effect and greater success.

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### 2.2.5 Platform Types: a final overview

In the last chapters, various types of platforms were introduced, encompassing product platforms, innovation platforms, two-sided platforms, and culminating with hybrid platforms.

Over time, various platforms' categories have arisen (Figure 2.21: Platform's Types ). Although they were not always initially identified as platforms due to a temporal gap between the model's inception and the emergence of platform-related research, these models now fall under the same overarching business model category.

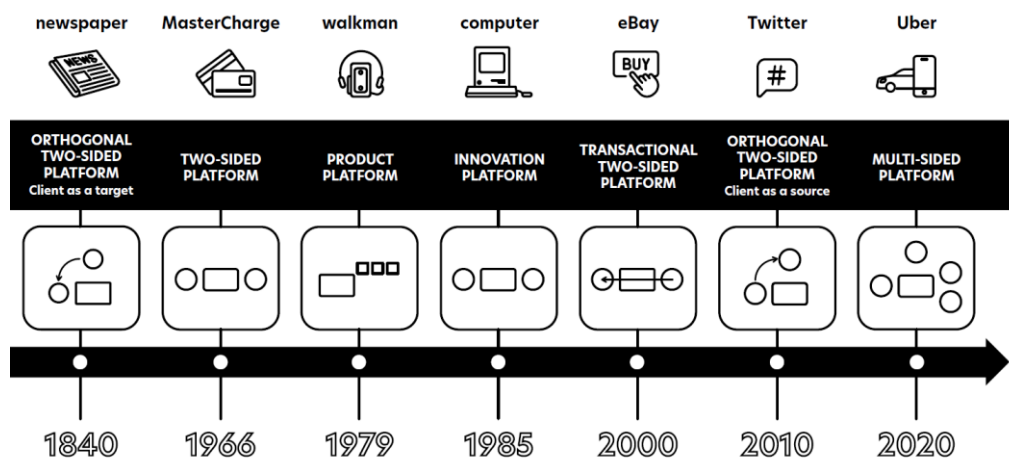


Figure 2.21: Platform's Types (Trabucchi, 2023)

While they belong to the same category, the various typologies exhibit differences across several variables. These distinctions can encompass a wide range of aspects (Table 2.6: Platform Features), including:

- **Focus:** specific area toward which the organization prioritizes and directs its efforts. It signifies what is considered the central point of emphasis within a particular context or goal.
- **Underlying principle:** core concepts that govern the growth and the success of a platform.
- **Logic:** systematic and rational principles used to achieve the goals. It represents the mechanism that allows to leverage on the underlying principle behind the business model in order to reach a superior performance.
- **Monetization strategy:** approach a platform takes to generate revenue.
- **Sides:** distinct groups or categories of users, participants, or stakeholders who interact with the platform.

Additionally, within the domain of two (or multi)-sided platforms, variations can arise based on factors such as: the number of sides involved, the nature of the relationships between these sides (whether they are transactional or orthogonal), the

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multitude of ways in which these sides can interact with each other, and, in the context of hybrid platforms, the intricate combinations of these dimensions.

	Product Platform	Industry-wide Platform	Two (multi)-sided Platform	
			Transactional	Orthogonal
<b>Focus</b>	Internal	External	External	External
<b>Logic</b>	<ul style="list-style-type: none"> <li>• Basic Architecture</li> <li>• Derivatives</li> </ul>	<ul style="list-style-type: none"> <li>• Ecosystem for complementors</li> <li>• Innovation</li> </ul>	Matchmaking	<b>CaaT:</b> advertising <b>CaaS:</b> gather information
<b>Monetization Strategy</b>	Derivatives' Sale	<ul style="list-style-type: none"> <li>• Sale of the Platform as a product</li> <li>• Commission fee of producers</li> </ul>	Transaction fee	<b>CaaT:</b> pay for the "eye balls" <b>CaaS:</b> pay for agg. data
<b>Underlying Principle</b>	Core - periphery	<ul style="list-style-type: none"> <li>• Network effect</li> <li>• Cross side network externalities</li> </ul>	Cross side network externalities	Network effect
<b>Sides</b>	Consumers	<ul style="list-style-type: none"> <li>• Producers</li> <li>• Consumers</li> </ul>	<ul style="list-style-type: none"> <li>• Buyers</li> <li>• Sellers</li> </ul>	Third parties
<b>Example</b>	Sony Walkman	Android, Play Station	Amazon Marketplace	<b>CaaT:</b> newspapers <b>CaaS:</b> Strava for Municipalities

Table 2.6: Platform Features

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### 2.2.6 Multi-Sided Platform – Elements of Success

As mentioned earlier, a multi-sided platform represents a business model that involves the participation of two or more distinct customer groups. These customer groups are interconnected through network externalities, forming a complex system that facilitates various types of relationships. They can be transactional, non-transactional, or a combination of both (hybrid), depending on the specific dynamics and objectives of the platform.

Once again, the success of these platforms depends on their ability to efficiently establish the process of *matchmaking* between the various customer groups, as well as their capacity to internalize the value generated by these interactions. In this perspective, various elements contribute to determining the prosperity of a firm.

#### Positive Network externalities

In general terms, network externalities refer to the effects associated with a product or service, according to which the utility that a given user derives from the good depends on the number of other users who are in the same “network”.

Network externalities can exhibit positive effects, leading to demand-side economies of scale, negative effects, where the value of the service decreases as more users join, as well as simultaneous positive and negative effects, such as the increased availability of Uber in a specific area. For instance, this last case is characterized by shorter waiting times (a positive effect), but also by higher congestion, resulting in longer travel times (a negative effect) to reach the final destination.

This first distinction highlights two main insights:

- Externalities are not always desirable.
- The perspective under which the network effects is analysed determines the positive/negative nature of the phenomenon.

Starting from this first assumption, network externalities can be classified according to two additional perspectives: *direct VS indirect*, *cross side VS same side*.

The main difference between **direct and indirect externalities** is the way in which they affect entities outside of the market transaction.

- **Direct externalities** are immediate and observable effects on parties that are involved in a market transaction. For instance, a factory pollutes a nearby river decrease the property value of the people who live near the watercourse.
- **Indirect externalities**, on the other hand, are often less visible effects on parties outside of the market that are not directly involved in the transaction. For example, an investment in R&D of a firm that creates a new technology may lead to increased productivity and economic growth, benefiting society as a whole.

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Differently, the key distinction between **cross-side** and **same-side externalities** lies in the nature of the relationship between the parties impacted by the externality.

- **Cross-side** externalities occur when the actions of one group affect the welfare of another in a related market.
- Alternatively, **same-side** externalities refer to situations in which the decisions of one group of market participants have an impact on the well-being of other members within the same group.

Considering a classical two-sided marketplace as a reference, characterized by the presence of three key players (demand side, platform provider, supply side), it is possible to map the different kinds of externalities and their relative effects (Table 2.7: Externalities Effects)**Error! Reference source not found..**

Externality	Demand Side	Supply Side	Platform Provider
↑ <i>Demand</i> ↓ <i>Supply</i>	<b>Negative:</b> less alternatives available	<b>Positive:</b> high demand	<b>Positive/Negative:</b> based on the relative supply capability
↓ <i>Demand</i> ↑ <i>Supply</i>	<b>Positive:</b> high offer	<b>Negative:</b> competition	<b>Positive/Negative:</b> based on the relative demand
↑ <i>Demand</i> ↑ <i>Supply</i>	<b>Positive:</b> high offer	<b>Positive/Negative:</b> <ul style="list-style-type: none"> <li>• higher demand</li> <li>• higher competition</li> </ul>	<b>Positive:</b> higher number of transactions
↓ <i>Demand</i> ↓ <i>Supply</i>	<b>Negative:</b> less alternatives available	<b>Positive/Negative:</b> <ul style="list-style-type: none"> <li>• potential monopoly</li> <li>• low demand</li> </ul>	<b>Negative:</b> lower number of transactions

Table 2.7: Externalities Effects

As is clear from the table, the third case (↑ *Demand*, ↑ *Supply*) is the one where every player involved in the marketplace can benefit from a positive effect. In fact, leveraging game theory – a powerful tool for analysing situations in which the decisions of multiple agents affect each agent’s payoff (Cachon, et al., 2006) – it is possible to demonstrate that the proposed solution is optimal in accordance with the Pareto principle: a situation in which no action or allocation exists that can improve one individual’s situation without simultaneously making another individual worse off.

Considering the demand side, the dominant strategy – a situation where one player has superior tactics regardless of how their opponent may play – is to join a marketplace where there is a high number of suppliers. This decision is coherent with the demand law and leads to the suppliers’ decision to enter the same marketplace in order to reach an higher customer base.



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Analysing separately the best scenario for each side, it emerges that both would prefer a marketplace where the number of participants on their own side is low, while the quantity of players on the other side is high. In fact, in one case, suppliers could raise prices, while on the other, consumers would benefit from competition among merchants, resulting in a reduction of costs.

Hence, the importance of the platform provider's role as a facilitator between the two parties becomes evident. To foster the growth of positive externalities, the platform provider must not only bring both sides on board but also ensure their ongoing engagement on the platform for an extended period. Therefore, to foster the desired network externalities, it is fundamental to investigate the initial lifecycle phase to understand how to reach critical mass and initiate a positive onboarding loop.

### Launch and Critical mass

As stated, platform providers are interested in establishing an environment where positive network externalities emerge and positive feedback loops can flourish in accordance with Metcalfe's law (Hendler, et al., 2008). On the other hand, it does not represent the optimal solution for either the demand or the supply side. In fact, individually, they would participate in a marketplace where they represent a cluster with a lower relative cardinality.

In this scenario, which is also characterized by the *Chicken-and-Egg Paradox* – a situation where the intermediary should rely on registered customers to attract the supply side, but these customers will be willing to register only if they expect many suppliers to be present (Caillaud, et al., 2003) – it is difficult to determine which group comes first. Each group seems to rely on the other for joining the ecosystem. This emphasizes the launch of the platform as one of the most critical phases in the entire lifecycle.

The underlying assumption to create value for users is to reach the critical mass on each side (Ruutu, et al., 2017), where the critical mass represents the point at which a system reaches a sufficient number of participants to produce a self-sustaining level of value. Without achieving it, a platform may fail to generate sufficient network effects, making it difficult to grow and attract users.

The challenge for the platform provider is even tougher compared to traditional businesses because they must simultaneously achieve a critical mass of users on both sides, where the value of one side is directly influenced by the number of users on the other, and vice versa. Therefore, the platform provider must carefully balance their efforts to attract and retain users on both sides, ensuring continuous growth and providing value to all parties involved.

The provider can overcome the chicken-and-egg problem and trig the positive loop to reach the critical mass by following different strategies (Evans, et al., 2016) and tactics (Trabucchi, 2020). They range from Two-Steps and Zig-Zag to Commitment

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Community and Single Target Group strategies, focusing on one side before expanding to the other, using subsidies and incentives, leveraging existing networks, allowing the same user to belong to both sides with a different role, and so on.

At the same time, the platform provider must design a dual value proposition to establish a meaningful platform (Muzellec, et al., 2015) and manage the onboarding process for various sides effectively, ensuring that each new player is motivated to join by providing access to a large pool of actors from the other side.

This last point is fundamental not only for the sustainability of the platform-based business model in its initial lifecycle phases but also to ensure a long-term perspective for the solution offered.

### Scalability

What all these strategies and tactics have in common is the ability to scale efficiently without sacrificing quality, as they leverage the same underlying asset and network externalities.

Leveraging network effects, platforms can achieve rapid and efficient expansion due to their minimal marginal expenses, utilization of automated technology, and the lack of physical assets necessitating substantial investments in both capital and time. The technological infrastructure, often based on a modular framework hosted on the cloud, ensures scalability and elasticity of the network, reducing uncertainty in predicting future resource needs and providing a high level of user experience even in the presence of demand peaks.

Once the infrastructure is properly set, the platform's role is to ensure a frictionless entry of users (scalability's enabler) and curate internal exchanges in order to trigger the "firm inversion process". This process occurs when a business model places more emphasis on external activities rather than internal ones, meaning that the core competencies and value propositions are centered around enabling interactions between external parties rather than providing goods or services internally.

As a result of this shift, a platform business model becomes less focused on producing, selling, managing inventories, and forecasting demand. Instead, it concentrates its efforts on developing and improving the service to better serve the needs of its users, reducing overall risk, and preventing multihoming with the ultimate objective of increasing the switching costs for participants.

### Asset

As mentioned, the key asset of a platform owner is constituted by the technology infrastructure that enables the sides to interact. Building upon this architecture, successful providers design algorithms, features, and user experience (UX) that facilitate the matching among sides and lock-in users in the ecosystem. In addition to the digital curation process (Yakel, 2007) – practice of selecting, organizing, and

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presenting digital content to customers in a way that adds value, improves their overall experience, and avoids negative network effects – the platform provider puts in place controls, validation, verification, and assistance to create and maintain trust in the managed interactions.

In addition to the technology infrastructure, platforms also benefit from the digital nature of their architecture, which allows them to gather vast amounts of data generated by users and their interactions on the platform. They include both demographic and psychographic information, collected passively by monitoring user behaviours, and metadata generated through active interactions (Ronteau, et al., 2023). These data constitute a valuable asset for the platform provider, as they can be exploited to gain insights that improve the customer experience, such as personalized recommendations, optimized matching processes, and reduced search times. Furthermore, they can be used to identify future trends, discover opportunities for growth, initiate demand/supply side extension strategies, or exploit the existing relationships between sides (Trabucchi, et al., 2023).

Finally, data can be viewed as an asset that is never fully exploited (idle) and can act as a trigger to initiate the “Deming cycle” of the platform: identifying idle assets, designing new value propositions, and getting more players on board (Trabucchi, et al., 2020).

The third fundamental asset is the community (or sides). The platform provider leverages the physical assets owned by its participants to create complementary value-added services. These services are designed to be efficient and effective, resulting in customer lock-in within the ecosystem and enabling them to pay in different forms (fees, attention, data, etc.).

These characteristics of platforms are particularly relevant for two main reasons:

- Minimization of the risk
- Revenue & cost structure

### Minimization Of the Risk

The business risk refers to the exposure to factors that could lower profits or lead to a failure in achieving set goals.

In general terms, it can be divided into two main categories (Shahzad, et al., 2020): idiosyncratic risk (unsystematic or company-specific risk) and market risk (systematic or non-diversifiable risk). Idiosyncratic risk is specific to a particular company, sector, or asset and is not correlated with the overall market. On the other hand, market risk refers to the potential for investment losses due to changes in overall market conditions or factors that are not under the control of the firm.

Considering the different stages of a firm life cycle, both idiosyncratic and market risks, as well as total risk, are higher during introduction, growth and decline stages

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due to limited resources, capabilities, and competitive advantage, while lower in mature stages (Shahzad, et al., 2020).

Platforms face significant challenges in the early stages when they need to attract a large number of players. However, once this initial phase is overcome, the business becomes self-reinforcing as it grows, resulting in lower risks compared to traditional firms. Platforms are agile organizations that rely on a few/zero physical assets that can renew themselves, adapting, changing quickly, and succeeding in dynamic, ambiguous, and turbulent environments. This is possible due to their low cost and time required to implement changes.

Furthermore, considering business risk as the combination of the probability of an event and its consequence ( $risk = likelihood \times impact$ ), platforms tend to have again a lower risk. In fact, the impact of a failure of one supplier or customer on the platform's business is inversely proportional to the size of the side, given that they are intermediaries between two or multiple parties composed of a large number of interchangeable players. Additionally, due to the "business natural selection" and low barriers to join the platform, a player that fails is quickly replaced by another that is more efficient and better able to capture the value of the network.

Therefore, once the ecosystem has reached critical mass and the positive feedback loop is established, which is the most challenging aspect for this type of business, the overall risk for the provider is low due to its efficiency in adapting to change, ability to minimize the impact of potentially negative events, and the low investment required in terms of money and payback time.

However, it is important to mention that even established platforms face some risk. Specifically, they must refine and update their curation mechanisms, continuously renew themselves, and retain customers who have low switching costs. Otherwise, these customers could potentially trigger a negative loop by leaving the platform and joining another that offers a similar service.

### Revenue & Cost Structure

Platforms typically use a variety of pricing strategies to generate revenue from the interactions among their members.

The first step in developing a monetization plan is to study the characteristics of the participants in order to determine who should be charged. They may differ in terms of motivation, objectives, incentives, and price sensitivity, all of which can affect the way in which they interact with the platform and the value they create. Therefore, it is important to consider the trade-off between the number of participants and interactions (network effects), and the price they are willing to pay (not only in monetary terms).

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Secondly, platforms have to select among the variety of pricing options available once they have a clear understanding of which users are more price-sensitive and which ones can be charged to participate (Parker, et al., 2016). These options include:

- **Cross-subsidization:** platforms can charge less price-sensitive users a full price while subsidizing, at least partially, the others, even if they belong to the same side. This strategy is effective in preventing the most price-sensitive users from abandoning the platform, which could destroy the network effect.
- **One-sided subsidization:** charging one side while subsidizing the other is a viable strategy when one side derives high value from interacting with the other, but the opposite is not true.
- **Super-profile subsidization:** some platforms may charge most users while subsidizing super-profile users. This strategy is adopted because super-profile users can attract a large number of users, and the value for the other side is significantly lower without them on board.
- **Full charging:** charging all users is suitable especially for exclusive membership associations where participants want to interact only with a certain kind of prestigious member.

Thus, the platform provider should decide which interactions to prioritize, and which are not essential to shift the focus from quantity to more quality based exchanges (Trabucchi, et al., 2021). Hence, the provider can even choose to charge price-sensitive users who may leave the ecosystem, to enhance core interactions and retain motivated users. However, strengthening positive network effects and encouraging desirable exchanges requires a sufficiently large customer base (critical mass) on all sides involved.

The third important step for a provider is to envision its future strategy. Once participants are accustomed to receiving services for free or at a low price, charging them for the same value or reducing the quality of the offer can have a negative impact on the user experience and increase the risk of losing many users from the ecosystem.

Thus, it is essential to carefully evaluate and choose the most suitable pricing strategy for the platform analysing the offer from a different perspectives. Some possibilities that can be adopted are:

- **Commission fee:** for each transaction made between the sides of the platform.
- **Subscription fee:** to access premium features or services.
- **Freemium model:** offering basic services for free and charging for premium services or features.
- **Pay-per-use:** charging a fee for each use of the platform or for each unit of service consumed. For example, AWS charges customers based on the amount of data stored and the amount of computing power used.
- **Dynamic pricing:** the platform, analysing historical and real time data, adjusts prices based on supply and demand.

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- **Subsidy:** only the side that is interested on the other pay for the access.

Of course, these alternatives could be combined in several ways to meet the needs of their specific business model and market.

Platforms have unique **cost structures** that allow them to operate at a relatively low cost compared to traditional businesses with physical assets. As mentioned previously, one key factor is the pace at which they can scale and expand their operations without incurring significant fixed costs. Platforms can quickly onboard new users and providers without necessarily incurring additional costs for infrastructure or resources.

Considering fixed costs as expenses that do not vary with the volume of transactions on the platform, the main components are associated to:

**Software development and maintenance:** it is the foundation of the platform's functionality and features because there is the need of flexible and scalable infrastructure to accommodate growth and changing user needs. Fixed costs associated to this category include the initial investment in the architecture, which may involve hiring in-house developers or outsourcing to third-party firms.

**Overhead expenses and salaries:** refer to the indirect operational expenses that are necessary for the functioning of the platform. Overhead expenses may not be as significant as they are for traditional businesses with physical assets and rent. However, cost of cloud computing services, internet connectivity, and software licenses need to be carefully considered.

**Salaries** constitute a major cost for platforms because they require a variety of employees with different skill sets, such as software developers, data scientists, marketing specialists, and customer support staff.

These costs are typically incurred at the start of the platform's development and are not influenced by the number of users or the volume of transactions. As a result, their impact on the overall financial viability of the platform decreases over time as the user base grows.

Variable costs, on the other hand, are expenses that vary with the volume of transactions or users on the platform, such as hosting fees, payment processing fees, and customer support costs. Mainly belonging to this category are:

**Marketing expenses:** they play a key role in attracting and retaining users and they can take several forms, including:

- **User acquisition** costs: advertising, promotions, and other marketing activities aimed at attracting new users. These costs can vary widely depending on the strategy and the target audience.

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- **User retention** costs: once a user is acquired, it is important to keep them engaged with the platform. This can include the cost of email campaigns, push notifications, and other strategies aimed at keeping users active and returning to the platform.
- **Branding and reputation** management: they are mainly associated to advertising campaigns, aimed at building brand recognition, and efforts to manage the platform's reputation through social media.
- **Partnership and collaboration** costs: these can include the cost of developing partnerships with other organizations, as well as collaborating with influencers or other individuals to promote the platform.

Overall, marketing expenses can be a significant part of a platform's cost structure, especially in the early stages of growth while, adopting and using open-source software strategy, many platforms were able to reduce costs. In fact, open-source software is free to use and can be customized to meet the specific needs.

**Software maintenance:** they include ongoing maintenance and updates, which may involve fixing bugs, adding new features, and improving user experience. These expenses are related to the continuous enhancement of the platform's value proposition and services provided to its users. To stay competitive and appealing, the platform must consistently improve its curation mechanisms and algorithms while launching new features to retain and engage its participants.

The main competitive advantage of the platforms' cost structure is the zero-marginal-cost mechanisms, which means that the cost of serving additional users or transactions is close to zero as the infrastructure is able to host a huge number of users. This allows platforms to enjoy economies of scale and lower their overall costs.

Additionally, platforms can harness user-generated content and interactions to create value by leveraging the ecosystem. This approach not only increases user engagement but also enhances the overall value of the platform, while generating new content for other participants without requiring any dedicated cash-out flow from the provider.

### Unpaid And Collaborative Complementors

To conclude the list of the elements that support and contribute to the success of multi-sided platforms it is important to define the complementors and their role in the business (Pellizzoni, et al., 2019).

Complementors are companies that make ancillary products that expand the platform's market. Considering the relevance of network effects, to trig a winner-takes-all dynamic (Schilling, 2002), which is likely to occur in this kind of business, the platform provider's objective is to attract the highest number of complementors and users to its platform in order to become the leader, leveraging network effects (Gawer, et al., 2002). Therefore, platforms are considered multi-sided markets, where

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producers of complementary goods, known as **traditional complementors**, on one side aim to attract users on the other side. In addition to these classical complementors, which are included in the platform's payment scheme as they gain from transactions or pay to interact with the other side, two other groups of complementors are important: unpaid and collaborative complementors (Boudreau, et al., 2015).

**Unpaid complementors** are a category of platform participants who work outside of a price system and do not receive any monetary compensation for their contributions. Despite not being paid, their work provides added value to the entire ecosystem. The underlying mechanism behind their contribution is based on signalling and reputation motivations (Boudreau, et al., 2015), where signalling refers to actions taken to demonstrate a particular quality, and reputation refers to the desire to establish or maintain a positive reputation level within a community or social group. Rather than competing for sales, they seek to attract the attention of users as a recognition of their ability and the value of their output. These characteristics make them interesting to platform providers for two main reasons:

- They increase the overall value of the platform without requiring anything in exchange from the provider.
- Unlike traditional complementors, they are less responsive to platform scale and network effects, making them a useful means of minimizing the usual chicken-and-egg problem.

As a result, the platform owner can manage this category as a low-cost source of high value for the entire ecosystem. They can reduce development costs, provide development tools, or simpler environments to encourage these individuals to create content. However, having too many unpaid complementors can also produce negative same-side effects, reducing the overall value of the platform. To prevent this, the platform owner should leverage governance tools such as laws, norms, and architectures to regulate the environment and exposure to users. It is essential to reduce noise for the other side by curating cross-side and, at the same time, to take care of same-side competition among unpaid complementors, promoting high quality and creating a mechanism to disincentivize those who are not as involved.

**Collaborative complementors** are individuals or organizations that work with the platform provider in a cooperative manner, sharing resources and knowledge to achieve mutual benefits (i.e., Wikipedia contributors).

Unlike traditional complementors, they are not compensated through direct financial incentives, but rather through the advantages that come from being part of the platform ecosystem, learn from other members. Their motivation comes from the desire to collaborate and contribute to a shared goal or project, sharing a common interest or passion, and working together to create something of value.



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Hence, from the provider perspective, they provide data, expertise, or technological solutions, which can help improve the overall value proposition, user experience and the curation mechanisms. Communities often establish internal tacit rules that are shared among participants without any external imposition. This behaviour, aligned with the Attraction-Selection-Attrition framework (Schneider, 1987), suggests that individuals and organizations are attracted to groups that share their values and attitudes. If they do not fit in with the culture and values, they may leave the organization. Instead if the community is aligned with their values and attitudes, participants are motivated to stay and contribute to the convergence of the community towards a shared purpose over time (Schneider, et al., 1995).

Thus, considering the management of this category, the platform provider must act as a supervisor in order to maintain and support the communities that are aligned with the strategic purpose and value proposition of the platform, and to eliminate and discourage those that could create problems or have a different scope that could blur the mission and image of the platform.

To conclude, a platform business does not need to own all the inimitable resources of its ecosystem, but it should aim to own the resources that hold the greatest value. It should have the ability to facilitate interactions between sides and simultaneously enhance an ecosystem where complementors are motivated to participate. Furthermore, the platform owner needs to establish the most suitable pricing mechanism that enables capturing the highest value without compromising the utility of the participants.

### 2.3 PLATFORM THINKING

#### 2.3.1 Platform Thinking Introduction

Up to this point, a comprehensive overview of different platform typologies has been provided, along with an examination of the determinants of success for this type of business. Taking into account the review of business model innovation and how it can offer advantages to the entire organization presented in the first section, it is now appropriate to introduce the missing link in the chain: Platform Thinking (Trabucchi, et al., 2023).

Platform Thinking is the ability to see Hybrid Multi-Sided Platforms as a useful resource-orchestration structure to unveil innovation opportunities (Trabucchi, et al., 2021).

Platform thinking is not just a strategy or a set of principles; it is a mindset that represents a fundamental shift in how individuals and organizations approach problem-solving, innovation, and value creation. At its essence, it encourages to view challenges and opportunities through the lens of ecosystems, recognizing the interconnectedness of various components and stakeholders.

#### 2.3.2 Underlying Principle

The original notion of Platform thinking was introduced as the key to leverage high variety of strategies that allow firms to achieve both differentiation and growth without increase in cost or complexity. Platform thinking was originally depicted as the process of identifying and exploiting the shared structure in a firm's activities and offerings to achieve leveraged growth and variety (Sawhney, 1998).

Although it represents the first milestone of an ongoing research field, at least three main pillars have been clearly embedded since the beginning:

1. Platform Thinking is based on core-derivative logic, where the core product is a platform that can generate complementary products and, eventually, new revenue streams (Leijon, et al., 2017).
2. Due to its nature, Platform Thinking can be applied to any kind of firm, especially incumbents that have idle assets and resources that are not fully exploited.
3. Platform Thinking is a process, a continuous and dynamic evolution aimed at unveiling hidden opportunities starting from what the firm is and how it is positioned in the market. The platform thinking process (Trabucchi, et al., 2023) starts with the definition of the value map, a framework to identify all the key stakeholders involved in the business and the value flows among them. Once the firm is positioned inside the ecosystem, its assets are analysed.

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This process is aimed at finding idle assets and understand for which new purpose they can be useful. Finally, it requires to define the ways in which the company would exploit those assets and how to get there.

The steps of the process are not linear: step back and read (where you are) [1], drive in and read (what you have) [2], drive in and write (where you may go) [3], step back and write (the roadmap to get there) [4] (Figure 2.22: The Platform Thinking Process ).

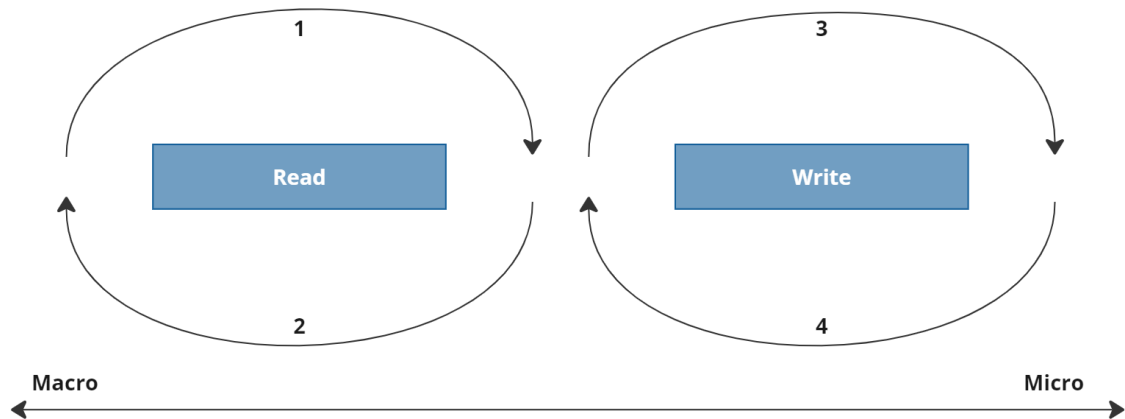


Figure 2.22: The Platform Thinking Process (Trabucchi, et al., 2023)

Hence, they suggest that the platform thinking process is a continuous study of the firm, an exploration routine that should analyse the firm from both outside (Macro perspective) and inside (Micro perspective), aimed at understanding if new opportunities or threats has emerged and if some resources could be further exploited.

### 2.3.3 Platform Thinking for Established Firms

Established companies based on traditional linear value chain, with suppliers, internal processes, resources, and knowledge that transform them in something valuable for the end-customers may exploit the value of the platform business model evolving toward Hybrid Multi-Sided Platforms (Trabucchi, et al., 2021). Two-Sided Platforms, acting as a trigger for business model innovation in mature industries such as retail (Hänninen, et al., 2018), can be considered innovative architectures that enable and support the application of platform thinking in established firms.

Incumbents that are operating in the market with established external relationships, consolidated internal routines and specific capabilities (Steen, et al., 2017) can apply platform thinking addressing four different dimensions (Leijon, et al., 2017): stimulating value creation, capturing value, protecting value, and evolving ecosystem.

Stimulating value creation means activate and sustain a collaborative process, where a focal player promotes the overall welfare of the ecosystem and the success of

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multiple actors (Baldwin, et al., 2011). It implies fostering both intrinsic and extrinsic motivations of the players involved (Boudreau, et al., 2011), stimulating them to participate more and, as a result, achieve the self-sustaining status of the ecosystem.

Once the value is created, the firms in the ecosystem need to develop the capabilities to restructure their competitive advantage and eventually reap profits from innovation (Ritala, et al., 2013). This phase is fundamental for capturing the value generated in response to the first step and for establishing an environment capable of accommodating changes and swiftly exploiting new opportunities.

The focal actor within a valuable ecosystem regains an attractive position. As such, the owner of that status must be able to protect it through effective governance mechanisms, bounding the participant behaviour without excessively constraining them (Wareham, et al., 2014). Furthermore, it must be able to defend the boundaries of the ecosystem, preventing opportunistic behaviours and increasing switching costs, as well as safeguarding innovation outcomes.

Finally, considering the dynamic nature of platform ecosystems, the focal actors must actively engage in creativity and continuously reconsider how they stimulate, capture, and protect value (Leijon, et al., 2017). This, together with a growth strategy that balances stability and the need for new (Wareham, et al., 2014), ensures the proper evolution of the entire ecosystem.

In order to address all these dimensions, incumbents have to develop a platform thinking mindset (Trabucchi, et al., 2023) within the organization shifting their focus from products to platforms. This involves sustaining and enhancing a set of capabilities for each dimension based on four main transitions:

1. **From Strategic Sourcing to Targeted Seeding:** incumbents should actively identify and attract specific complementors who can contribute to the platform ecosystem by sharing various boundaries of resources. Furthermore, the focal players have to remove the resistance of privacy concerns and regulation setting up a collaborative environment where, at least at the beginning, the scope of the ecosystem is intentionally limited and oriented to quality more than quantity (Trabucchi, et al., 2021).
2. **From Core Products to Related Complements:** incumbents should gradually shift the focus from developing and selling core products to actively nurturing the development of related complements, searching for new revenues streams that are connected and coherent with the existing business model.
3. **From Controlled Processes to Selective Recruitment:** the transition should move from a top-down approach, to manage processes aimed at actively seeking external partners, developers, or contributors who can bring new ideas, skills, and capabilities to the platform. Hence, incumbents must balance the autonomy and the openness level of the ecosystem (Di Minin, et al., 2010), establishing appropriate control and constraint mechanisms for participants.

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4. **From Long-Range Product Planning to Resource Orchestration:** incumbents should embrace resource orchestration, which involves dynamically allocating and leveraging resources within the ecosystem based on emerging opportunities and needs. This implies that the focal actors should continuously expand the boundaries of the ecosystem while, at the same time, ensuring effective incorporation mechanisms and enhancing platform performance.

Stimulate Value Creation	Capture Value	Protect Value	Evolve Ecosystem
Provide incentives	Profit from transactions	Protect firm position	Expand the ecosystem
Establish structures for co-opetition	Profit from spillovers	Protect ecosystem boundaries	Secure incorporation mechanisms
	Profit from new value propositions	Protect innovation outcomes	Enhance platform performance

Table 2.8: Capabilities to apply Platform Thinking (Leijon, et al., 2017)

In conclusion, this innovative mindset offers a support system to incumbents struggling with underutilized assets and traditional business models in a rapidly evolving digital landscape. By embracing Platform Thinking, these firms can harness their inactive resources, orchestrate ecosystems of value, and shift towards a future marked by agility and adaptability. In fact, the concept of PT extends a promising path forward, allowing established organizations to not only survive but thrive in the age of digital disruption, propelling them into a new era of sustainable growth and relevance.

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### 2.3.4 The Business Model Shift in Linear Businesses

Applying Platform Thinking to linear businesses means initiating a shift that involves the entire organization. An effective transformation of a company refers to the process by which the firm significantly improves its performance indicators (e.g., cost, quality, and service) to survive or develop better (Kanter, 1992). The success of the transformation does not depend only on the resources involved in the change (Berker, et al., 1997) and the organizational culture (Reger, et al., 1992), but also on the external environment and the pressure for change. These aspects highlight that the shift is not a linear process, and several components could influence the final result.

Focusing the analysis on the business model perspective, Platform Thinking represents a conceptual framework that can be used by both traditional firms based on linear business models and two-sided platforms. While firms that are launched as platforms from the beginning are more likely to have the mindset and capabilities to manage multi-sided relationships and exploit idle assets, linear value chain businesses could find some obstacles in changing their perspective. Although pipeline businesses have the potential to achieve significant results in a shorter period of time due to their financial strength and their already established customer base, they face several challenges as a result of their daily routines.

As a consequence, many incumbent organizations across industries and sectors want to become more like tech companies: fast, agile, and dominant in order to establish a process of breaking patterns. Hence, to make this change, the key step lies in adopting a technology operating model based on products and platforms (Gala, et al., 2023) and starting the Platformization process. It means to begin the transformation of a traditional business or industry into a platform-based business model (Islind, et al., 2016).

As mentioned, the main advantage of building a platform from an existing linear business, rather than starting from scratch, includes the ability to bypass the chicken-and-egg dilemma and the potential for a faster return on investment. This is because one side of the platform, either the demand or supply side, is already present and can serve as a foundation for attracting the other side. Furthermore, in addition to the customers who are already engaged in a relationship with the firm, established businesses also have data, information, resources, and capabilities which make it easier to develop the platform and start a smooth transition towards the new business model (Warg, et al., 2018).

Considering the potential benefits and challenges associated with this shift, established organizations require a set of guidelines and a theoretical model to effectively manage the transition. Therefore, according to Verhoef (Verhoef, et al., 2019), the digital transformation process of one business can be divided into three stages: digital application, digitalization, and digital transformation.

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In the initial phase, the focus is on adopting digital technology to change certain processes within the firm. In the second stage, the emphasis shifts towards the digitalization of specific functions. Finally, in the third stage, the firm aims to deeply transform its value creation and operations through the widespread application of digital technologies.

In terms of process management, these steps involve implementing digital technology across all functions of the firm and prioritizing the development of digital capabilities in order to start a process of targeted digital growth strategies (Hein, et al., 2019). At the organizational level, digital transformation from product to platforms involves taking action in five domains (Gala, et al., 2023):

1. **Build product teams around the end user experience:** the technology represents the enabler of the offering that allow customers and employees to engage in activities that create value. Therefore, an effective organizational approach has often been to build cross-functional product teams around stages of the customer experience, define a shared mission (Parker, 2010) at every level of the hierarchy, and outline, together with the team, the business outcomes for which they are accountable.
2. **The platform:** embarking on the transformation, that simply reorganizing around products will not be sufficient. Platform teams, when they are designing and operationalizing platforms, should focus on three elements: organization of platform teams, interaction with the product teams and platform operations. This holistic approach of addressing the development of the platform together with the ongoing business ensures the ability to manage the platform from different points of view, develop an infrastructure that is coherent and aligned with the current core business, and link objectives and key results to the business.
3. **Autonomy:** product and platform teams should have a reasonable autonomy to ensure flexibility and to commit to clear OKRs linked to outcomes and aligned with the goals of the company. This approach decentralizes decision making, eliminates duplicate responsibilities, and foster a collaborative and outcome-based culture.
4. **Establish joint accountability between tech and the business:** considering that the main goal of a product and platform transformation is to generate the biggest impact for the business, companies have to sustain business involvement and foster collaboration between different functions by establishing joint accountability between technology and the business for delivering the Objectives and Key Results (OKRs).

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5. **Developer experience:** companies should consider allocating 10 to 30 percent of developer capacity to building new engineering and automation capabilities and upgrading skills through tailored learning programs (Gala, et al., 2023). It is necessary to create an environment where developers and engineers can thrive by engaging in work of the highest value. Hence, through a great developer experience, they are motivated to replicate the quality level in the user journey.

Therefore, when an incumbent decides to transition its business model from a linear approach to a platform-oriented one, it becomes fundamental to exhibit a strong commitment and belief in the potential success of this transformation. Otherwise, given the substantial effort required to sustain such a change, achieving a positive transformation becomes challenging and expensive.



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### 2.3.5 How deal with the shift? Strategic Innovation

Although the strategic dimension of effectively supporting the entire transaction is not the primary focus of this study, an overview of one possible approach to dealing with this shift is proposed to conclude the literature review on the topic.

**Strategic Innovation** refers to a process for established organizations in which they conceive and implement new growth strategies, product/service categories, or business models that fundamentally disrupt the status quo and create substantial new value for both customers and the company (Markides, 1998).

The reason for proposing this framework over others is that it aligns with the purpose incumbents should pursue to prevent the success paradox and it effectively addresses business model innovation. In fact, as well as initiating a business model process is fundamental for long-term survival, embracing strategic innovation is critical to ensure sustained growth over time by envisioning new horizons, aligning strategies with these visions, and relentlessly focusing on customer needs.

At its core, it thrives on collaboration, calculated risk-taking, and the ability to adapt. Thus, thorough market research, experimenting with new ideas, and measuring success, organizations can disrupt the status quo and generate substantial value for their customers.

Strategic innovation is a potent force for growth and resilience in today's dynamic business landscape. It emphasizes that a clear vision for the future, a well-defined strategy aligned with the organization's goals, and a strong focus on understanding both customer needs and other stakeholders' requirements are the core elements that enable an organization to remain competitive and responsive to changing market dynamics.

While Strategic innovation provides the vision and direction, a successful implementation is related to innovation streams. Innovation stream refers to a portfolio of innovations within a firm that includes incremental innovations as well as more substantial ones that either extend the firm's existing technical trajectory or move it into new markets. These innovation streams manifest a firm's dual capability to exploit its current competencies while also exploring future opportunities (Tushman, et al., 2010) through a spectrum of activities from product innovation—enhancing and refining current offerings—to process innovation—improving the ways in which value is delivered.

The firm's strategy must integrate the insights gained from its innovation streams to anticipate and shape market trends rather than react to them. In doing so, strategic innovation doesn't just respond to market changes—it creates them, leveraging the firm's capabilities in product and process innovation to explore new business models and create new value propositions.

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This conversation can be extended to business model innovation (Spieth, et al., 2014), emphasizing it as a multidimensional construct that represents the nexus of product, process, and strategic innovation and acts as a vehicle for exploiting these innovation streams to reconfigure the ways in which firms create and capture value.

Kortelainen, Piirainen, and Tuominen (Kortelainen, et al., 2008) stitch these elements together within a dynamic model that incorporates learning as a critical component, arguing that “the firm’s ability to innovate and adapt its business model is predicated on its learning mechanisms,” which are, in turn, fuelled by the ongoing pursuit of product and process innovations. Collectively, these perspectives underscore the symbiotic relationship between the evolutionary paths of product and process innovations and the transformative impact of business model innovation, shaping a firm’s trajectory within its innovation streams.

What has been discussed underscores why strategic innovation may serve as a potential means to navigate shifts in business models. It directs and guides the formulation of a strategy comprising various innovation streams, characterized by their focus (such as product or process) and the extent of change (from incremental to radical). These streams converge in business model innovation, which encapsulates all preceding elements to be efficacious. As such, business model innovation acts as a receptacle that requires the integration of these diverse aspects to yield a potent competitive edge.

Furthermore, strategic innovation connects the concept of developing a value proposition introduced in the chapter on business models, with the multi-stakeholder approach described in the section of platforms, adopting the Platform Thinking framework as “how to do it” method to develop a new platform – based business model for established firms (Figure 2.23: Literature Review Framework).

# LITERATURE REVIEW

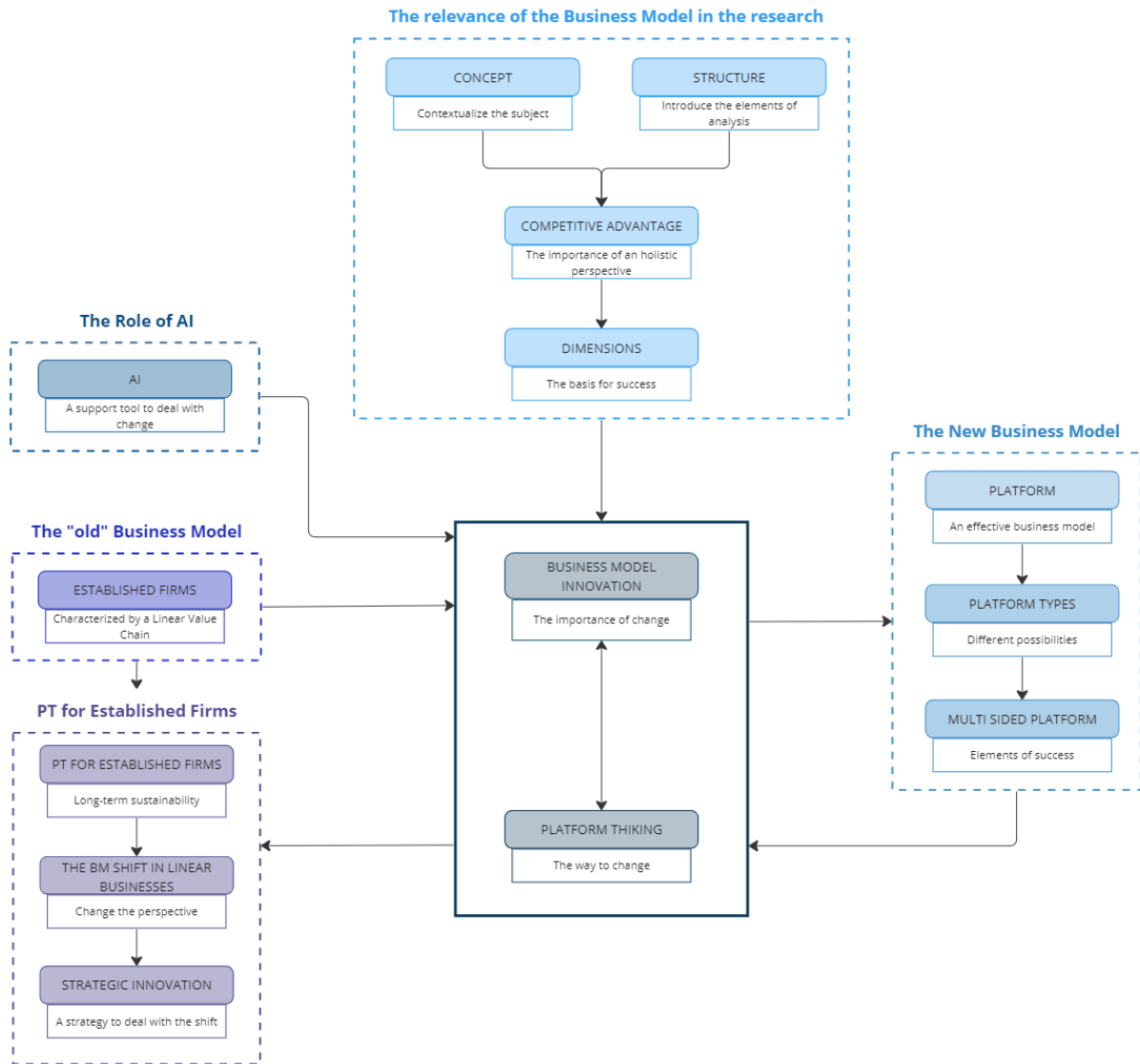


Figure 2.23: Literature Review Framework



## LITERATURE REVIEW

### 2.4 LITERATURE GAP & RESEARCH QUESTION

With the chapters on Platform Thinking and the shift in business models for linear businesses, the review of existing literature that supports the purpose of this study is concluded.

This final topic is especially intriguing as it bridges the gap between the realm of platforms and that of traditional linear incumbent firms. It illustrates how these entities can evolve over the course of their lifecycle by embracing the practice of business model innovation as an effective means to achieve long-term success and avoid the risk of being stuck in a success paradox.

Considering the inherent advantages of platforms, such as rapid growth and minimal marginal costs, and their disruptive influence on established markets (Trabucchi, et al., 2019) both academics and managers have delved deeper into the possibility of incumbents leveraging platform thinking to promote innovation. Besides, a substantial stream of research on business model innovation, the components of business models, and the advantages and disadvantages of various business model types has been thoroughly explored.

However, these frameworks often do not encompass the entire lifecycle of a firm. Often, the frameworks proposed for established firms to manage business model innovation remain at a high level and do not delve into the specific typology of business models, staying at the process level. They may also fail to investigate specific phases, such as the initiation phase marked by uncertain revenue generation, profitability, and cash flows (Biswas, et al., 2022).

Furthermore, existing studies on platforms often emphasize the inherent advantages of the platform business model, with the majority of cases tending to focus on the success stories of companies that originated as platforms or delving deeply into specific use cases developed within the same organization.

While these studies demonstrate internal statistical validity, indicating a high level of accuracy within the specific sample used for the research, the ability to generalize these findings to a broader population or real-world scenarios remains limited.

In addition, due to the recent rapid development of this topic, the role of Artificial Intelligence as a supportive tool for managers and entrepreneurs of established firms tasked with initiating this transition has not yet been explored.

Therefore, considering the existing gap in the literature, this thesis has three purposes:

## LITERATURE REVIEW

- To uncover new evidence on how incumbent firms can initiate the process of business model innovation by transitioning from a traditional linear value chain to a platform-based model while harnessing the power of AI to sustain this initiative.
- To assess the existing level of knowledge regarding the concept of platforms and to evaluate its overlapping with the domain of digital services.
- To enhance the external validity of the research findings associated with how incumbent firms are embracing platform thinking as they aim to transform their business models from conventional linear value chains.

These objectives give rise to the exploration of the following research question:

*How can established firms, characterized by a linear value chain, leverage AI tools to embrace platform thinking and initiate the process of business model innovation, leading to the development of a multi-sided platform?*



# 3. RESEARCH METHODOLOGY

## 3.1 Research Methodology Introduction

As mentioned in the previous sections, the aim of this study is to explore how incumbent firms, which typically operate with linear value chains, can successfully embrace platform thinking as a means to kickstart the process of business model innovation, ultimately leading to the creation of a multi-sided platform.

Therefore, to effectively examine the subject matter, a structured research methodology was adopted. It guarantees logical progression, fosters reproducibility and credibility, and terminates in the generation of valuable insights within a specific field of study. Among the set of possibilities for conducting the analysis, given the limited contributions in the field, an exploratory research design was considered more aligned with the purposes of the study mentioned in the previous section.

In particular, the multiple case study methodology was selected based on its effectiveness in addressing “how” questions (Eisenhardt, 1989) and its orientation toward generalizing results through a comparative analysis of findings. Consequently, the next section will be structured as follows:

- Research Design: Qualitative Research
- Selection: Rationale and Insights
- Case Study Structure
- Problem Setting
- Definition of the Objectives
- Framing the analysis in extant theories.
- Methodology
- Evaluation and assessment



### 3.2 Research Design: Qualitative Research

In general terms, qualitative researchers aim to understand and explain different aspects of human experiences, often by listening to the insights of selected individuals (informants). They make an effort to be open about their own biases and interpretations, so that others can form their own opinions on the matter (Heath, 1997).

However, the choice of qualitative research as the methodology is driven by its emphasis on the generation and construction of new theories. While quantitative research aims to test existing theories by analysing data through mathematical and statistical methods, qualitative research gathers data from multiple sources, aggregating and combining them to assist the analyst throughout the entire process.

In the realm of qualitative research, the chosen methodology is the case study, specifically the multiple case study approach. This selection was made to delve into the intricacies of why and how certain phenomena unfold within distinct contexts. As previously mentioned, this method allows for a deep exploration of specific scenarios, enabling a comprehensive understanding of the factors at play.

### 3.3 Selection: Rationale and Insights

In a multiple case study, the research involves the examination and comparison of multiple contexts. More precisely, it entails the comparison of various individual case studies. This approach allows for a comprehensive exploration of diverse scenarios and facilitates meaningful comparisons between them.

Considering an individual case study, it is defined as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, particularly when the boundaries between the phenomenon and context are not clear (Yin, 2009).

This definition emphasizes the fundamental aspects of case studies, protocols used to examine complex phenomena observed in real-world settings. The research questions are typically open-ended, as they involve investigative inquiries where informant statements are subject to confirmation or refutation.

Because the phenomenon being studied in this research is contemporary, deeply embedded in its context, and there is a lack of existing theories to form hypotheses beforehand, an exploratory multiple case study approach is employed as the protocol. Hence, a selection of cases where the object of interest can be observed was made. Although exploratory cases usually start with minimal or no preexisting theories and hypotheses, beginning with a completely blank theoretical slate is virtually impossible (Eisenhardt, 1989). Therefore, theories related to Business Model Innovation and Platform Thinking were applied to established firms as a starting point for the data collection process and to define the study's general objectives.

# RESEARCH METHODOLOGY

## 3.4 Case Study Structure

Conducting a case study involves following a methodology composed by a set of predetermined steps, which include (Ghezzi, 2023):

- Problem Setting
- Definition of the Objectives
- Framing the analysis in extant theories.
- Methodology
- Evaluation and assessment

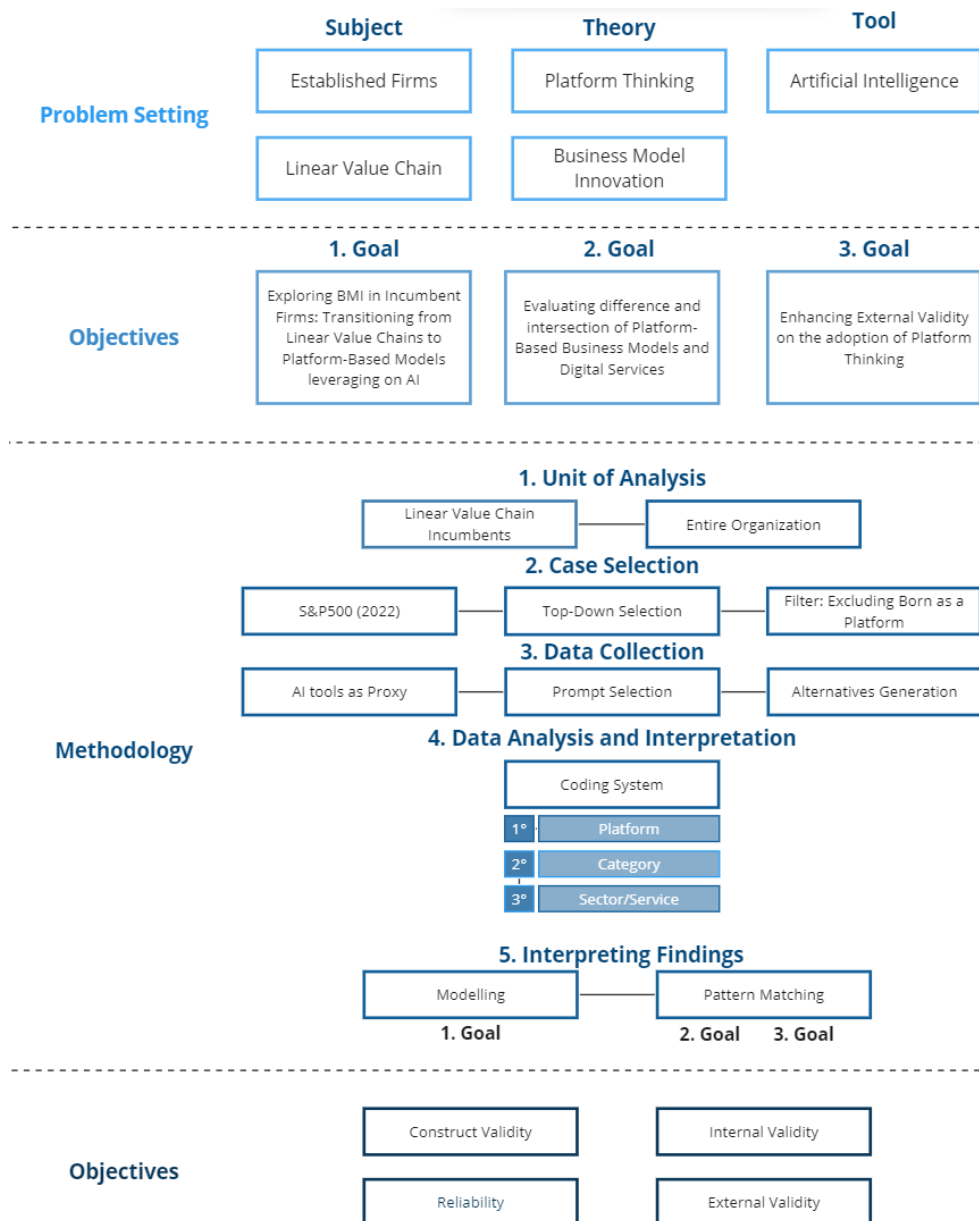


Figure 3.1: Research Methodology Structure

### 3.5 Problem Setting

To employ case studies as a research method, the first step involves defining the problem's boundaries.

The first phase of the design process is problem setting. Here, the research is performed in order to analyse the situation, the market, and the target group and its needs (Diefenthaler, 2008). The importance of this initial analysis step is highlighted by the shift in the role of designers. They are transitioning from problem-solving roles to problem-setting positions, role in which the focus shifts on influencing the strategic criteria by framing and reframing a problem, rather than immediately diving into execution. (Brown, 2008).

This step is fundamental in order to established processes, operations and even business model that are characterized by a clear and define scope. This is crucial to ensure that high-quality data are collected and that the level of completeness is high, preventing the "garbage in – garbage out" scenario. Therefore, the information collected needs to be highly accurate otherwise data analytics, applications or business process will be unreliable due to poor quality data entry (Kilkenny, et al., 2018).

Considering the problem setting of this study, is important to start from the evolution of incumbent firms' strategies. It will exert a profound influence on individuals, society, and the planet as a whole. Moreover, considering the demonstrated impact of platform-based business models through companies like Amazon, Airbnb, and Uber, the effects of transitioning to such models are even more pronounced. The significance of the argument is confirmed by its novelty. Although theory on business model innovation (Massa, et al., 2013) has some years, a comprehensive theory on platforms, and especially on Hybrid Multi-Sided Platforms (Trabucchi, et al., 2021), is recent, especially if it is addressed through the lenses of Platform Thinking (Trabucchi, et al., 2023) and Artificial Intelligence.

Therefore, the boundaries of the problem are defined within the context of these two theories, with a particular emphasis on established firms: incumbent companies that, differently from startups and emerging businesses, prioritize market stability and wield market dominance. This divergence, coupled with the shift from a linear value chain perspective to a platform-centric approach, highlights the critical importance of focusing the analysis on this specific group of firms as unit of analysis.

### 3.6 Definition of the Objectives

Defining the objectives involves determining what you intend to discover and selecting the theoretical frameworks for investigating and interpreting the case.

Given the nature of exploratory case studies, which often involve limited reliance on theoretical framing and hypothesis formulation, as variables and their relationships are expected to emerge during the data gathering process, the research was developed starting from a broad area of analysis to let emerge findings and patterns.

Specifically, regarding the research purposes outlined in the preceding section, the study's objectives encompass:

1. To uncover new evidence on how incumbent firms can initiate the process of business model innovation by transitioning from a traditional linear value chain to a platform-based model while harnessing the power of AI to sustain this initiative.
2. To assess the existing level of knowledge regarding the concept of platforms and to evaluate its overlapping with the domain of digital services.
3. To enhance the external validity of the research findings associated with how incumbent firms are embracing platform thinking as they aim to transform their business models from conventional linear value chains.

### 3.7 Framing the analysis in extant theories.

Since the case is exploratory, it does not assume any predefined relationships among variables or propose specific propositions or hypotheses. Instead, the case will utilize Business Model Innovation theory and Platform Thinking as a starting point, with theory contribution emerging because of the empirical research conducted.

### 3.8 Methodology

Establishing a methodology involves five steps: it begins by identifying the unit of analysis for the case. Then, the second step is to choose the specific case or cases for the research process. Following case selection, data collection (3<sup>rd</sup>) and analysis (4<sup>th</sup>) take place, leading to the interpretation of findings (5<sup>th</sup>). Finally, the last stage of the process involves the evaluation and assessment of the case study.

#### 3.8.1 Unit of analysis

The unit of analysis delineates defines what the "case" is in a case study, representing the specific context within which the phenomenon of interest is situated.

## RESEARCH METHODOLOGY

In this study, the unit of analysis for each case is the entire organization and, in particular, established firm characterized by a linear value chain.

This choice is driven by the comprehensive nature of the Business Model Innovation process, which involves the entire firm, including its people, culture, resources, and operations. Transforming the entire company into a platform-oriented entity represents a strategic decision with far-reaching impacts on nearly every aspect of the organization. Therefore, it is not feasible to limit the unit of analysis to specific departments, resources, or teams, given the interconnected and holistic nature of the outcome. Simultaneously, the subject of analysis cannot include firms that were originally founded as platforms because they are not currently undergoing this kind of transition.

### 3.8.2 Case Selection

To enhance result generalization and facilitate comparative analysis within the theoretical sample, the method chosen to select the case is known as theoretical sampling. Therefore, the data gathering efforts are focused on collecting information that will best support the development of a theoretical framework. In this multiple case study, two logics were employed:

- Replication: each case is analysed in the same manner, ensuring comparability.
- Heterogeneity supports external validity and potential results' generalization.

With the aim of addressing the research question from an objective and unbiased perspective, the starting point for case selection was identified in the list of companies that belong to the Standard & Poor's 500 (2022), commonly known as the S&P 500. This index tracks the stock performance of 500 of the largest companies listed on stock exchanges in the United States. The list was chosen for three main reasons:

- It encompasses approximately 80% of the American equity market in terms of capitalization. This characteristic ensures the diversity of cases across sectors and core assets, while simultaneously ensuring comparability between the firms based on market capitalization.
- The structure of the list aligns with the methodology of a multiple case study. In fact, thanks to the ranking of firms, the principle of sample saturation, which is the point in research where adding more cases to your study does not yield new or additional information or insights, is naturally reached when moving from the top to the bottom of the list. Furthermore, investigating the firms in a predetermined order enhances objectivity in determining the saturation point.
- Presence of incumbents: the average foundation year of the firms on the list is 1950, and only 10.6% of the companies were founded after 2002. This

## RESEARCH METHODOLOGY

highlights how the sample is populated by firms that have reached and/or maintained their position over a long period of time.

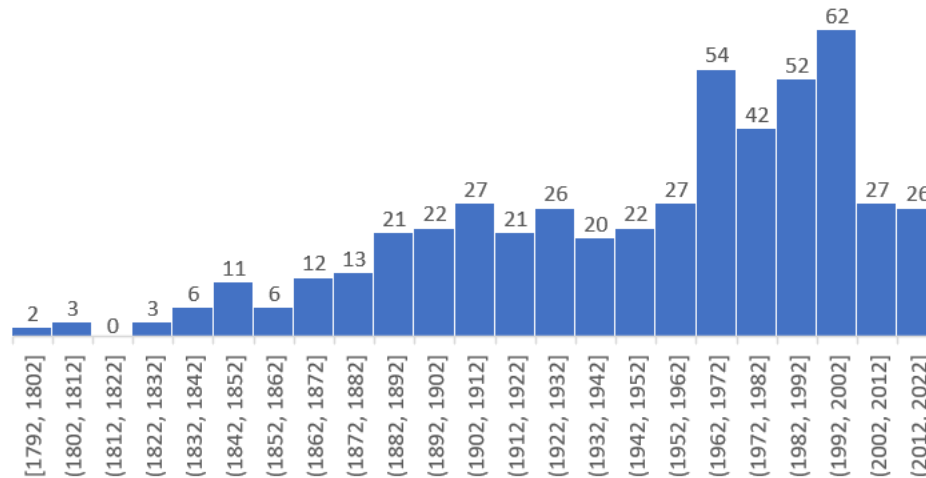


Figure 3.2: S&P 500 - 2022 - Foundation Year

Considering that the second step of the case selection process involves taking the firms in order from the first until the sample is saturated, a third and final step is needed. This step acts as a filter that excludes from the analysis those firms that were founded as platforms from the beginning of their lifecycle (Seawright, et al., 2008), such as Meta and Mastercard, among others. This decision, once again, is rooted in the purpose of this study: investigating how incumbents, characterized by a linear value chain, are addressing a platform-based business model.

To sum up, the cases selected for the analysis are non-platform firms from the S&P 500, chosen from the top of the list, with the number determined by the saturation criteria.

### 3.8.3 Data Collection

In theory, the data collection process should adhere to three fundamental principles: employing multiple sources of evidence, establishing a comprehensive case study database by utilizing notes, documents, and tables, and maintaining a clear chain of evidence to ensure study reliability and the ability to trace inferences backward.

Considering the dimensions of the firms in the sample, their geographical distribution, and the difficulty in reaching the top managers responsible for making strategic decisions related to the research question, primary sources were excluded as a source of data. Furthermore, considering the objective of comparing different cases using the same criteria and the aim of supporting the external validity of the results, it was decided to use two Generative AI tools as proxies to access a wide variety of data.

This choice is supported by two main factors:

## RESEARCH METHODOLOGY

- Data Source
- Comparability

### **Data Source**

Generative AI tools rely on a diverse range of data sources to fuel their capacity for understanding and producing human-like results. These sources encompass licensed data, providing foundational knowledge and language patterns, as well as publicly available data from the internet and other sources. Furthermore, a vast collection of text from books, articles, websites, and more is used as the bedrock for teaching the model the intricacies of language and the nuances of human understanding.

This combination of data sources empowers generative AI tools to offer coherent and contextually relevant responses while always operating within the boundaries of the information available up to their last training cut-off. Therefore, leveraging this extensive dataset as a source, generative AI tools represent an interesting and updated gateway to initiate and pursue a data strategy based on the principles of data collection, data evaluation, labelling, and data wrangling (Tauli, 2023).

For the purposes of this study, these tools are considered valuable for due to their ability to draw from various sources in an unbiased manner. Specifically, they can extract and provide a perspective that is not influenced by promotional goals and branding strategies that organizations typically exhibit when presenting themselves in public. Furthermore, their generative foundation aligns with the exploratory nature of the research question, oriented toward a new configuration and not associated with an evaluation of the current one where these instruments could face several challenges.

### **Comparability**

Comparability is a foundational principle for ensuring the validity and reliability of research findings. It guarantees that data collected from different sources or in various settings can be meaningfully compared and analysed.

However, achieving comparability can be a challenging process, as different data sources can introduce variations that affect the quality of the analysis and result in asymmetries in the information available for each case. These sources may encompass variations in data collection methods, measurement tools, timeframes, and even cultural or contextual factors.

These limitations, coupled with the difficulty of collecting a sufficient amount of data for each of the cases included in the analysis, along with the decision to prioritize the horizontal dimension (the number of different cases mapped) over the vertical one (in-depth analysis of each single case), represent other key points that drive the decision to use Generative AI tools as a gateway to collect data.

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Utilizing the subset list of S&P 500, which was presented in the previous chapter, the data collection process for this study is organized into three phases.

1. **Generative AI tools selection:** the instruments chosen to generate various alternatives for new platform-based business models were ChatGPT (model 3.5) and Bard. While ChatGPT's journey from concept to influential AI model exemplifies the rapid evolution of artificial intelligence (Bernard, 2023), Bard was chosen for two main reasons: to provide an alternative tool for diversifying the gateway for data collection and to overcome the limitation of data available on ChatGPT, which is set up to September 2021.
2. **Prompt definition:** once the gateways were chosen, the prompt for generating alternatives for a platform-based business model was defined as follows: *"Can you apply Platform thinking – which means using multi-sided platform-based mechanisms to unlock digital business transformation opportunities – to FIRM\_NAME?"*  
This prompt includes a description of the concept of Platform Thinking. This clarity in instruction helps to reduce ambiguity in the generated responses and ensures that the tool understands the task correctly.
3. **Alternatives generation:** for each case, corresponding to a firm from the list, a variety of alternatives are generated by applying the prompt to the two selected Generative AI tools.

### 3.8.4 Data analysis and interpretation

Once data are collected and organized, the analysis and interpretation process becomes a fundamental activity aimed at identifying patterns, relationships, and frameworks. Given the nature of the data collected, the method adopted is text analysis, a technique that involves examining and extracting meaningful insights, patterns, and information from written or textual data. The key component of this method is represented by content analysis.

Content analysis is performed through a process called coding, the analytical process of examining data, whether line by line or paragraph by paragraph (depending on one's preferred style), to identify significant events, experiences, feelings, and other elements that are subsequently categorized as concepts (Strauss, et al., 1990).

The literature about coding suggests that it is possible to label important information in the text analysed using the following two approaches:

- **Deductive coding:** this approach begins by formulating a research question and identifying theory-based elements of the study. Theory is then used to define the categories and codes for data coding, ensuring that the interpretation of results aligns with the deductively chosen theory



## RESEARCH METHODOLOGY

- **Inductive coding:** also referred to as open coding, this is an approach where the researcher starts with empirical data and allows the categories and codes to emerge from the text analysis process. Unlike deductive coding, it is more flexible, allowing for the development of abstract categories based on the data. These categories are then interpreted within the framework of existing theories

Given the research's objectives, the coding system consists of three layers (Figure 3.3: Coding System):

1. **Platform:** deductive code defined starting from the theory on the platform.
2. **Category:** inductive code (child) derived from the parent code on the platform.
3. **Sector/Service:** inductive code related to the typology of services or sectors.

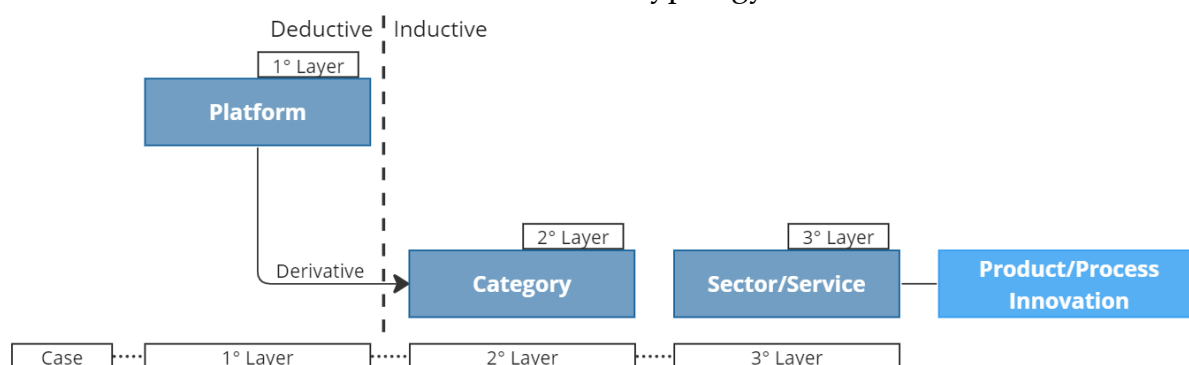


Figure 3.3: Coding System

### Platform:

The initial layer of analysis is embodied in the platform code. It serves a dual purpose: first, it acts as a binary variable indicating whether a generated alternative falls within the platform category; second, it assigns each option to the appropriate business model category in accordance with platform literature.

In particular, the first layer is composed of eleven instances (Table 3.1: Platform: 1° Layer):

- **Product Platform:** a set of common components that form a basic structure shared by many products in a company or industry.
- **Transactional Platform:** a product or service in which two (or more) distinct customer groups interact through transactions facilitated by the platform provider.
- **Innovation Platform:** a set of products, services, or technologies that serve as a common infrastructure, enabling multiple firms to develop compatible complementary products and services.
- **Orthogonal Platform CaaS:** the platform capitalizes on assets generated from a user base, typically data, and offers them to third parties that are interested.

## RESEARCH METHODOLOGY

- **Orthogonal Platform CaaT:** the platform leverages the demand side as its target audience for the second side, which aims to capture the attention of users from the first side.
- **Potential [Platform Type]:** the solution could function as a [Platform Type]. While it is not explicitly stated that it is open to the second side, it has the potential to be.
- **Digital Service:** a unidirectional service offered by the firm to its customers, suppliers, or employees, leveraging digital technologies.
- **Other:** solution which is not a platform or a digital service

Platform: 1° Layer	
Type	Platform
Product Platform	Yes
Transactional Platform	Yes
Innovation Platform	Yes
Orthogonal Platform CaaS	Yes
Orthogonal Platform CaaT	Yes
Potential Transactional Platform	Yes
Potential Innovation Platform	Yes
Potential Orthogonal Platform CaaS	Yes
Potential Orthogonal Platform CaaT	Yes
Digital Service	No
Other	No

Table 3.1: Platform: 1° Layer

### Category

After labelling the alternatives based on the first layer, each cluster is placed into subcategories. These subcategories emerge through an inductive approach initiated during the text analysis process with the goal of enhancing the mapping process for various types of platforms falling under broad categories.

Because of the inductive approach, not all instances from the first layer are deployed to the second tier. This is because some of them, such as the product platform, are not represented in the results of the initial output of the text analysis process.

Therefore, the entities of the second layer are the following (Table 3.2: Category: 2° Layer A, Table 3.3: Category: 2° Layer B, Table 3.4: Category: 2° Layer C):

- **Product Marketplace:** the exchange between sides is based on a product, which could be physical, digital, money, or a right.

## RESEARCH METHODOLOGY

- **Knowledge Marketplace:** the exchange is based on data, information, and knowledge, taking the form of coordination, sharing, and interactions among participants.
- **Service Marketplace:** the unit of exchange between sides is based on a professional service.
- **Product&Service Marketplace:** in the same interactions, parties can exchange physical or digital products and professional services.
- **Hybrid:** the platform combines elements from both the transactional and orthogonal dimensions.
- **Product Development:** the platform offers users tools and instruments to build (mainly) new digital products on top of it.
- **Integration of complementary services:** Vertical/Horizontal integration of different services which complement the existing offer of firm. They could be developed by both external players or the firm itself.
- **Business Support:** the platform is designed to assist businesses during their initial launch phase through the provision of knowledge, supporting tools, and advice.
- **Data Driven Service:** by aggregating and analysing data from various sources the platform could offer to third parties interesting insights encouraging collaborations and unlocking new research opportunities.
- **Data Trading:** selling anonymized and aggregated data to third parties.
- **Funding & Resource Collection:** the platform represents the gateway through which funding mechanisms and other resources can be accessed.
- **Default CaaT:** the platform targets the demand side as its primary audience, aiming to capture the attention of users from the supply side.
- **Standard Digital Service:** unidirectional service oriented toward a specific customer segment, based on digital technologies, data, and the firm's assets.
- **Internal Optimization:** service aimed at enhancing efficiency, optimizing production, reducing costs, reorganizing the firm, and improving security.
- **Offer Customization:** the platform collects and analyses customer data to deliver a personalized shopping experience, including customized product recommendations and content.
- **Partnership & Collaboration:** platforms can establish strategic partnerships and collaborations to bolster their ecosystem, enhance growth, offer added value to users, and explore new business opportunities.
- **Building step:** the alternative is a step toward platform implementation, but when considered on its own, it does not constitute a service or a platform.
- **Franchising & Sub-brand:** the platform fosters collaboration between franchisees and brands within its ecosystem.
- **Device:** physical object used to engage with the customer
- **M&A:** Mergers and Acquisitions.

## RESEARCH METHODOLOGY

Transactional Platform	Innovation Platform	Orthogonal Platform CaaS
Product Marketplace	Product Development	Data driven Service
Knowledge Marketplace	Integration of complementary services	Data Trading
Service Marketplace	Business Support	Funding & Resource Collection
Product&Service Marketplace		
Hybrid		

Orthogonal Platform CaaS
Default CaaS

Table 3.2: Category: 2° Layer A

Potential Transactional Platform	Potential Orthogonal Platform CaaS
Knowledge Marketplace	Data driven Service
Product Marketplace	Funding & Resource Collection
Product&Service Marketplace	
Service Marketplace	

Table 3.3: Category: 2° Layer B

Digital Service	Other
Standard Digital Service	Partnership & Collaboration
Internal Optimization	Building step
Offer Customization	Internal Optimization
Integration of complementary services	Integration of complementary services
	Franchising & Sub-brand
	Device
	M&A

Table 3.4: Category: 2° Layer C

### Sector/Service:

The third layer of the coding system includes entities linked to the sector and the service. This layer serves the crucial role of connecting the alternatives, labelled according to the other two layers, with the firm's objectives and strategic direction.

In fact, while embracing business model innovation is a good practice to avoid the success paradox, the firm needs to define a solid direction to guide the transition

## RESEARCH METHODOLOGY

toward a new business model. The output of this third level of analysis provides essential information to align the classification system composed by the first two layers with the ultimate objective and, consequently, establish a framework that managers and entrepreneurs can adopt to determine the right configuration to achieve a specific innovation goal.

The primary function of this layer is to act as a bridge between the alternatives and product/process innovation. This tier was designed to link each alternative to its corresponding goal, thus connecting it to the necessary innovation stream for achievement.

Each instance contains information related to a configuration (handled by the first two tiers) and an objective. The latter is explored through the service/sector layer, leading to the innovation stream required to fulfil the goal. Methodologically, this relationship stems from an interconnection between the product/service layer and product and process innovation, where each instance in the third tier corresponds to one or both of the aforementioned streams.

To conclude the chapter on data analysis, it is important to mention that the overview of instances presented represent the final outcome of an iterative process where, for each layer, codes are iteratively contrasted, compared, and aggregated into sets of primary concepts.

### 3.8.5 Interpreting Findings

The last step in the methodology used to develop a case study involves the analysis and interpretation of the results. In this research, two primary techniques were employed: pattern matching, which compares patterns to determine their correspondence, and modelling, which seeks to integrate the key variables identified in the case study into an emerging model that may contribute to theory development.

The pattern matching technique is used to compare sets of data to determine if they correspond or match in some way. It involves looking for similarities, commonalities, or recurring themes in the data in order to identify relationships or patterns within the information being studied. The results associated to this method fit two purposes of the study, uncovering new empirical evidence on how incumbent firms can initiate the process of business model innovation and assessing the existing level of knowledge regarding the concept of platforms.

On the other hand, modelling entails creating a simplified representation or model of a complex system. In this study, the aim is to develop a model that contributes to theory development by providing a structured framework for adopting platform thinking and selecting the best platform-based business model to achieve the firm's objectives.

### 3.9 Evaluation and assessment

The final step in designing a case study involves its evaluation and assessment. Since the case study methodology is intended to facilitate the application of the scientific method, it is essential to evaluate its characteristics to assess the validity of its outcomes. In this study, four principles are followed to ensure the validity of results and evaluate their quality:

- **Construct Validity:** establish and maintain a consistent chain of evidence during data collection. A structured approach ensures result stability and coherence in case assessment.
- **Internal Validity:** utilize techniques like pattern-matching to address alternative explanations and enhance discussions related to the research question. Internal validity ensures the reliability of results within the sample.
- **External Validity:** in the context of a multiple-case study, the replication logic is a key characteristic that enables the generalization of results. By replicating the study across various cases, it becomes possible to extend the applicability of findings to a broader range of situations or contexts.
- **Reliability:** it ensures the consistency and replicability of the study employing a protocol. This protocol acts as a structured guide, outlining the steps, procedures, and criteria for data collection. It helps maintain a standardized approach, allowing multiple researchers to conduct the same study and achieve consistent results. Additionally, the development of a case study database further contributes to reliability, as it facilitates data organization, storage, and retrieval. Through these measures, the study becomes more robust and trustworthy, ensuring that the findings can be replicated and relied upon for valid conclusions.

To conclude the methodology section, it is important to note that the evaluation and assessment of the results, as presented, will be discussed in detail at the end of the study to examine the quality of the output.

## RESEARCH METHODOLOGY

# 4. RESULTS

## 4.1 Results Introduction

This section presents the findings of a comparative analysis conducted on alternatives generated by different artificial intelligence models, fulfilling the study's objectives. The methodology was crafted to ensure the generation of alternatives adhered to predefined criteria, guaranteeing the relevance and practicality of the results. Data saturation was confirmed after reviewing a substantial number of cases according to two layers of the coding system, offering a thorough insight into the performance of the models.

Hence, the next subsection will provide a detailed overview of the results related to the analysed cases and the alternatives generated. Subsequently, the layers of the coding system described in the methodology will be applied to categorize the options. The section is organized as follows:

- Result Overview
- 1° Layer – Platform
- 2° Layer – Category
- 3° Layer: Sector/Service for Innovation

## 4.2 Result Overview

Revisiting the case selection criteria detailed in the methodology section, the study selected non-platform companies from the S&P 500 index, picking from the top until reaching the point of data saturation for the first and the second tiers of the coding system. This threshold was met with the inclusion of 60 firms, where each company represent a case. Although the number of firms might seem limited, it is important to acknowledge the depth of analysis each one provided. On average, each firm contributed to the creation of approximately 13.9 distinct options through AI, with the number ranging from 10 to 18 per firm. In total, this resulted in 835 alternatives analysed.

Of the 835 alternatives, 62% (520 alternatives) were generated by ChatGPT model 3.5, while the remaining 38% (315 alternatives) were produced by Bard. Specifically,



## RESULTS

ChatGPT generated an average of 8.7 options per case, whereas Bard produced an average of 5.3 alternatives per case.

Firm	Total		ChatGPT (3.5)		Bard	
	Alternatives Generated	Average Alternatives/Firm	Alternatives Generated	Average Alternatives/Fir	Alternatives Generated	Average Alternatives/Fir
60	835	13.9	520	8.7	315	5.3

Table 4.1: Result Overview

### 4.3 1° Layer – Platform

Considering the first layer of the coding system, each alternative generated was labelled according to a deductive approach derived from the literature about platforms. In particular, the options were allocated in eleven different entities as described in the methodology.

The results after the labelling process highlight how only eight entities were present in the dataset: Transactional Platform, Innovation Platform, Orthogonal Platform CaaS, Orthogonal Platform CaaS, Potential Transactional Platform, Potential Orthogonal Platform CaaS, Digital Service, and Other. Consequently, no cases belonging to the categories of Product Platform, Potential Orthogonal Platform CaaS, and Potential Innovation Platform were found.

The distribution of the results is the following:

Coding System	GPT	BARD	TOTAL	GPT	BARD	TOTAL
Transactional Platform	87	73	160	17%	23%	19%
Potential Transactional Platform	21	17	38	4%	5%	5%
Innovation Platform	83	37	120	16%	12%	14%
Orthogonal Platform CaaS	25	8	33	5%	3%	4%
Potential Orthogonal Platform CaaS	11	12	23	2%	4%	3%
Orthogonal Platform CaaS	8	6	14	2%	2%	2%
Digital Service	173	129	302	33%	41%	36%
Other	112	33	145	22%	10%	17%
<b>Total</b>	<b>520</b>	<b>315</b>	<b>835</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

Table 4.2: 1° Layer Results

## RESULTS

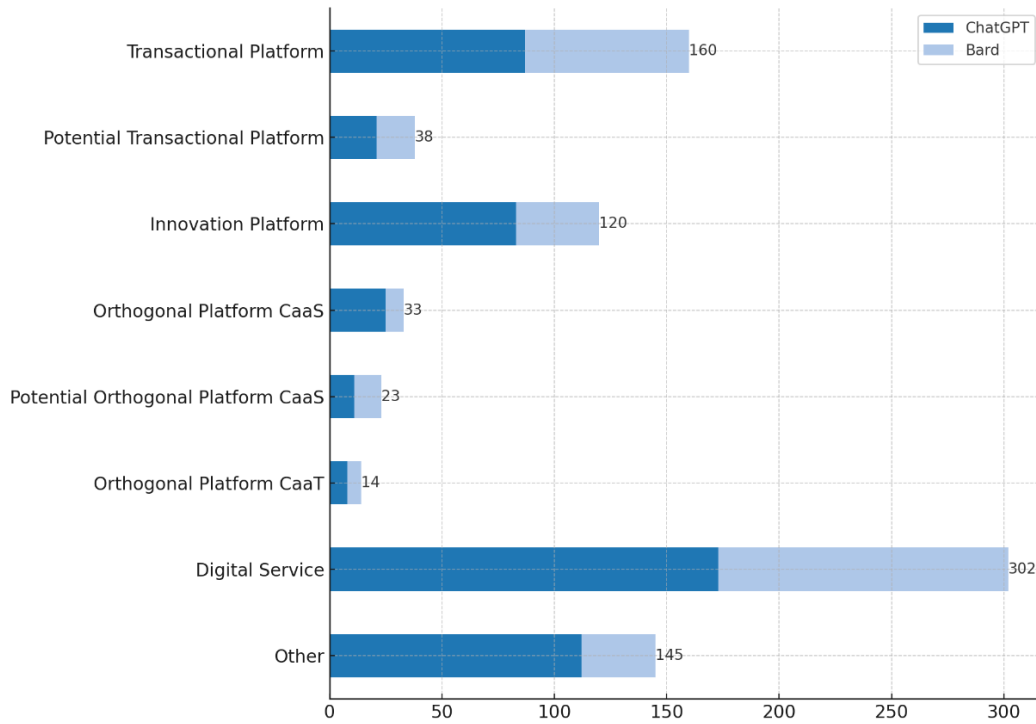


Figure 4.1: 1° Layer - Absolute Frequency

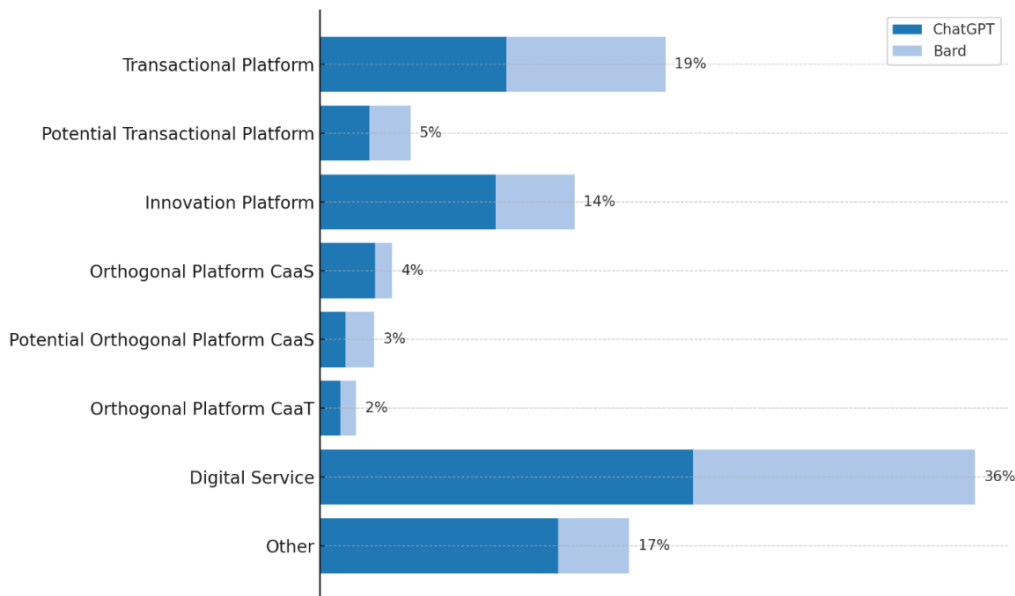


Figure 4.2: 1° Layer - Relative Frequency A

## RESULTS

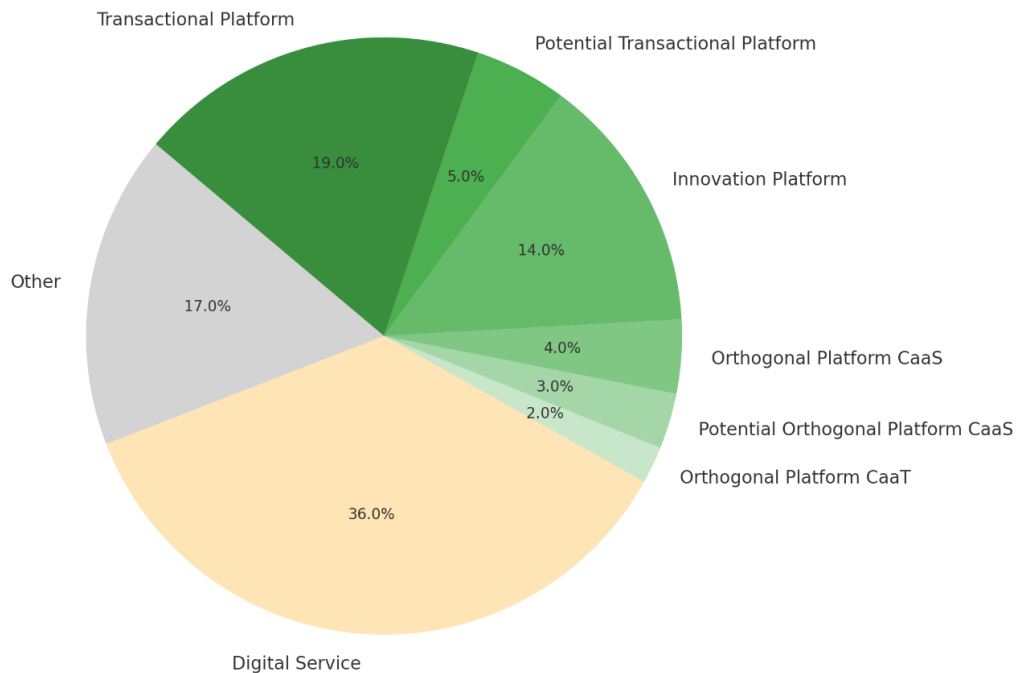


Figure 4.3: 1° Layer - Relative Frequency B

The results corresponding to the first layer of the coding system, in response to the prompt “Can you apply Platform thinking – which means using multi-sided platform-based mechanisms to unlock digital business transformation opportunities – to [FIRM\_NAME]?” show that the alternatives generated by both AI tools used are allocated as follows:

- 46% of the alternatives are categorized as platform-based businesses or potential platforms. This indicates that nearly half of the solutions involve leveraging multi-sided platform mechanisms.
- 36% are classified as digital services. These solutions use technology as the central element but still do not fulfil all the criteria to be considered a platform. This suggests that these are technology-assisted services that do not create the network effects or value generation mechanisms typical of a platform.
- The remaining 17% of solutions do not fit into the categories of platform or digital service. This implies that there is a portion of solutions that may involve other types of business models or strategies that have not been identified as platform-related or digital services.

This interpretation breaks down the solutions into three distinct groups based on their relationship to platform thinking and their role in digital service provision.

Considering the first category, in the assessment of business model alternatives using Platform thinking, the distribution of solutions across different platform types is varied.

## RESULTS

**Transactional Platforms**, which facilitate exchanges between users and typically involve direct transactions, constitute 19% of the alternatives, suggesting a strong lean towards business models that enable direct marketplaces or service exchanges. Potential Transactional Platforms, which may not currently operate as developed transactional entities but have the potential to evolve into one, make up 5%. This indicates a recognition of nascent structures that could be developed into more robust transactional platforms.

**Innovation Platforms** play a pivotal role in shaping the ecosystem of new products or services, accounting for 14% of the business model alternatives. This significant percentage underscores the strategic emphasis on creating and nurturing environments where innovation is not just supported but actively encouraged. These platforms serve as a foundation for collaboration among developers, creatives, and entrepreneurs, providing the tools and integration capabilities necessary to bring fresh ideas to market. They often enable third-party entities to build upon the underlying technology or service, effectively generating a multiplier effect in terms of innovation and value creation.

**Orthogonal Platform CaaS** represents 4%, and, together with Potential Orthogonal Platform CaaS—which could offer such services in the future, accounting for an additional 3%—these categories highlight solutions that place data and information at the core for various stakeholders. This indicates a focus on leveraging centralized information systems to facilitate interactions and operations across different users within the platform ecosystem.

**Orthogonal Platform CaaST**, characterized by identifying the platform as a means to enhance customer service reach, makes up a smaller segment at 2%. This indicates that while there is a niche focus on platforms designed to extend and improve customer services, it is a less dominant strategy compared to other platform models. Nonetheless, this segment represents an existing interest in leveraging platforms to foster better customer interactions and service delivery within the platform spectrum.

To summarize the findings from the first coding layer, it is crucial to highlight that “potential platforms” – named so because they are not fully operational and are either conceptual or in a development phase with potential for scaling to a multi-sided model—constitute 15.7% of the instances classified under platform. These instances are particularly noteworthy as they possess the foundational structure of a platform but have yet to maximize their capabilities. The presence of such infrastructure suggests that the providers have the opportunity to transition into a platform-based business model, which can engage various ecosystem participants by delivering targeted value propositions.

## RESULTS

### 4.4 2° Layer – Category

Based on the outcomes highlighted by the first coding layer, a more granular examination of each entity is required to comprehensively understand the orientation of the alternatives towards specific objectives. Consequently, the second layer of the coding system aims to delve deeper into each class identified from the literature using an inductive approach. In this phase, emergent categories are related with a class from the first layer, effectively segmenting the pool of options into clusters. These clusters result distinct and independent from one another, allowing for a nuanced analysis of how each subset aligns with the overarching strategic goals.

The detailed analysis of the deployment of all platform entities from the first layer has culminated in the delineation of 20 distinct categories which are distributed as follows as a consequence of the first layer of analysis.

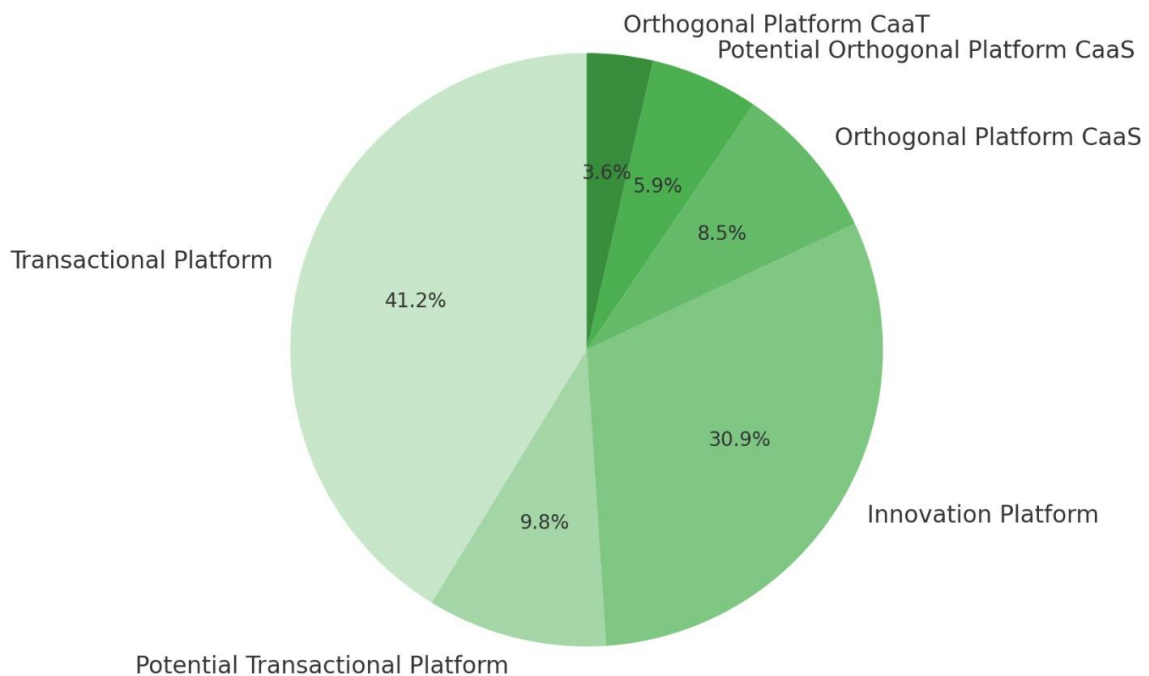


Figure 4.4: 2° Layer – Platform Categories A

## RESULTS

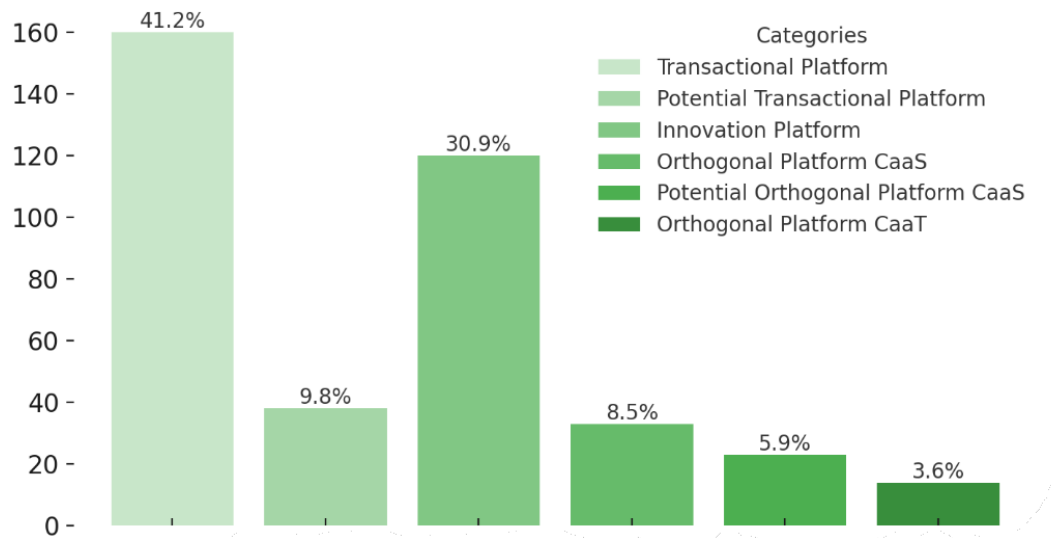


Figure 4.5: 2° Layer – Platform Categories B

As emerge from the graphs just presented, the sum of Transactional Platforms and Potential Transactional Platforms have a total of 198 entities, making up 51% of the alternatives that belong to platform solutions in the dataset. Within this category, Transactional Platform account for 80.8%, while the remaining 19.2% is occupied by Potential Transactional Platform.

Considering the entity of **Transactional Platform**, the sub-categories are distributed as follows:

- Product Marketplace is the most prevalent subcategory with 90 entities, constituting 56.25% of the Transactional Platform category. This suggests a dominant trend where platforms focus on the exchange of physical or digital products.
- Knowledge Marketplace comes next with 30 entities, accounting for 18.75%. These platforms emphasize the exchange of data, information, and knowledge, allowing for interaction among participants.
- Service Marketplace has 22 instances, or 13.75%, reflecting platforms that facilitate the provision of professional services from one party to another.
- Product&Service Marketplace includes 11 records, making up 6.88%, indicating platforms that handle both goods and professional services within the same transactional space .
- Finally, Hybrid platforms, which combine elements of both transactional and orthogonal dimensions, are the least represented with 7 entities (4.38%), highlighting the complexity of managing multiple dimensions in the same solution.

## RESULTS

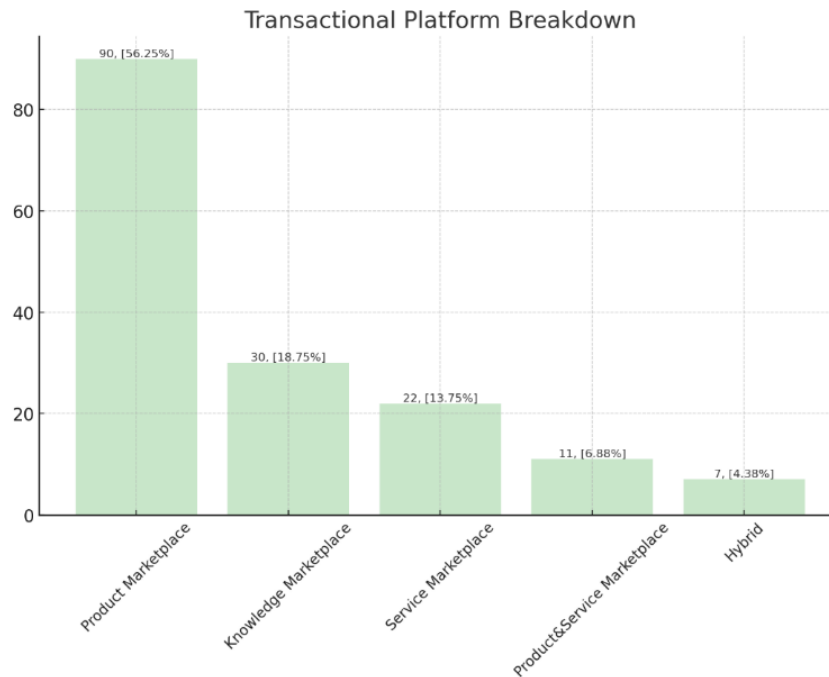


Figure 4.6: 2° Layer – Transactional Platforms

**Potential Transactional Platforms**, which represent business model alternatives that could evolve into transactional platforms, include 38 entities, which is 4.55% of the overall dataset. Within this category:

- Knowledge Marketplace forms the largest part with 22 entities (57.89%), suggesting significant potential in platforms that deal with the exchange of knowledge and information.
- Product Marketplace has 10 entities (26.32%), showing some prospects for growth in platforms centered around product exchanges.
- Finally, Product&Service Marketplace (10.53%), and Service Marketplace (5.26%) appears to have the least potential from the specific analysis.

## RESULTS

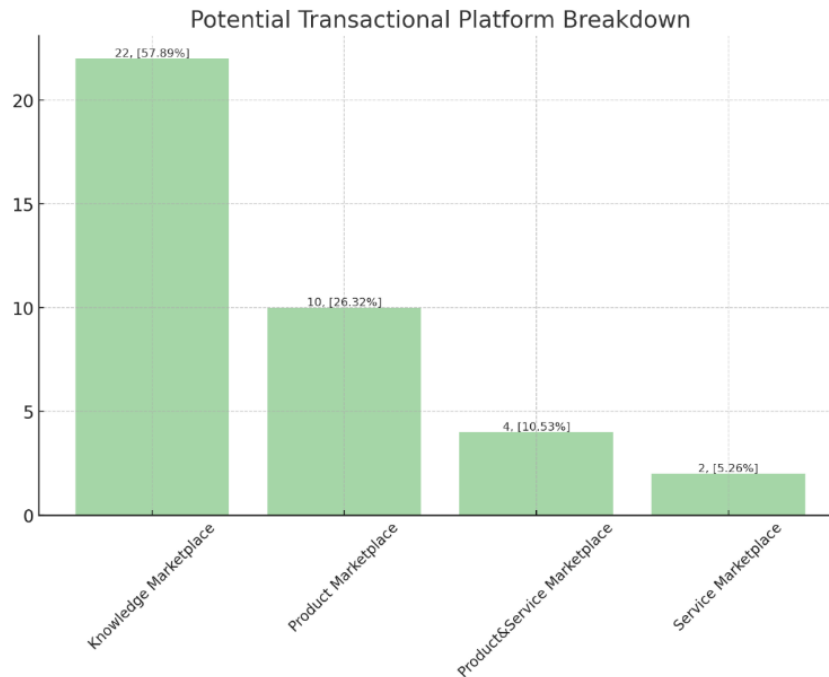


Figure 4.7: 2° Layer – Potential Transactional Platforms

These results highlight the current and potential future distribution of platform-centric business models with a focus on transactional dynamics, demonstrating a strong existing and potential influence of product-centric and knowledge-centric platforms in the digital marketplace.

Shifting the focus on **Innovation Platforms**, it accounts for 120 entities, making up 14.37% of the overall dataset and the 30.9% of the alternatives labelled as platforms. Within the Innovation Platform category:

- Product Development is the predominant subcategory with 80 entities, comprising a significant 66.67% of the category. This reflects a focus on platforms that provide users with tools and instruments to create new products, especially applications and software.
- Integration of Complementary Services follows with 27 instances (22.50%). This subcategory emphasizes platforms that facilitate the integration of vertical or horizontal services to create more comprehensive solutions.
- Finally, Business Support is the least represented with 13 entities (10.83%). Platforms under this subcategory support businesses, particularly during their launch phase, indicating a smaller but specific focus within the innovation platform sphere.



## RESULTS

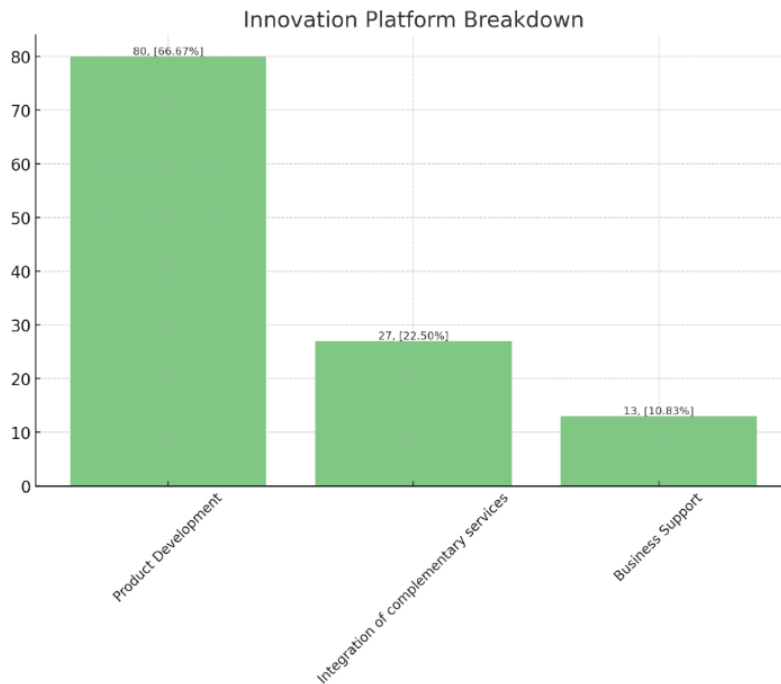


Figure 4.8: 2° Layer – Innovation Platforms

These figures illustrate the composition that highlight the strong emphasis on product development and the significant role of service integration in fostering innovation in the business sector.

Continuing the analysis on the platforms, the **Orthogonal Platform CaaS**, together with Potential Orthogonal Platform CaaS, account for the 14.4% of platforms' alternatives. For the former, out of 33 entities, the majority are "Data driven Service" with 27 entities. This constitutes 81.82% of the Orthogonal Platform CaaS category, highlighting a strong focus on services that utilize data as a core part of their offering. "Data Trading" services are less represented, with 6 entities, indicating a smaller niche focused on the exchange or selling of data.

## RESULTS

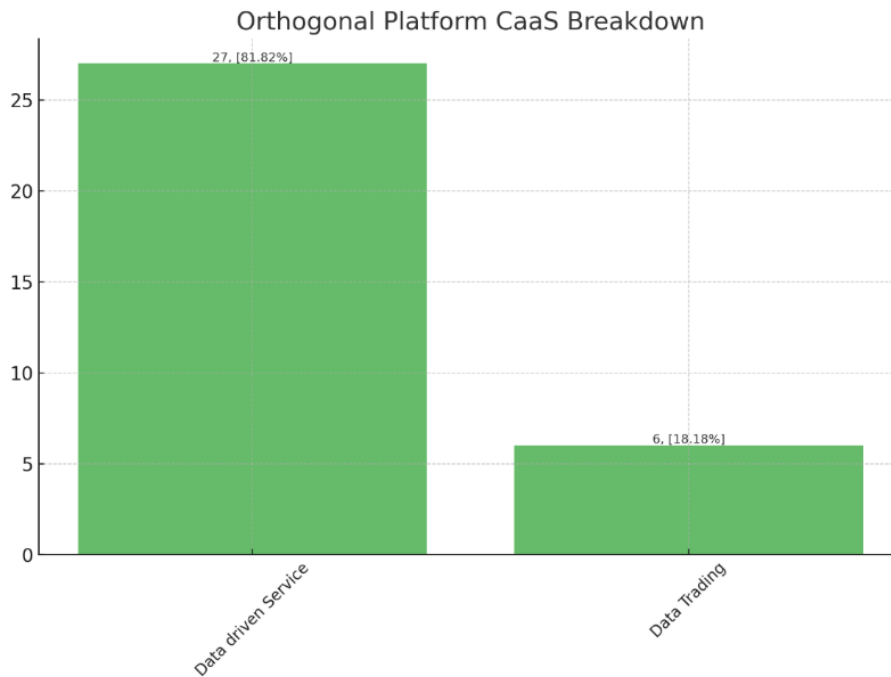


Figure 4.9: 2° Layer – Orthogonal CaaS Platforms

For the **Potential Orthogonal Platform CaaS** there are 23 entities in total, comprising 2.75% of a broader dataset. Within this, “Data driven Service” types remain dominant with 16 entities, showing that even among platforms considered to have potential, data-centric services are prevalent. Finally, “Funding & Resource Collection” services have a presence with 7 entities, representing 30.43%. This suggests that a significant portion of these potential platforms may be involved in activities related to securing funds or gathering resources.

## RESULTS

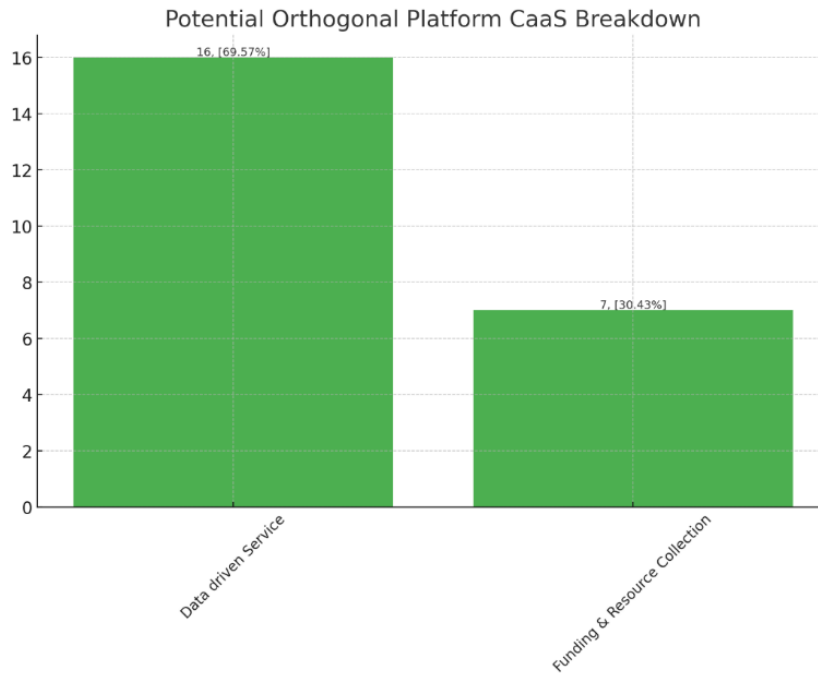


Figure 4.10: 2° Layer – Potential Orthogonal CaaS Platforms

To conclude the analysis on platforms, there are 14 entities categorized under **Orthogonal Platform CaaST**, which account for 1.68% of a broader total and the 3.6% of platforms. All the instances fall into the “Default CaaST” category, suggesting that every one of these entities adheres to a standard or default model of operation within this context.

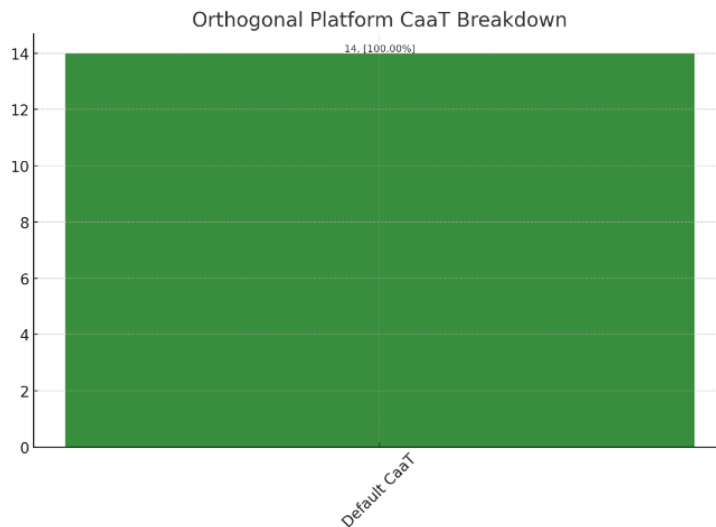


Figure 4.11: 2° Layer – Orthogonal CaaST Platforms

The results associated with the second layer provide some evidences also on digital services and Other.

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In particular, options related to **Digital Service** make up 36.17% of the total being analysed. Out of these, the largest subset is the “Standard Digital Service” with 169 entities, accounting for 55.96%, highlighting how the unidirectional service, oriented towards a customer segment and based on digital technologies, represents the great portion of the entity. “Internal Optimization” services are provided by 54 entities (17.88%), while “Offer Customization” is another significant category with 49 entities (16.23%) of the digital services. This shows how the purpose of this broad category can be both internal and external oriented. Lastly, “Integration of complementary services” is offered by 30 entities (9.93%), indicating that as it happens for Innovation Platform, the firm can Vertical/Horizontal integrate different services in its offer.

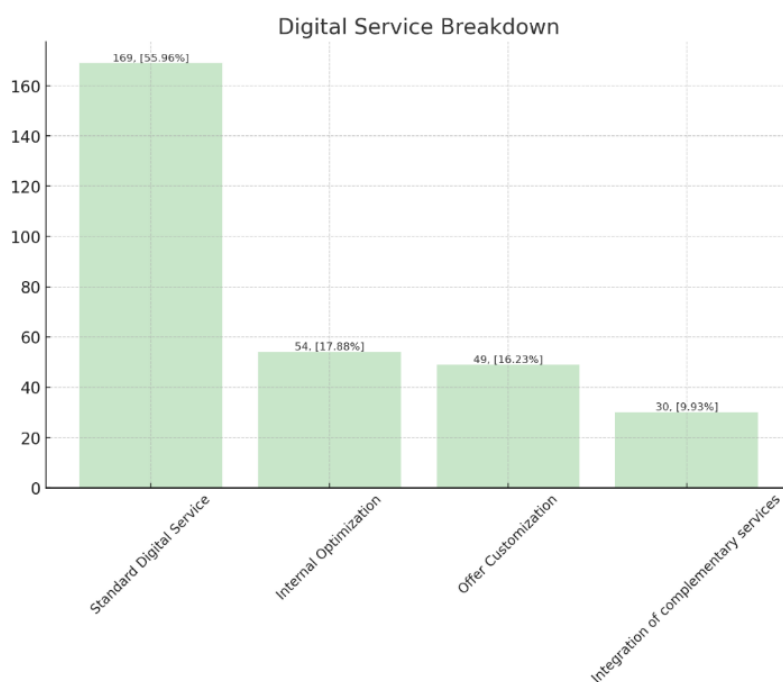


Figure 4.12: 2° Layer – Digital Services

The last section of the results is associated with those alternatives that are not a platform or a digital service. The breakdown of the **Other** category shows the following findings:

- Partnership & Collaboration is the most common activity within this category, with 48 entities engaged in such activities, followed by Building step (28.97%) which together sum up to the 62% of the alternatives.
- Internal Optimization (23 instances) and Integration of complementary services (23 entities), categories that are common also to other entities of the first layers, account for more that the 30% of the “Other”.
- The remaining alternatives are distributed between “Franchising & Sub-brand” activities (4.14%), “Device,” (2.07%), and “M&A” (1.38%).

## RESULTS

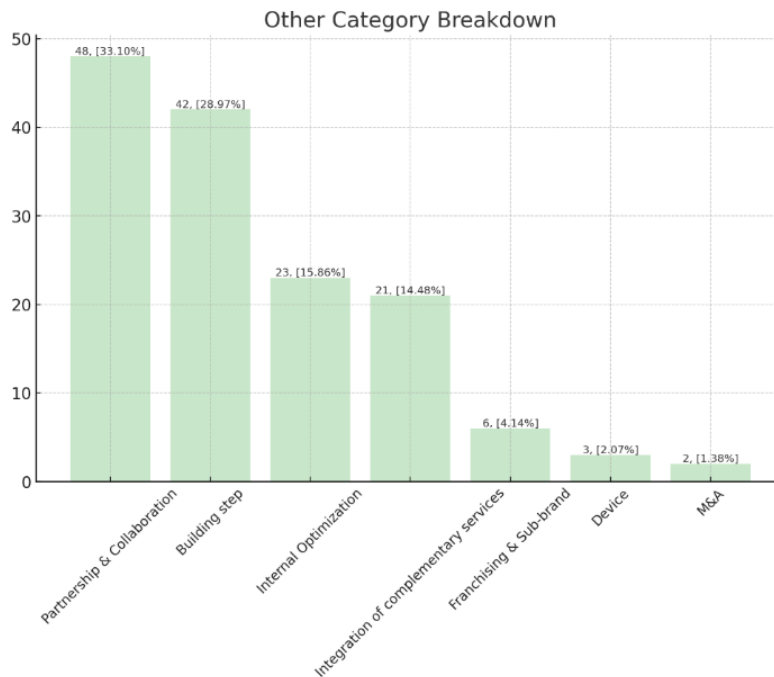


Figure 4.13: 2° Layer – Others

This data indicates a diverse range of activities and strategies that companies undertake outside their core offerings, with partnerships and collaboration being the most prominent and activities useful to establish a platform as second occurrence, highlighting how this options are oriented towards the development of a platform oriented business.

Reversing the analytical lens to explore how instances of the second layer relate to the first layer's categories, it becomes apparent that "Integration of complementary services" is a unique category. It stands out as the only one connected with both platform and non-platform alternatives. This suggests a versatile application of integrating services across different facets of the organization:

- Within Digital Service, the integration likely refers to adding value to the core offerings through supplementary digital services, enhancing the overall customer experience.
- In the Innovation Platform context, it probably involves enriching the platform's core functionality by incorporating external services or technologies, thus expanding its innovation capacity.
- For the Other category, which serves as a broad grouping for miscellaneous activities, the integration may pertain to ancillary services that bolster the primary business operations but are not strictly tied to digital or innovation-focused platforms.

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Moreover, both Digital Service and Other are connected to Internal Optimization, emphasizing a focus on refining internal operations and processes rather than adopting a holistic perspective that includes external stakeholders as well.

In conclusion, it is noteworthy that there is no intersection between the second-layer entities and the relative Platform category of the first layer. This highlights the distinctiveness of each platform type, with specific derivatives that are tailor-made for that particular category, reflecting the specialized approaches within platform-based ecosystems.

### 4.5 3° Layer: Sector/Service for Innovation

The third tier of the coding system, as detailed in the methodology section, employs an inductive labelling approach that classifies each alternative by its service or sector. This categorization helps in identifying the specific stream of innovation (product or service) that each alternative embodies. While the initial two layers scrutinize alternatives by examining their structural composition for value creation, delivery, and capture, this additional dimension of analysis is useful to assess the specific industry, field or typology of service where the innovation is applied.

Considering the diversity of sectors to which the firms belong, and the wide variation in the types of services offered, the number of instances within this tier of the coding system is considerable, totalling 50. Consequently, this specific layer cannot be deemed saturated, as there is no clear indication that the array of alternatives encompassed by this layer is comprehensive.

To maintain focus within the main text, the appendix will provide comprehensive information on how alternatives are distributed within this category. Here, only the principal categories will be presented, illustrating how this layer functions as a conduit connecting the structural and functional aspects of the first two layers with the underlying currents of innovation.

3° Layer Instance	BARD	GPT	Grand Total	
App Development	23	41	64	7.7%
Not Specific Sector/Service	28	32	60	7.2%
Software & App	17	34	51	6.1%
Finance & Insurance	21	26	47	5.6%
Contextual Data based service	13	30	43	5.1%
Healthcare - Integrated service	20	23	43	5.1%

Table 4.3: 3° Layer – Main Instances

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Considering breakdown of categories within a study, the main results related to the third layer of the coding system highlight that around the 37% of the alternatives belongs to 6 instances: App Development (7.7%), Not Specific Sector/Service (7.2%), Software & App (6.1%) Finance & Insurance (5.6%), Contextual Data based service (5.1%) of the total, and Healthcare - Integrated service (5.1%).

While these numbers might seem high, it is important to note that they are not representative of a saturated sample. Hence, there could be sectors that are underrepresented and others that have numerous cases in the sample due to the process of case selection and the structure of the list from which the cases are drawn. The percentages indicate the proportion of each category relative to the grand total of instances across all categories. However, the base number from which the percentages are calculated is not provided in the image.

Consequently, the valuable insights this layer contributes to the study are linked with innovation streams. In accordance with the methodology described earlier, each cluster of alternatives in the third layer was associated with specific innovation streams. At the same time, these alternatives, as noted in the preceding section of the results, have been categorized according to two business-centric tiers (1° and 2° layers). By integrating these two strands of classification, the following results emerge:

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Platform	Process Innovation	Product&Service Innovation
<b>Transactional Platform</b>	✓	✓
Hybrid	•••	✓
Knowledge Marketplace	✓	✓
Product Marketplace	✓	✓
Product&Service Marketplace	✓	✓
Service Marketplace	✓	✓
<b>Potential Transactional Platform</b>	✓	✓
Knowledge Marketplace	✓	✓
Product Marketplace	•••	✓
Product&Service Marketplace	✓	✓
Service Marketplace	✓	✓
<b>Innovation Platform</b>	✓	✓
Business Support	•••	✓
Integration of complementary services	✓	✓
Product Development	✓	✓
<b>Orthogonal Platform CaaS</b>	✓	✓
Data driven Service	✓	✓
Data Trading	✓	✓
<b>Potential Orthogonal Platform CaaS</b>	✓	✓
Data driven Service	✓	✓
Funding & Resource Collection	•••	✓
<b>Orthogonal Platform CaaST</b>	•••	✓
Default CaaST	•••	✓

Table 4.4: Platforms for Innovation

Transactional Platforms, Innovation Platforms, along with a Orthogonal Platform CaaS are associations with both product and process innovation. Exposing a breakdown analysis of the results emerge that:

- All the marketplaces (Knowledge, Product, Service, and Product&Service) are involved in both process innovation and product & service innovation. This suggests a comprehensive approach to innovation within these platforms.
- Hybrid: despite not having an association with process innovation, it shows involvement in product & service innovation.
- The category of Potential Transactional Platform indicates platforms have the potential to innovate in products and services, as well as in their processes, but may not yet be fully realized or operational.
- Innovation Platform encompasses platforms that are designed to foster innovation both in terms of product/service creation and the enhancement of processes. In particular, in the categories of Integration of complementary services and Product Development are present alternatives of both kind.



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- While Business Support does not show an association with process innovation, it implies innovation in products and services aimed at supporting businesses.
- Orthogonal Platform CaaS: this reflects a more specialized category of platforms that offer client-oriented services and shows innovation in both the services provided (data, trading) and the mechanisms by which these services are delivered.
- Potential Orthogonal Platform CaaS have can be implemented to meet both the innovation purposes

This analysis indicates a trend among these platforms towards a dual focus on innovating their offerings (products and/or services) and the processes by which they are created and delivered. This dual focus can enhance competitiveness and responsiveness to market needs, potentially leading to a significant advantage in their respective sectors.

## RESULTS



# 5. DISCUSSION

## 5.1 Introduction

In this chapter, a comprehensive discussion of the findings, which emerged from the recently presented results, is proposed. This section will critically analyse and interpret the patterns of results within the context of existing literature, investigating both the determinants behind the evidences and elucidating their associated implications.

Therefore, to address the research question of the study comprehensively – How can established firms, characterized by a linear value chain, leverage AI tools to embrace platform thinking and initiate the process of business model innovation, leading to the development of a multi-sided platform? – the discussion section will be structured as follows:

- Platform Landscape
- The notion of Platform
- Platforms and Innovation
- AI

## 5.2 Platform Landscape

To begin, it is essential to highlight the main finding associated with this study: the existing categories of platform represent just the high level of a detailed classification scheme that is in continuous development.

Although this finding logically pertains to the second layer of analysis and it would typically follow the section describing the notion of a platform, it constitutes the main discovery of this thesis. Therefore, it is presented first.

The literature on platforms primarily focuses on three main categories: product platforms, innovation platforms (Gawer, et al., 2014), and two (multi)-sided platforms. With particular emphasis on the last category, it further differentiates into transactional, orthogonal, and hybrids platforms (Trabucchi, et al., 2020). Additionally, within the class of orthogonal platforms, there is a segmentation based on the logic of the Client as a Source (CaaS) and the Client as a Target (CaaT) (Trabucchi, et al., 2021).

## DISCUSSION

The pattern underlying this process is clear: starting from the broader category to define specific derivatives for each. Similarly, this research enhances the level of detail for each derivative to offer a comprehensive view of the platform landscape (Figure 5.1: Platform Landscape).

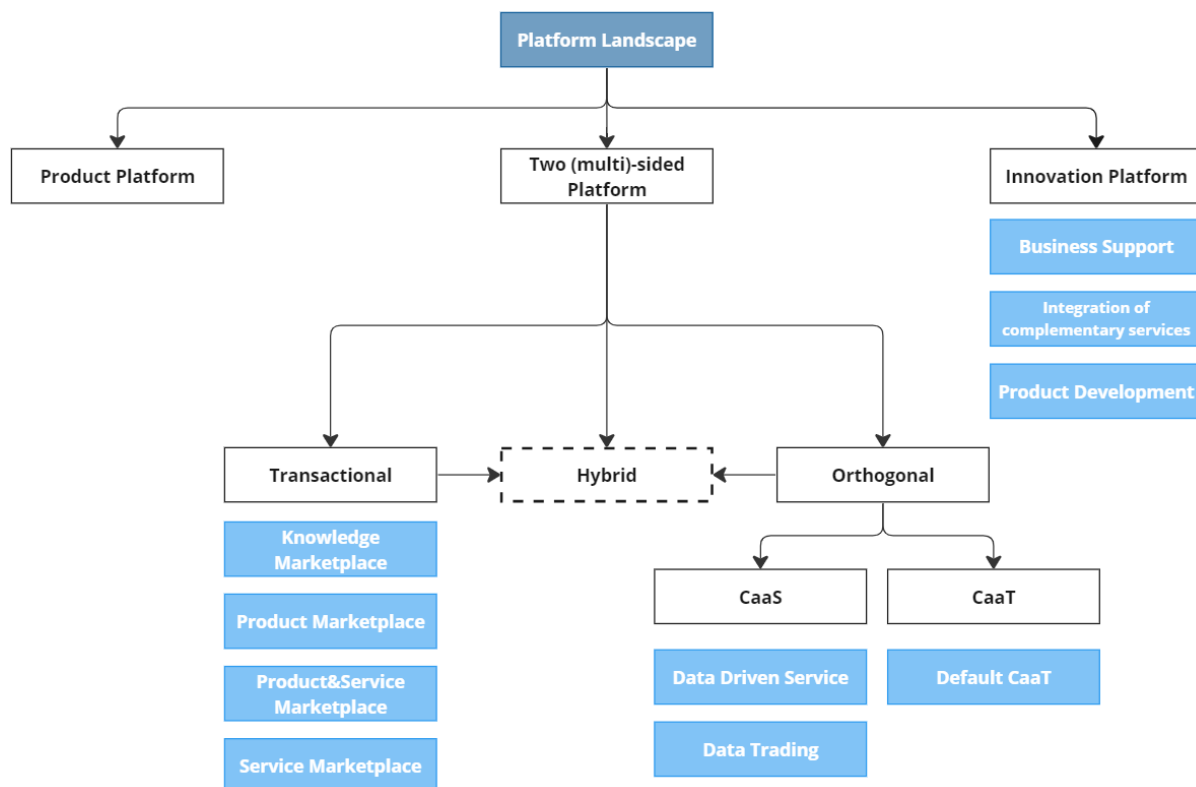


Figure 5.1: Platform Landscape

The results of the analysis, restricted to effective platforms (not potential), highlight that Transactional and Innovation platforms are the two 1<sup>st</sup> layer classes with the highest number of new derivatives associated with the study. In contrast, the already developed orthogonal platforms manifest a lower number of different extensions.

As is evident from the platform landscape, instances belonging to the class of Transactional Platforms differ from each other in the object of exchange, while the mechanism of interaction between them remains common. This pattern suggests that any firm, regardless of sector, can launch a platform, as demonstrated by the concept of knowledge marketplace, an solution that is orthogonal to all industries.

Furthermore, derivatives such as product&service marketplaces demonstrate that platforms can be established from the outset with multiple exchange objectives, integrating the concept of transactional exploitation (Trabucchi, et al., 2023) where new transactions are established among players who are already onboard.

Continuing, the analysis of derivatives from Innovation Platforms indicates that these configurations are well-suited for product development, as demonstrated by

## DISCUSSION

developer ecosystems that utilize platform resources. However, their utility extends beyond this. Such business models can also support enterprises in search of expertise, mentorship, and advice, particularly if the platform incorporates a knowledge management system that assimilates both tacit and explicit knowledge from advisors and makes it accessible to interested parties. While this setup may resemble an Orthogonal CaaS platform, it is distinct in its aim to establish an ecosystem. This involves the integration of various stakeholders, such as partners and technology providers, with the goal of supporting the launch of new ventures that can capitalize on the platform to create complementary businesses. Moreover, similar to product development scenarios, this structure can be utilized not only to allow developers the freedom to build their applications but also to actively recruit other parties to join the ecosystem for the purpose of developing a specific type of service that is required.

Ultimately, with regard to an orthogonal CaaS platform, two distinct paths emerge: data trading, which aims to sell data, and data-driven services, which align with the platform's original intent of gathering valuable information for third parties to provide a dedicated service.

The last insights related to the deployment of the first layer classes in detailed categories is related to the absence of constraints related to an industry or some peculiarities of the firm for the development of platform based business model. From the study of the results emerge that all the cases involved in the research generate valid alternatives in terms of content and numerosity. Moreover, the variability of platform categories within each case is also elevated, suggesting that the same firm can deal with the platform thinking in several ways, developing different kinds of platforms and ultimately enhancing the external validity of the results.

From a platform literature perspective, this research delves deeper into the category of innovation platforms, as described by Annabelle Gawer (Gawer, et al., 2014). It provides a more detailed segmentation of this class, offering a better description of how a firm can pursue this direction. Additionally, within the realm of two (multi)-sided platforms, the study divides transactional platforms based on the object of exchange. This expands upon the existing literature, as reviewed in the systematic literature review on hybrid multi-sided platforms (Trabucchi, et al., 2021). The research contributes in two ways: firstly, it demonstrates how this category of platform can be further categorized based on predefined criteria, and secondly, it presents a range of alternatives for segmentation. These alternatives highlight that almost any firm can establish this kind of platform, as exemplified by the knowledge marketplace, where the object of exchange is information, an asset that most incumbents possess.

Finally, it introduces an additional layer to orthogonal Client-as-a-Service (CaaS) platforms in comparison to the existing landscape (Trabucchi, et al., 2021),

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underscoring that even the most widely deployed categories can be further refined. This insight underscores the dynamic nature of this framework, illustrating how it adapts and evolves over time.

### 5.3 The notion of Platform

As stated, the purpose of this section, following the structure of the coding system, is to explore the concept of platforms in order to understand the differences between them, digital services, and other available alternatives, with digital services serving as a proxy for technology-based linear models.

Therefore, to start the discussion, an overview of the term platform is needed. It has attained a widespread presence, manifesting in the realms of new product development and operations management, technology strategy, as well as industrial economics (Gawer, et al., 2014). Furthermore, searching the word “platform” on Wikipedia, one of the largest online encyclopaedia, it returns a disambiguation page. This page is used to resolve conflicts in article titles that arise when a single term can be associated with multiple topics, making it likely to be the natural title for more than one article. In particular, it provides a range of definitions that encompass various domains, including Art, Politics, Physical objects, Features, Technology, and Other uses (Wikipedia-Contributors, 2023).

While the distinction between platforms as business models and the first four categories is clear, there can be some overlapping in the case of technology, as becomes evident from some of the definitions within this final class:

- Platform economy is an economic and social activity facilitated by platforms. Such platforms are typically online sales or technology frameworks.
- A computing platform, digital platform, or software platform is an environment in which a piece of software is executed. It may be the hardware, the operating system, a web browser, and associated APIs, or other underlying software, provided that the program code is executed within it.
- The Web platform is a collection of technologies developed as open standards by the World Wide Web Consortium and other standardization bodies such as the Web Hypertext Application Technology Working Group, the Unicode Consortium, the Internet Engineering Task Force, and Ecma International.

Assuming that the first definition matches the definition of a platform as a business model, the second and the third should describe two different configurations. However, a platform-based business almost always relies on a digital platform as an enabling technology, and it is accessible through the web.

Continuing the exploration of the categories previously introduced, the section ‘Other uses’ contains two additional definitions that contribute to this ambiguity: Economic

## DISCUSSION

platform is defined as an intermediary that connects two distinct user groups, enabling them to provide each other with network benefits, leveraging the theory of a two-sided market; while a Platform (business model) is a business model that creates value by facilitating exchanges between two or more interdependent groups.

Although the final two definitions offer a more comprehensive understanding of the concept, to sustain the purpose of this section it is important to start from the examination of an alternative scenario derived from the dataset: “Platform for energy management: it enable businesses and consumers to more effectively manage their energy use through features like real-time monitoring, predictive analytics, and demand-response programs”. This scenario raises the question of whether it is considered a platform or a linear digital service.

To address this and similar questions, the discussion primarily focused on the results associated with the first two layers of the coding system. The aim of this analysis is to identify determinants that can resolve ambiguity and clarify distinctions. Therefore, assuming there is a consensus among researchers about the definition of a platform, the interpretation will shift. The objective becomes answering the question: “Why are digital services and other alternatives often mislabelled as platforms?”

In light of the results presented in the previous section concerning the first layer of the coding system, it was revealed that 53.5% of the generated alternatives do not fit the definition of a platform. Meanwhile, 36.2% of them, which represent 68% of the non-platform alternatives, are categorized as digital services. Conducting a benchmark analysis between the alternatives labelled as digital services and those classified as platforms yielded four key findings. These findings serve to enhance the clarity of the distinction and contribute to the existing literature by enriching the knowledge on how to differentiate between a platform and other forms.

### Finding #1 – Role of the firm: degree of participation in the interaction

Finding	Digital Service	Transactional Platform	Innovation Platform	Orthogonal Platform CaaS	Orthogonal Platform CaaST
#1 Role of the Firm	Actively participates in delivery as side	Facilitator in delivery, may not participate	Facilitator in delivery, may not participate	Hub for information collection and transfer, actively participates in transfer	Hub for information collection and transfer, passively participates in delivery
	One-to-many, Firm to sides	One-to-one, Platform as the means	One-to-one, Platform as the means	One-to-many, Platform as a collector hub	One-to-many, Platform as a distribution center

Table 5.1: Finding #1 – Role of the firm

The primary distinction between these categories relates to the role of the company that owns the service or platform. According to the Industry-Wide Platform Ecosystem framework (Van Alstyne, et al., 2016), in cases identified as platforms, the entity controlling the intellectual property and determining participant involvement acts as



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an intermediary between multiple parties. On the other hand, in alternatives classified as digital services, analysed as proxies for a linear models, this entity tends to align more closely with one side of the interaction, actively participating in the delivery of services to a customer base.

Considering that a platform is characterized by three essential features (Evans, 2003) – involving multiple and interdependent customer groups, demonstrating cross-side network effects where the presence of one user group increases the platform's value for another, and having these effects internalized by an intermediary – the same technological structure may be categorized either as a platform or a digital service. This categorization depends on the perspective of the specific firm or department (i.e., amazon basics that operates as supplier selling on the amazon marketplace) in question and its ability to transform competitors from rivals into potential customers.

Consider OpenTable as an example. From its owner's perspective, it qualifies as a platform because it manages multiple value propositions and meets the aforementioned necessary conditions. However, if the provider does not open it to other restaurants and solely uses it to boost reservations, then it functions as a digital service. Similarly, a company's personalized rewards program based on customer preferences may be a digital service exclusive to its customers. However, if the company allows access to competitors, it transforms into a transactional platform, with the company acting as an intermediary. This program might also evolve into an orthogonal CaaT platform, if it provides advertisers with access to its customer base. Alternatively, it could be an orthogonal CaaS platform like if it offers aggregated, anonymized data to other firms.

As a result, the differentiation between a digital service and a platform depends on how the firm positions itself within the ecosystem and its ability to open the infrastructure to other participants. This result, illustrated through the comparison between Supply Chain Management (digital service) and Supply Chain Platform (transactional platform), highlights how a single firm can achieve the same objective by adopting either a platform or a linear model, depending on its position within the ecosystem and its approach to interacting with other participants, including competitors. However, it is important to note that although the objective may remain the same, the activities required in each model are distinct, resulting in differing performances.

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### Finding #2 – Delivery & Payment: a service supplier in the firm – clients relationship

Finding	Digital Service	Transactional Platform	Innovation Platform	Orthogonal Platform CaaS	Orthogonal Platform CaaST
#2 <b>Delivery &amp; Payment</b>	From the firm to independent sides	Between sides through the firm	From the firm to sides	From the firm to sides, with unidirectional interest from one side to the other	From one side to the other through the firm
	Each side related to service utilization	Transaction fees	Entry/Transaction fees	From the side interested in the information	From the side interested in reaching attention

Table 5.2: Finding #2 – Delivery & Payment Mechanism

From a business perspective, the methods of delivery and payment shed light on how a firm provides and captures the value it creates. The distinctions between various platforms and digital services depend on the specific platform being considered. Thus, understanding these differences is more straightforward when viewed from the supplier’s perspective in both scenarios

The distinction between digital services and transactional or innovation platforms primarily relies on the nature of payment and interaction. In the realms of both transactional and innovation platforms, there is a mutual interest between the parties involved in the platform’s ecosystem. The supply side, eager to reach a larger pool of potential buyers, is often willing to pay a fee to the platform, either for each transaction or for access to tools that enhance their ability to deliver valuable outcomes to clients. Contrastingly, a conventional digital service typically operates on a pay-per-use model. Here, clients pay directly to the supplier for the service that adds value to their operations or their personal life. The interaction in this model is fundamentally firm-to-client, wherein the firm directly offers its services to the end user. This direct approach grants the firm more control over service quality, user experience, and pricing.

Comparing digital services with Orthogonal platforms is not straightforward. Although both models primarily employ a firm-to-client delivery mechanism to engage end users, the characterization of the client differs significantly between CaaST and CaaS approaches. Furthermore, the objectives and interests of the firm providing the service vary markedly in the case of a platform.

A digital service is directly offered by the supplying firm to the client, relying on the firm’s assets, internal capabilities, and expertise in creating and providing services tailored to each client. However, in the context of platforms, this direct service approach is insufficient as the supply side often lacks the channels, reputation, or capabilities to directly engage the end user, or may deem it less profitable to do so. As a result, it tend to pay for access to a broader customer base. Setting aside the relevance of network effects for this section, in both CaaST and CaaS models, the party that is conventionally recognized as supplier in a standard digital service scenario (either

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receiving direct payment or benefiting indirectly through enhanced reputation) becomes a side willing to pay an intermediary to deliver a service to the ultimate user.

From the supplier’s perspective, although collecting customer data or initiating marketing campaigns to attract new customers can be expensive, using a platform as an intermediary changes both the delivery process and the payment dynamics. In CaaT, it becomes firm-to-firm-to-client, and in CaaS, it’s client-to-firm-to-firm. In this arrangement, suppliers pay another entity for a service, effectively introducing a service provider into their relationship with the end user.

In conclusion, by adopting the perspective of the firm within the traditional firm-to-client relationship, the distinctions between digital services and platforms become more apparent. In the case of digital services, which align with the classic value chain, the firm provides a service directly to clients in exchange for compensation, or it invests in research and marketing to better meet customer needs. In contrast, introducing a platform as an intermediary adds another supplier into the mix, changing the relationship dynamics between the firm and its current and potential customers. This shift impacts the delivery and payment mechanisms, as well as the competition with other brands because it introduces a layered structure where firms not only compete on their offerings but also on their positioning within the platform’s ecosystem, amplifying the need for strategic partnerships, differentiation, and adaptability.

The research significantly contributes to this finding, as evidenced by analysing the contrast between social networks (digital services) and knowledge marketplaces (transactional platform). In both cases, the firm connects people and collects information. However, with social networks, the firm often fails to fully capitalize on the community’s knowledge potential, since it does not deliver value to external parties interested in engaging with the users. In contrast, knowledge marketplaces facilitate matches between community subgroups and third parties. This approach not only yields the same benefits as a social network but also introduces a transactional relationship. This provides value to the supply side, and the provide is able to capture this value establishing a fee.

### Finding #3 – Role of Data: from Enhancing to Defining Success

Finding	Digital Service	Transactional Platform	Innovation Platform	Orthogonal Platform CaaS	Orthogonal Platform CaaT
#3 Role of Data	Provides customization and process improvement	Improves matchmaking	Serves as the basis for new product development and content creation	Serves as the basis for new product development and content creation	Serves as the basis for new product development and content creation

Table 5.3: Finding #3 – Role of Data

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For Digital Services, data primarily serves to provide customization, tailoring the user experience to individual preferences and aiding in process improvement. This contrasts with Transactional Platforms, where data plays a crucial role in improving matchmaking, ensuring that users or entities find the best possible matches for their needs. On the other hand, Innovation Platforms use data as the foundational bedrock for new product development and content creation, harnessing insights to drive innovation and meet emerging demands. Similarly, both Orthogonal Platforms rely heavily on data as the cornerstone for developing new products and creating content.

As just mentioned, in the realm of digital services, data serves as a quality enhancer to bolster the comprehensiveness, quality, and accuracy of the services provided to customers. Conversely, for platforms, data serves a dual purpose. Like digital services, platforms use data as enhancers. More importantly, however, data acts as a fundamental asset that underpins the very existence of the platform.

Without data, Transactional platforms cannot effectively match sides, rendering even the most high-quality service towards customers ineffective due to the lack of participants. Similarly, while Orthogonal platforms might offer exemplary targeting and data collection services, their success depends on understanding the intrinsic value of the information and discerning which data sets appeal to external parties for monetization purposes. This principle also applies to Innovation platforms. Here, tools and support given to the supply side must be current and geared towards the creation of data-driven products/services to ensure success.

Therefore, to truly grasp the significance of data within the platform ecosystem, it is important to consider that platforms onboard competing entities. If a platform cannot deliver value to all its stakeholders, they will inevitably depart. Hence, the intrinsic value of data must be maximized to deliver a customized ecosystem for each participant. This tailored environment should not only ensure outstanding service delivery to clients but also enable them to stand out and differentiate from others.

Reflecting on the analysis results, it's clear that a data-driven service, characteristic of orthogonal CaaS platforms, significantly diverges from the offer customization or internal optimization typical of digital services, primarily due to the indispensable role of data. In the latter scenario, the value of the digital service remains limited without proper information management. Conversely, in the case of a platform, the firm cannot provide any service if there is no demand, as the platform's viability is dependent on the willingness of users to pay for the services offered

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### Finding #4 – Network Effect: delighter for digital service

Finding	Digital Service	Transactional Platform	Innovation Platform	Orthogonal Platform CaaS	Orthogonal Platform CaaST
#4 Network Effect	Delighter - One side	Must-have - Bi-directional cross-side network effects	Must-have - Bi-directional cross-side network effects	Must-have - Unidirectional cross-side network effects	Must-have - Unidirectional cross-side network effects

Table 5.4: Finding #4 – Network Effect:

The last difference related to network effects that has emerged from the analysis can be useful to add another determinant to distinguish between platforms and digital services. While the impact of network effects on platforms is well-understood, its relevance for digital services sheds light on the distinctions between the two. The Kano model assists firms in discerning between features worth investing in and those that might have a marginal impact on customer satisfaction (Sauerwein, et al., 1996).

For platforms, the network effect is a “must-have” – an indispensable feature that customers inherently expect, and its absence results in notable dissatisfaction. However, its role in digital services diverges. In this context, the network effect can be seen as a delighter. When present, it can notably elevate customer satisfaction, surpassing expectations and offering unanticipated value. Yet, its absence does not detract from satisfaction, as customers may not inherently expect it and are already prepared to pay for the service without it.

Once again, this conclusion arises from the differences observed in some alternatives from the study, specifically in the field of healthcare. The way in which a firm can interact with patients differs significantly between a digital service and a platform. In the first case, if the firm leverages a large patient base as a resource, it can deliver an integrated service to each consumer, utilizing the available information. Additionally, if the number of participants decreases for any reason, the firm can still provide value to those who remain in the interaction. On the other hand, in the case of a platform without such network effects, the ecosystem may not be attractive. Consequently, the organization may struggle to provide value to the supply side, and engaging in activities such as drug development can become impossible due to the need for specific competencies and resources that may not be internally available in a profitable manner.

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From the joint point of view of the literature on platform and business model, this section of discussion explain the distinction between a linear and a multisided business model. In particular, considering as reference for the current knowledge about platform the definitions provided by David Evans (Evans, 2003), Jean-Charles Rochet (Rochet, et al., 2003), and the articles “Landlords with no lands: a systematic literature review on hybrid multi-sided platforms and platform thinking” (Trabucchi, et al., 2021) as comprehensive review of the literature on two-sided platforms, this initial section of the study contributes to the existing knowledge by providing a comprehensive understanding of the concept of platforms. It illustrates how this type of business model differs from others that may leverage the same technological infrastructure.

The research not only compares platform-based business models with traditional businesses from a multi-stakeholder perspective (Trabucchi, et al., 2023) and in terms of idle assets (Trabucchi, et al., 2020), but it also defines the differences between a platform and a digital service. This distinction is particularly crucial when the goal is to transition from a linear value chain and mindset to a platform-centric business model, especially when the entity overseeing this transformation is accustomed to thinking and operating in a linear manner.

The study highlights how starting a “Market Platformization” with digital technology does not change fundamentals of business. Hence, to become profitable, the firm needs to link different business units and use its assets in unique ways to achieve economies of scale and scope (Cusumano, et al., 2019). Considering this, the findings confirm that digital platform firms and their ecosystems represent the emblematic organizational form of the digital age (Gawer, 2022). They can extensively capitalize on contemporary digital infrastructures and benefit from the behavioural patterns of billions of users who connect to these platforms daily via their digital devices. Furthermore, especially through third insight, the research confirms that leveraging the data generated and transforming them into a crucial resource makes it possible to improve existing digital services and innovate new one towards a platform.

To sum up, this section underscores the pivotal role of a firm within its ecosystem, emphasizing how chose a perspective instead of another and the degree of service openness can culminate in either a digital service or a platform. The significance of data (Trabucchi, et al., 2017) is reaffirmed, pointing out that data is not merely essential for improving customer experiences or efficiency. In fact, to truly establish a platform, it is almost imperative to harness the latent value embedded within this data and offer it to the right stakeholders. Moreover, the research delves into the impact of network effects (Parker, et al., 2016) across various contexts and examines the positioning of entities within a conventional value chain.

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Given the inherent inflexibility of incumbent businesses and their adherence to established routines and traditional business models, this insight can guide management teams responsible for transitioning to this new business model.

Finally, it elucidates the shift in the delivery process, where there is a reliance on an intermediary that not only demands payment but also intensifies competition by presenting end-users with more options. Recognizing this dynamic is crucial, as it enables decision-makers to pinpoint their desired positioning, assess potential business opportunities and threats, and weigh the economic implications of choosing between a traditional digital service and a platform, all while taking into account the significance of regulation.

To really conclude the overview presented in this chapter regarding the concept of platforms, it's pertinent to consider two additional insights derived from the study.

First, there is a noticeable absence of product platform alternatives in the generated data. This may reflect the sample of firms considered, which may skew towards the physical rather than digital realm. Nevertheless, the clear distinction between product platforms and other types, which tend to have a digital focus, suggests that strategies for developing a system based on product platforms require a distinct approach that set them apart from digital-centric alternatives.

Second, the data reveals that many alternatives do not qualify as platforms or digital services. Within this non-platform category (Other):

- Partnerships and collaborations are the most represented subcategories, accounting for 33.10% and indicating that transitioning to a platform-based business model often involves forming alliances with other firms.
- The building step subcategory, which constitutes 28.97% of the category, is acknowledged as a preparatory phase for platform implementation rather than as an end service or platform in itself.

Collectively, these two categories, which represent over half of the Other category and 10.8% of the total entities, treat the platform as a central theme without constituting a complete platform. This observation underscores the complexity within the platform concept and implies a knowledge gap regarding what qualifies as a platform according to the necessary conditions (Evans, 2003). Moreover, reading the results, the cardinality of the Other cluster may be overstated since the alternatives it contains do not constitute independent platforms.

Their categorization within this category is primarily due to their incompleteness rather than their intended function. This clarifies that these entities may not currently be considered platforms, but they contain elements of platform architecture and are at different stages of evolving towards such a status.

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### 5.4 Platforms and Innovation

The previous section established a clear distinction how established organization can trig a process of transition towards a platform-based business models, or instead start a digital services as proxy of linear models, delineating their unique features and overlaps. Following this clarification, the focus shifts to an analysis of the findings related to “platforms”, as classified in the first level of the coding scheme.

Recalling how organizations pursue innovation, they typically engage in the exploration of new knowledge or novel recombination of existing knowledge (Li, et al., 2013). However, established companies tend to focus their search efforts on familiar domains, as venturing into uncharted knowledge territories incurs higher costs (Laursen, 2012). As a result, the innovation process is a complex journey that integrates various streams, such as product, process, and business model innovation (Bucherer, et al., 2012), it encompasses different search techniques like cognitive and experimental search, and involves several configurations for the firm, each distinct in numerous ways.

	Business Model Innovation	Product Innovation	Process Innovation
<b>Definition</b>	A novel activity system within the industry where the firm operates and competes	Product or service newly introduced to the market to satisfy a user need	The introduction of new elements into a firm's operations to enhance product production or service delivery
<b>Unit of analysis</b>	The interplay between a firm, customers, and partners	Product and its features	Routines and processes employed in production or service delivery.
<b>Main stakeholders</b>	External business partners and customers	End-user customers	Primarily internal stakeholders, including various departments and employees
<b>Knowledge needed</b>	A general business acumen focused on restructuring activities	Technical R&D knowledge, often documentable and patentable	Tacit technical knowledge that's often hard to document
<b>Relation with the value chain</b>	This involves comprehensive changes to the value chain, altering content, governance, and stakeholder relationships	Changes typically occur in marketing and sales, frequently initiated by R&D, affecting the middle to downstream value chain	Changes aim to optimize operations, affecting the upstream to middle value chain

Table 5.5: Product, process, and business model innovations (Snihur, et al., 2019)

Firms engaged in innovation may choose to market new products, develop new processes, or adopt new business models in parallel or separately (Crossan, et al., 2010). Consequently, the objective of this section is to comprehend how various platforms facilitate different types of innovation and to explore how their interrelationships are crucial for achieving the goals of this study. Considering the three types of innovation presented—product, process, and BMI— they are positively interconnected each other (Snihur, et al., 2019). It means that a progress in one area often correlates with advancements in the others, suggesting that a strategic model, where different types reinforce one another, lead to an integrated and holistic approach towards innovation. This interconnectedness suggests that firms innovating in these areas can do so without encountering significant trade-offs, reflecting the importance of fostering a culture that fully leverages the innovation capabilities of individuals within the organization and optimally utilizes its resources.



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As indicated by the table comparison, Business Model Innovation encapsulates elements of product and process innovation, including among the others: stakeholder involvement, knowledge application, and value chain interactions. Hence, since product and process innovations are typically more tangible and restricted in scope, they are easier to recognize than BMI, suggesting that an analysis of the relationship between platforms and these types of innovations can provide valuable insights into how such established organizations might transition toward a multi-sided business model.

Analysing and interpreting the results related to the connection between platforms and innovation streams (Table 4.4: Platforms for Innovation), the following insights emerge: every “pure” transactional platform, as classified by the secondary tier of the coding system—where “pure” refers to an exclusive focus on transactional dimension—are all capable of driving innovations in process as well as in products or services. This delineation implies that even with a singular transactional focus, platforms can advance operational efficiencies and develop new product or service offerings. The same logic applies to platforms that are centered on innovation and those that adopt a Client-as-a-Source approach. However, the underlying reasons for the innovative outcomes in these platforms may differ.

### Transactional Platforms

In the expansive category of transactional platforms, which also encompasses potential transactional platforms, the four types—Knowledge Marketplaces, Product Marketplaces, Product & Service Marketplaces, and Service Marketplaces—can drive innovation in both processes and products, even though the object of their exchanges varies widely.

When considering process innovation, it often reflects the strategic role that a company assumes within the emerging framework. The transformation from a traditional linear value chain to a transactional platform model necessitates a shift in how resources are managed. Companies must pivot from focusing on internal efficiency and effectiveness in reaching customers with available resources to adopting an outward-looking approach. It involves coordinating with various stakeholders and continuously enhancing matchmaking processes. This transition requires the integration of new operational elements to improve service delivery, which in turn alters employee roles and reshapes the relationships with suppliers and competitors. As consequence, in order to establish an effective transactional platform, activities such as benchmark with competitors, protection against imitation, marketing positioning are not more necessary as the firm must completely shift its role in ecosystem and reorganize its internal processes to the new configuration.

Regarding product innovation, the creation of transactional platforms often means offering new services to entities that were once suppliers or competitors but are now

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clients. Additionally, if a company establishes a transactional platform with exchange offerings that are distinct from its core business—for instance, a manufacturing firm launching a knowledge marketplace—it must capitalize on idle assets to foster an environment where new products or services can be marketed. This approach can monetize resources that were not previously profit-generating within the traditional value chain.

### Innovation Platforms

Innovation platforms are intrinsically linked to product innovation as they offer a foundational framework that enables other companies to develop their products and services using the resources provided by the platform. In addition to this, the study provides evidence oriented towards a connection between innovation platforms and process innovation, particularly when the platform's focus on product development aligns with the industry of the firm that established the platform.

While there is limited information on the process innovations realized through business support and the integration of complementary services as a second layer, the situation is markedly different for platforms established specifically for product development, which account for 67% of the overall Innovation Platforms. The cases within this category require the platform provider to develop products or services similar to those produced by the platform participants. In such scenarios, the process innovation for the provider is tied to learning from the experiences of others. Considering an external player, it participates in an innovation platform to leveraging the platform's resources. Instead, when a firm's department, such as R&D, participates in an innovation platform, it benefit from the platform's resources, as it happens for the external player, but it also gains insights from other participants. In fact, the owner of the platform has to possibility to monitor the participants in order to support them. In doing so, it can learn the best practices, understand which can be the most prominent trend in advance, and evaluate which are the less profitable businesses avoiding their in-house development. Furthermore, observing others' mistakes, it can reduce the risk of repeating the same errors and enhancing their process innovation efforts.

### Orthogonal Client-as-a-Source

Orthogonal Client-as-a-Source platforms serve a dual innovation purpose, encompassing both data-driven services and data trading. These orthogonal CaaS platforms are primarily data-centric, providing critical information that firms can use to optimize operations—such as when a department within the firm consolidates data from various sources to enhance decision-making—or to spark product or service innovation by applying insights to refine existing offerings or create new ones based on these findings. In fact, with regard to product innovation, the implementation of an orthogonal CaaS platform presents a novel value proposition to the firm's clients, who gain access to a vast and diverse pool of information aggregated from multiple sources.

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### Orthogonal Client-as-a-Target

To conclude the analysis of platform categories, the last to be considered are Orthogonal Client-as-a-Target platforms. Studies of options within this category (Amit, et al., 2012) reveal an association with product innovation. Orthogonal CaaT platforms are identified as a new method for firms to access and serve their customer base through specialized services. Regarding process innovation, nothing can be stated as there is an absence of evidence showing a connection with Orthogonal CaaT platforms.

Until this point, the discussion has illustrated that platforms can facilitate both product/service and process innovations, confirming the theme treated in the book *Platform Thinking* (Trabucchi, et al., 2023) in which these configurations are adapted to create favourable conditions for innovation.

Recalling the purpose of this study, it is important to mention how process and product innovation are linked to Business Model Innovation

Product innovation is deeply interconnected with BMI, as it can transform a company's value proposition and reconfigure its business strategy. The introduction of novel products often requires firms to develop new strategies for market engagement, encompassing innovative revenue streams, distribution networks, and customer interfaces (Amit, et al., 2012).

Meanwhile, process innovation acts as the critical support structure for the adaptation and implementation of new business models by fostering operational effectiveness, reducing expenses, and refining service delivery. The practicability of new business models frequently depends on inventive processes that disrupt conventional retail and supply chain operations (Euchner, et al., 2014). Such innovations in company procedures facilitate the transition to competitive business models, supporting strategic reorientation and market innovation (Casadesus-Masanell, et al., 2013).

Thus, the approach to business model innovation within firms unfolds in two distinct phases (Berends, et al., 2016). The initial phase is exploratory, characterized by the generation and testing of novel ideas. This is succeeded by a phase of consolidation and scaling, wherein firms refine their early concepts, bolster their business strategies, and establish a robust platform for enduring growth. The integration of platforms into BMI is a subject of increasing interest as it provides a strategic direction for the consolidation and scaling phase. Scaling involves the mobilization of additional resources, a more comprehensive engagement with markets, and the integration of new models with the firm's existing operations. Besides, it typically requires involving a larger number of stakeholders, undergoing significant organizational transformation, and achieving higher levels of coordination.

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Again, recalling previous studies about business model innovation and platform, this research confirm how two (multi)-sided platforms, as well as innovation platforms, can be the right configuration for business model innovation as described by Rushab Gala (Gala, et al., 2023) and to drive the transformation (Hänninen, et al., 2018). Furthermore, considering as unit of analysis established firms that have linear operations to support their business model, embracing a transformation towards a platform is a process innovation.

### 5.5 AI

To wrap up the discussion, evaluating the impact of artificial intelligence on developing new business models is crucial.

The findings indicate that the performance difference between two AI tools is not significant, suggesting that relying on current data (as with Bard) as opposed to outdated information (like ChatGPT model 3.5) does not substantially affect the ability to generate accurate alternatives and associated quality.

The results confirm that management can use AI to support the generation and experimentation of new ideas during the exploration phase (Berends, et al., 2016). Additionally, when analysing the quality of the alternatives generated in terms of content, the outcomes validate the practical aspect of AI in addressing obstacles to business model innovation (Chesbrough, 2010).

Furthermore, in terms of strategic decisions, AI can be adopted to better connect the existing assets to business models that are different from the current one. This is crucial for incumbents who have made significant investments in traditional models and may resist changes that threaten to decrease the value of the current assets or that invert a pas decision taken by them.

Another interesting insight that emerges is that AI can help to overcome cognitive barriers related to BMI. These barriers typically involve challenges in recognizing the need for change and conceptualizing the process of innovation. As a result, they include difficulties in identifying the optimal timing for shifting business models and in imagining new models that diverge from traditional practices.

Finally, when evaluating the AI's error rate in generating platform alternatives in response to specific inputs, it is evident that these tools are not always the most effective solution for managing transitions. As there is the possibility of generating incorrect results, the management should possess a high level of expertise to assess these outcomes and, in case of errors, should adopt prompt engineering techniques to enhance the generative capabilities of these tools. This strategy encourages users to venture beyond their usual boundaries and explore previously unconsidered options. Furthermore, the application of reinforcement learning to refine responses based on

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past inaccuracies establishes a feedback loop, which progressively improves the output quality by eliminating irrelevant alternatives and increasing the reliability of the results even for not experts.

To conclude the discussion it is important to mention that this research provides two insights to the literature of Artificial Intelligence: in the first place, it shows that for this kind of topic the reliance of updated information is not a critical factor as the answer of Bard are not better of the ones provided by ChatGPT (model 3.5) in terms of precision. Furthermore, considering together the answers of the two tools, the error rate provide an interesting insight: when the topic of the interaction has more than one meaning, the tools do not return a set of coherent answers, showing how the human capability of evaluating the answers is fundamental.

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# 6. CONCLUSION

The final part of this thesis presents the insights and analyses carried out through preceding sections. This chapter aims to synthesize the findings, assess the validity and reliability of the study, and elucidate both theoretical and practical contributions made by this research. It will also discuss the limitations inherent in the study's design and propose directions for future research.

The initial evaluation of the study, as introduced in the corresponding methodology section (Evaluation and assessment), relates to the validity and reliability of the results. Specifically, four fundamental principles are considered for this purpose:

- **Construct Validity:** the approach adopted adheres to a structured methodology in order to guarantee the stability and coherence of results during case assessment. This process begins with case selection, which is systematically conducted using a list of firms sourced from reputable databases. Furthermore, the methodology ensures that the coding of alternatives follows the principles of vertical replication, applying a consistent method across all cases; and a rigorous retrieval flow, ensuring that for each output, whether final or intermediate, there is a clear trace back to the original source of information.
- **Internal Validity:** the internal validity of the results is linked to the pattern-matching techniques used and the adherence to the saturation principle. Each alternative was labelled with three distinct codes, which incorporated both deductive and inductive approaches, and a dual perspective which focuses on the "how" (first and second layers) and the "what" dimensions (third layer). Furthermore, the application of the saturation principle to the first two layers of the coding system guarantees the results' reliability within the sample by providing a comprehensive view of the available configurations.
- **External Validity:** the replication of the same method across different cases, coupled with the diversity of the industries in which the firms operate, enables the generalization of results concerning how AI can support the transition toward a platform-based business model. However, the absence of external validation by management, which is responsible for these final decisions, introduces a potential vulnerability regarding the real effectiveness of the proposed method. This does not affect the external applicability of the methods



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per se but it can hide the real applicability of some instances within specific fields. Consequently, some methods may be valuable for certain cases but not applicable to others, thereby reducing the overall generalizability of the results.

- **Reliability:** to ensure the consistency and replicability of the study, the employed protocol began with the creation of a database from which results were extracted. This extraction facilitated data organization, storage, and ensured retrieval. Therefore, the procedure for drafting the analysis followed the steps described in the methodology, structuring the analysis with well-defined protocols and balancing the information related to each case in terms of both quantity and quality. Although the findings can be replicated for other cases, the robustness of their effectiveness is limited by the data gathering process, which relies on AI tools as a gateway to generate information for each firm.

In summary, this thesis validates and ensures the reliability of its research through a structured methodology and case analysis. However, the reliance on AI for data collection presents limitations, indicating a need for cautious application of findings across different contexts. Hence, future studies should aim to improve data collection and validation techniques to better align with the rapid advancements in technology and business, thereby enhancing the findings' applicability and accuracy. At the same time, replicability and the saturation principle enhance the results' validity and reliability, especially since they are future-oriented. As mentioned previously, the lack of specific management interviews within the firms diminishes the robustness of the findings, as some proposed alternatives may be deemed unfeasible for firms with particular characteristics.

### 6.1 Theoretical Contribution

As outlined in the literature review and referenced earlier in the discussion section, this study makes theoretical contributions in three areas: understanding of platform, innovation in business models, and the role of AI as an instrumental support tool.

It advances the discussion on platforms by differentiating the current typologies of platforms in detailed entities. Moreover, it demarcates what constitutes a platform as opposed to a digital service or a traditional linear business process. It sheds light on the ambiguous identity of a tech-based service, which can be considered a platform or a digital service based on a firm's strategy and its ecosystem's position. Furthermore, the study reveals that a firm's technological infrastructure might serve as a platform only when it is developed together with a shift on the provider's approach that should move from competing to collaborating with other businesses, turning competitors into participants and customers.

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Therefore, considering the first field, the research enriches the literature on platforms by categorizing each into subgroups, demonstrating how the same business model can have varying focuses. These findings are of interest to the research community as they provide a horizontal baseline that can be further developed by analysing each category in more depth. This deeper analysis will enhance understanding of platforms and how they offer benefits to the involved stakeholders.

Then, the research also demonstrates how digital platforms harness digital infrastructure, user behaviour, and data analytics to drive innovation and enhance services, underlining the central role of data as foundational to platforms, rather than just supporting elements in digital services. It further explores the necessity of network effects in establishing successful platforms, as well as the transformation in service delivery that accompanies the shift to platform models, illustrating the broad implications for how companies operate and compete in the digital economy. This contribution is valuable to researchers in both platform and business model fields, as it not only highlights the differences between linear and multi-sided models, represented by digital services and platforms respectively, but also underscores how similar technological infrastructures must be managed differently to develop a platform rather than merely delivering a service.

Within the realm of innovation, specifically business model innovation, this study elucidates how transactional platforms, innovation platforms, and orthogonal platforms CaaS can be architected with dual objectives: to foster product innovation and advance process innovation. Consequently, the research enhances the literature by bridging the gap between these two streams of innovation under the umbrella of a platform-based business model. It reveals that these businesses are well-positioned to leverage the dual potential of product and process innovation, thus significantly contributing to the broader field of business model innovation, as to deal with the entire business model both the aforementioned streams represent a necessary conditions.

In conclusion, despite being a nascent area of study with limited existing literature, this thesis partially contributes to the body of knowledge on artificial intelligence by providing empirical evidence of its application in business. It showcases AI's potential and outlines the constraints these tools face in generating relevant alternatives, particularly when there is an overwhelming abundance of information from various fields associated with the same term. In particular, it highlights that an excessive amount of information from various fields related to a topic (platforms in this case) can decrease the precision of the answers, as they may be influenced by contradictory information. Furthermore, the research indicates that the quality of responses from ChatGPT (model 3.5) and Bard are comparable, suggesting that Bard's use of an updated information set does not necessarily enhance the quality of the answers.

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### 6.2 Practical Contribution

Taking the perspective of the management in charge of leading the business model transition and practitioners, professionals who actively engage to solve problems and improve outcomes, this chapter provides a number of practical recommendations for innovation that can help them to make a significant contribution to ensuring the long-term sustainability of the business, manage the transition, and guarantee the success of their organization.

#### #1 –Diverse Platform Categories

This study reveals the existence of various platform categories. The diversity within this field is significant, and it is compounded by the potential for misclassifying digital services as platforms due to feature overlap. Concentrating on platforms, the literature identifies four major classes – Transactional, Innovation, Orthogonal CaaS, and Orthogonal CaaS. These typologies, according to the results achieved in this research, give rise to twelve distinct entities among which the people in charge of leading the organization can choose to drive their firm in the best direction.

In practical terms, beyond recognizing this segmentation and understanding each type's characteristics, management must discern which alternative best leverages the company's resources to achieve its goals. The decision-making process demands a high degree of precision, as it entails developing a finely-tuned value proposition specific to the selected sub-category. Additionally, it involves setting up distinct procedures that are tailored according to the initial choice, ensuring that each step is optimized for the particular context.

The stream's pattern dependence, linked to the specialized reinforcement learning processes required for effective matchmaking between stakeholders, limits the ability to alter the plan later on and the flexibility. As a consequence, it becomes fundamental identifying the right setup from the beginning among all the different options available. Finally, although the points mentioned might add complexity to the decision-making process due to the increase in available options, they enable decision-makers to have more elements useful for assessing different scenarios. Hence, this allows them to promote and demonstrate a clear commitment towards a specific goal since the beginning.

#### #2 – Differentiating Digital Services and Platforms

Business models centered on platforms have been recognized as efficient and profitable according to literature. However, their successful implementation demands a substantial change in both the mindset of individuals and the organization's culture (Trabucchi, et al., 2023). If this transformation is not well-supported by leaders skilled in platform-based businesses, there is a risk of creating a system that is mislabelled as

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a platform. Such a system may not deliver the intended benefits, lacking the necessary features and management.

Therefore, a shift towards a platform model that is poorly informed or executed can result in inadvertently creating a digital service in disguise, failing to achieve the anticipated benefits of a true platform model. The analysis indicates that the boundaries between platforms and digital services often overlap, which necessitates a clear understanding by management of the differences between them. With this knowledge, they can make educated decisions about the strategic direction they wish to take, ensuring they harness the right model to foster growth and profitability.

### #3 – The risk of openness

A third insight for managers concerns the danger of underestimating the move toward a platform-based model, particularly when a firm already delivers value through an effective digital service. Transitioning to a platform is a form of business model innovation that requires a company to fundamentally rethink how it creates, delivers, and captures value. A platform must cater to various user groups, offering a unique value proposition to each, which in turn generates value for all participants. This requires onboarding multiple players and, even if they are competitors of the firm or each other, the provider must be able to offer benefits to all of them.

A digital service operates in a straightforward, one-directional manner and should not be mistaken for a multi-sided platform. While the underlying technology infrastructure may be similar between the two, and a digital service could serve as a jumping-off point for platform-oriented thinking, developing a platform is more than just opening up a service to other players. It involves a pivotal change from being a provider to becoming an orchestrator, enhancing value for all parties involved, including potential competitors from the old business model. This must be done while maintaining service quality to reduce customer turnover.

Not getting the hang of the differences between linear single-sided and multi-sided models can result in a platform that does not work or even harm a previously digital service by compromising its performance and eroding customer trust.

### 4 – AI's Role in Transition to Platforms

The final practical insight addresses the role of AI in transitioning towards a platform-oriented business model. AI offers immense potential for creativity and opening up new ways to tackle challenges. Yet, according to the analysis, over half of the responses generated by AI when prompted for platform solutions actually pertain to digital services and other categories. This suggests that generative AI tools may not be the most reliable starting point for such a transition, as they could lead to incorrect paths without the user's strong discernment to choose the best options from the proposed pool.

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As a consequence, managers and practitioners should exercise caution when using these tools, especially without a solid knowledge of the subject. They risk engaging in a reinforcement learning loop around an incorrect solution from the outset, missing the signs of misclassification. Therefore, if knowledge is lacking or the initial concept is vague, AI could steer the decision-making process based on faulty premises.

Conversely, an expert with a firm understanding of the topic might use AI tools effectively from the beginning, enhancing their initial concepts and harnessing AI's capacity to enrich the value of the solution proposed.

### 6.3 Limitation & Future Studies

The last section of this research thesis is essential for understanding the boundaries of the study's conclusions and for shaping future research directions. It emphasizes the importance of recognizing the research's limitations and how they may influence the findings' applicability. By acknowledging these limitations, future research can be guided to fill in the gaps, potentially examining a wider range of variables and expand the relevance of findings.

The primary limitation arises from the data collection and alternative generation process, particularly due to the limited number of information sources used, which can result in an incomplete view of the phenomenon. While AI tools serve as a useful starting point for accessing wide range of information to build knowledge about the subject, they may lack the specificity and strategic alignment needed for the firm's unique context. Although the objective of the study is future oriented, and the forecasting of a firm's upcoming directions is not solely based on past actions and disclosures; it requires insight into ongoing strategic transitions. To address this, incorporating interviews with management responsible for overseeing these changes, and integrating their insights with the information from AI tools, could yield a more comprehensive understanding of each scenario.

The second limitation identified concerns the sample size of cases for each platform category. Although the sample meets the saturation principle, there is a possibility that some cases within the second layer of the coding system are underrepresented. This underrepresentation could affect the apparent prominence of certain patterns over others, a bias introduced through the path-dependent selection of cases during the alternative generation process. The absence of a secondary analysis applying the same methodology to a diverse sample—in terms of firm size, industry sectors, and geographic distribution—introduces a vulnerability in the study's findings. This limitation restricts the generalizability of the results, as they may primarily apply to firms with characteristics similar to those examined in the analysed group. Therefore, expanding the research to include varied samples would strengthen the applicability of the conclusions across a broader spectrum of business environments and it could

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provide a more robust validation of the study's outcomes. Moreover, it would offer insights that are relevant to a wider range of organizational contexts, potentially revealing new patterns and trends associated with different firm profiles.

The limitations highlighted in this study provide a foundation for identifying promising directions for future research, recognizing the challenges and opportunities inherent in this field of study. Specifically, two main avenues for future research have been recognized, underscoring the potential for substantial progress and the development of valuable solutions to pressing issues.

- A prospective study following this research could involve a deep analysis of selected cases that were previously outlined. The research would delve into the intricate details of individual platform transitions, examining the unique challenges and successes encountered by each firm. This close examination would provide richer, context-specific insights into the practical application of platform-oriented business models. This study could validate the proposed categorizations and explore the reasoning behind the preference for certain solutions over others, supporting their development. Moreover, interviewing the key personnel responsible for managing the transition could yield further insights, contributing to the discovery of new alternatives that this research has not covered.
- The second valuable direction for future research is the investigation into the effectiveness and efficiency of the solutions outlined in this study. While the current research presents a comprehensive array of options for transitioning to a platform-based business model, it stops short of evaluating which option is superior in terms of efficiency and effectiveness.

An intriguing progression of this work would be to assess each solution, potentially through evaluations by experts and practitioners who have previously or are currently engaged in such transitions. The study's quality would be further enhanced by an extended compilation of success and failure cases for each solution examined, revealing the key factors that lead to the success or failure of each alternative and allowing a benchmark among the alternatives. This would provide a holistic view of the best strategies for shifting towards a platform model, considering a range of input variables.

In closing, while this chapter has addressed some of the most significant limitations and avenues for future research, it is by no means exhaustive. There remains a vast potential for further scholarly exploration beyond the scope of this discussion, which future investigations could richly benefit from.



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## APPENDIX A

# A. APPENDIX A

Sector/Service	GPT	BARD	TOT	
App Development	41	23	64	7.7%
Not Specific Sector/Service	32	28	60	7.2%
Software & App	34	17	51	6.1%
Finance & Insurance	26	21	47	5.6%
Contextual Data based service	30	13	43	5.1%
Healthcare - Integrated service	23	20	43	5.1%
Retailing	13	17	30	3.6%
Commodity	13	15	28	3.4%
Healthcare - Drug development	16	11	27	3.2%
Security & Compliance	26	1	27	3.2%
Internet of Things	20	6	26	3.1%
Recommendation & Support	18	7	25	3.0%
Supply Chain Management	19	4	23	2.8%
Social network - Consumers	9	13	22	2.6%
Educational and Training	17	4	21	2.5%
Media & Entertainment	10	10	20	2.4%
Identification of core elements of the platform	19		19	2.3%
Not Applicable	15	3	18	2.2%
Advertising	8	6	14	1.7%
Loyalty program	10	4	14	1.7%
Pricing Strategy	12	2	14	1.7%
Payment & Money Transfer	7	6	13	1.6%
Startup Hub/small business launch	11	2	13	1.6%
Content Creation	9	4	13	1.6%
Delivery & Shipping	5	8	13	1.6%
Social network - B2B		12	12	1.4%

e-commerce	5	6	11	1.3%
Healthcare - Telehealth	5	5	10	1.2%
Mobility Integration Service	6	4	10	1.2%
Social & Sustainability purpose	7	2	9	1.1%
Augmented Reality (AR) and Virtual Reality (VR)	7	2	9	1.1%
Food & Beverage	4	5	9	1.1%
Hosting & Collaboration	7	2	9	1.1%
Creation of the digital platform	7		7	0.8%
Healthcare - Community		6	6	0.7%
Home Improvement and Care Management	2	4	6	0.7%
Scientific Research	2	4	6	0.7%
Marketing Campaign	4	2	6	0.7%
Human Feedback based service	4	1	5	0.6%
Social network - Internal		5	5	0.6%
Promote Innovation Culture	3	1	4	0.5%
Machinery related services	1	3	4	0.5%
Art & Creativity	2	2	4	0.5%
Monitoring & Maintenance	3		3	0.4%
Real Estate	1	2	3	0.4%
Telecommunication Services	2		2	0.2%
Integrated Athlete Engagements & Outdoor	1	1	2	0.2%
Supply Chain Platform	2		2	0.2%
Professional Service	2		2	0.2%
Data storage		1	1	0.1%

Table A.1: 3° Layer - Overview

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