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EXECUTIVE SUMMARY OF THE THESIS

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

TESI DI LAUREA MAGISTRALE IN MANAGEMENT ENGINEERING – INGEGNERIA GESTIONALE

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1. Introduction

In the current business landscape, established firms operate in an environment characterized by intense competition and rapid change. This scenario challenges businesses to be agile, customer-centric, and forward-thinking, often compelling them to reinvent their strategies and operations to remain relevant and successful.

The median age of companies in the Standard & Poor's top 10 dropped from 85 to 33 years between 2010 and 2018 [1], showing that even leading companies struggle to maintain their positions. As a result, firms across different industries are evenly allocating capital to balance transforming their core business and developing new ventures [2].

Since its inception in 2008, Airbnb has experienced extraordinary growth, revolutionizing the tourism accommodation sector. Its remarkable expansion, driven by an innovative approach, leverages internet technologies to create a platform-based business model, thereby redefining travellers' expectations and experiences [3].

These examples, including Airbnb, Uber, and OpenTable, highlight three key concepts.

Firstly, platform-based business models are remarkably efficient, as demonstrated by their rapid scaling and industry disruption capabilities. This is reflected in the S&P 500 market capitalization, where just five platform companies—Microsoft, Apple, Amazon, Alphabet, and Meta—constitute over 24%

Secondly, the trend confirms that even market leaders in stable industries, not typically characterized by technological breakthroughs, can be overtaken by innovative newcomers. These entrants, with their technology-based value propositions, compete effectively due to their agility and lower capital needs, especially if established players lag in innovation.

Finally, this situation illustrates the disruptive power of certain technologies, particularly Artificial Intelligence, which is the third pillar of this study. AI stands out among several emerging disruptive technologies [4]. It has the potential to drastically change the current business landscape and challenge the dominance of many market leaders.

What has been described forms the foundation of this study, which focuses on understanding how incumbent organizations can begin innovating their business models towards a platform capable of ensuring the firm's sustainability. In this transition, AI plays a pivotal role, acting as a crucial tool to aid management in defining and pursuing a new direction for the company.

2. Theoretical Background

To effectively address the study's topics, a dedicated section is essential for understanding existing research and for a deep analysis of the foundations of the research's pillars: business model innovation and platforms, with a special emphasis on platform thinking.

Business Model Innovation

To introduce the concept of business model innovation, it is important to understand the foundations of the Business Model, a concept that has existed since 1957 [5]. Over time, the definition has changed and evolved multiple times, shifting from a purely economic perspective [6], to focusing on product/service families [7], and ultimately culminating in the comprehensive definition provided by Osterwalder & Pigneur in 2010 [8]: *A business model describes the rationale of how an organization creates, delivers, and captures value.*

The definition mentioned earlier is represented in the Business Model Canvas, a tool for practitioners that shows the framework's multidimensionality and illustrates how its different elements are interconnected. Analysing this tool, the central role of the value proposition emerges, highlighting how it forms the core of the business model and serves as the real source of competitive advantage.

To thoroughly understand the topic of BMI, the analysis of a business model examines the three dimensions critical to the success of one configuration over another: value creation, value delivery, and value capture.

These represent the core elements that a firm must consider when drafting its Business Model, because without proper management of each dimension, the organization may not be able to maximize the benefits generated

Therefore, having established the concept of the business model, its evolution, and the key elements that determine the value of this framework, the stage has been set to introduce the concept of business model innovation.

BMI refers to the process of creating, adapting, or reconfiguring the fundamental structures and strategies through which an organization operates, generates value, and captures profits [9]. This practice is rooted in the uncertainty associated with future investment returns and the need for organizations to sustain long-term viability.

The success paradox—a situation where successful incumbents often face rapid and unexpected failure or disappearance (Table 2.1: Fortune - Global 500 evolution over time) combined with an accelerating pace of change in business contexts due to digital transformation [10] and other forces, shifts the underlying rationale for Business Model Innovation. It transforms BMI from an opportunity into a necessity for firms aiming to survive and maintain a competitive position

	2015	2005	1995
Firms in 2022 Ranking	60%	16%	13%

Table 2.1: Fortune - Global 500 evolution over time

Considering Artificial Intelligence, a term that was coined in 1956 [11], it is important to note that, despite its relatively recent escalation and the lack of a well-developed, detailed research stream, AI plays a fundamental role in the current business scenario, as evidenced by the impressive growth of ChatGPT [12]. AI represents a disruptive force [13] that can prompt corporations to redesign their innovation processes from several perspectives [14], with significant impacts ranging from products, services, and processes to the entire business model [15].

In this context of continuous change and evolution, management should determine the direction they wish to pursue. Among the various alternatives available, one of the most effective types of business models that has gained significant traction in recent years is the *platform-based business model* [16].

Platform

Based on the concept of a two-sided market [17], platforms are businesses designed to connect at least two distinct groups of customers. Both two-sided and multi-sided platforms, which involve more than two groups, are characterized by three key determinants [18]:

- The presence of two or more distinct groups of customers.
- The emergence of externalities among customer clusters when they become connected or coordinated.
- The ability of an intermediary to internalize the externalities created between these groups.

Although two (multi)-sided platforms are the most recognized type, as evidenced by successful examples like Uber and Airbnb [19], the field of platforms is broader. It encompasses Product Platforms, also known as Internal Platforms, which provide a common infrastructure upon which multiple products (derivatives) are developed within a company or industry [20]. Innovation or Industry-wide Platforms form a shared infrastructure that enables multiple firms to develop complementary products or services, potentially creating network externalities [21]. Additionally, as previously mentioned, multi-sided Platforms act as intermediaries, matching two or more groups of customers and influenced by cross-side network externalities [22].

This last type of platform can be further categorized according to two dimensions: Transactional and Orthogonal.

Figure 2.1: A comprehensive view of the different kinds of two-sided platforms

This leads to three distinct categories of two (multi)-sided platforms:

- Transactional Platform
- Orthogonal Platform
- Hybrid Platform

Transactional Platforms are products or services where two (or more) distinct customer groups interact through transactions facilitated by the platform provider, who earns a commission or fee for each transaction.

On the other hand, Orthogonal Platforms are products or services based on unidirectional cross-side network externalities. In these platforms, one side benefits from exposure to various services offered, while the other side values the intrinsic offerings provided by the first. Orthogonal platforms can be further categorized according to two logics:

- Client As A Target (CaaT): the platform targets the demand side as the audience for the second side, which aims to capture the attention of users from the first side.
- Client As A Source (CaaS): this strategy capitalizes on a user base that generates a valuable asset, which is then utilized and offered to the second side to capture a larger share of the value.

The third category consists of Hybrid Platforms, which are models that combine elements of both transactional and orthogonal dimensions.

Although these platforms vary in terms of underlying principles, monetization strategies, characteristics of the sides involved, and other factors, they share several common elements that contribute to their success as models.

In particular, these kinds of businesses can scale rapidly as they focus on managing external rather than internal activities. Enabled by technology, this process reduces the capital required to launch and manage such businesses. Consequently, the monetary risk and the need for assets are not significant obstacles for development, as they are mitigated by the structure of the business model itself.

Moreover, the value of a platform depends on its participants and the matchmaking process established by the provider. If the firm fails to

attract customers, network externalities—effects where a user's utility from a product or service depends on the number of other users in the same network—do not emerge, and the platform cannot deliver value to its participants. At the same time, if the matchmaking process is ineffective, customers may leave the ecosystem, initiating a negative loop that significantly decreases the platform's value.

Finally, to complete the overview of platform characteristics, two additional areas need to be addressed: launch and critical mass.

Launching a two (multi)-sided business is challenging, as the owner must manage dual (multiple) value propositions in a scenario marked by the Chicken-and-Egg Paradox. This paradox arises when 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 [23]. Adding to this complexity is the issue of critical mass. If the firm fails to reach critical mass on all sides within a reasonable timeframe, engagement levels will diminish, leading customers to exit the ecosystem, rendering even the most effective matchmaking mechanism ineffective.

Platform Thinking

Given the challenges associated with launching a platform-based business model, an effective solution is offered by platform thinking. This concept refers to the ability to view Hybrid multi-sided platforms as a resource-orchestration structure that reveals innovation opportunities [24]. Platform thinking aims to propose a shift in how individuals and organizations approach problem-solving [25], offering the greatest advantages to incumbents possessing idle assets and resources that are not being fully utilized.

By embracing Platform Thinking, these firms can transition from a linear value chain to a more dynamic and interconnected ecosystem. This not only allows them to harness underutilized assets but also positions them for sustainable growth and relevance in an era marked by digital disruption and constant change.

To be effective, the Platformization process – transformation of a traditional business or industry into a platform-based business model [26] – needs to enhance the firm's performance indicators [27]. Therefore, it is essential to demonstrate a strong commitment and take action across several domains [28]. This includes transforming internal culture and organizational structure, as well as managing products and user experience.

As emerges from the literature review, the topics of business model innovation and platforms are well-structured. However, the theory regarding platform thinking, particularly when focusing on established firms, remains underdeveloped. The primary aim of this study is to uncover new evidence on how incumbent firms can initiate the process of business model innovation. This involves transitioning from a traditional linear value chain to a platform-based model, while harnessing the power of AI to support this initiative. A key challenge to be addressed when the management used to follow linear thinking mindset. 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

To address the research question and the nature of the topic, an exploratory research design was selected. Specifically, the study employs a multiple case study methodology, with a foundation in theories related to Business Model Innovation and Platform Thinking. The objectives of the study, aimed at providing answers to the research question, include:

1. Innovating Business Models through AI: explore how established firms can transition from traditional to platform-based business models using AI.
2. Understanding Platforms in comparison with Digital Services as proxy of linear models.
3. Enhancing the external validity of findings related to traditional firms adopting platform models.

To achieve these goals, the unit of analysis for each case is the entire organization. Consequently, the starting point for case selection was the list of companies in the Standard & Poor's 500 (2022). This ensures the inclusion of incumbents and diversity in terms of sectors.

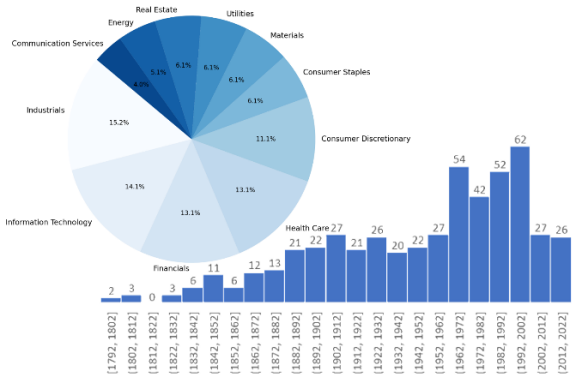

Figure 3.1: S&P500 (2022)

Therefore, cases were selected from the list based on three criteria:

- Non-platform firms from the S&P 500
- Selection in a top-down order
- The number of cases, up to the point of saturation of the first two layers of the coding system

Beginning with the list of selected cases, the data collection process is organized into three phases. First, ChatGPT and Bard were selected as generative AI tools to generate future directions for the firm. Next, the prompt to generate platform-based alternatives was defined. Finally, the alternatives were generated.

The decision to use Generative AI tools in the study was driven by the challenges of collecting primary data from top managers and the necessity for consistent comparability across different cases. These tools have access to a wide range of unbiased data sources and ensure comparability in research findings. Furthermore, they align with the study's focus on future directions, where an evaluation of previous performance is not a primary consideration.

Considering the research objectives, each alternative is labelled based on the three layers of the coding system:

1. **Platform:** deductive code derived from platform theory to distinguish between platform and linear solutions.
2. **Category:** inductive code (child) derived from the platform code to categorize the first class of alternatives into smaller, independent clusters.
3. **Sector/Service:** inductive code related to the type of services or sectors. This code serves as a bridge connecting the alternatives to innovation streams.

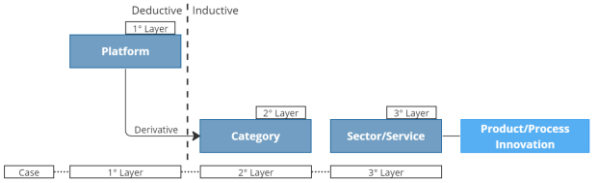

Figure 3.2: Coding System

The methodology's final step in the case study involves analysing and interpreting results through two techniques: pattern matching and modelling. Pattern matching compares data sets to identify correspondences, assisting in the discovery of new empirical evidence for business model innovation and assessing knowledge of the platform concept. Modelling creates a simplified representation of complex systems to develop a theoretical framework for adopting platform thinking and selecting suitable platform-based business models.

4. Results

The number of cases included in the study, following the saturation principle, is 60. For each case, the average number of generated alternatives is 13.9, with a minimum of 10 and a maximum of 18, resulting in a total of 835 alternatives.

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

The study's results are subsequently categorized into three groups, with each category corresponding to one layer of the coding system.

1° Layer: Platform

The outcomes related to the first layer of analysis are distributed as follows:

- 46% of the alternatives are categorized as platform-based businesses or potential platforms.
- 36% are classified as digital services because they use technology as a central element but do not meet all the criteria to be considered a platform.
- The remaining 17% of solutions do not fit into the categories of platform or digital service.

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 CaaT	8	6	14	2%	2%	2%
Digital Service	173	129	302	33%	41%	36%
Other	112	33	145	22%	10%	17%
Total	**520**	**315**	**835**	**100%**	**100%**	**100%**

Table 4.2: 1° Layer Results

2° Layer: Category

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 associated with a class from the first layer, effectively segmenting the pool of options into distinct and independent clusters.

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

Not-Platform
Digital Service
Standard Digital Service
Internal Optimization
Offer Customization
Integration of complementary services
Other
Partnership & Collaboration
Building step
Internal Optimization
Product&Service Marketplace
Service Marketplace

Table 4.3: 2° Layer Results

The detailed analysis of the deployment of all platform entities from the first layer has resulted in the delineation of 20 distinct categories for segmentation.

The distribution of each entity of this layer within the original 1st layer class reveals a predominance of one 2nd-tier cluster in each category. Specifically:

- Transactional platforms are dominated by product marketplaces (56.25%), followed by knowledge marketplaces (18.75%) and service marketplaces (13.75%).
- Potential transactional platforms have a different dominant cluster: knowledge marketplace (57.89%).
- Product development represents the 2nd main layer of innovation platforms with 80 cases, accounting for 66.67% of instances.
- Regarding orthogonal CaaS platforms, data-driven service is the most represented class in both effective and potential first-layer entities, with 81.82% and 69.57%, respectively.
- Finally, all the orthogonal CaaT platforms belong to the same second-layer entity, suggesting that each one of these entities adheres to a standard or default model.

3° Layer: Category

The last layer of the coding system aims to assess the specific industry, field, or typology of service where the innovation is applied. This additional dimension is useful to complement the initial two layers focused on structural composition for value creation and delivery, and to connect the alternatives with product and process innovation streams.

In particular, labelling the alternatives according to the criteria of the third layer generates 50 classes, and the sample is not saturated. These classes are linked to the corresponding innovation streams.

The results (Table 4.4: 3° Layer: Platforms for Innovation) indicate 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.

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

Table 4.4: 3° Layer: Platforms for Innovation

5. Discussion

The main findings of the research are related with the second layer's entities. The categories emerged contribute to the literature about platforms [24] as they propose a new framework to classify alternatives highlighting how the current scenario is in continuous development. Regarding innovation platforms, the derivatives represent the first segmentation of the class as in the literature there were not proposed any possibile configurations, while regarding Transactional platform they represent a second layer as the parent class is derived from two (multi)-sided platforms. Ultimately, the findings associated with Orthogonal CaaS platform represent third layer of analysis, as the class is divided into two logics.

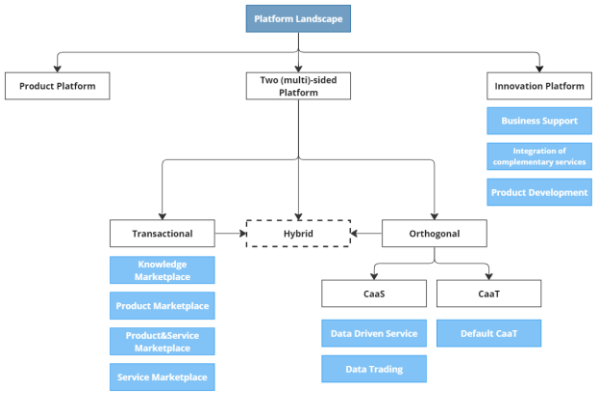

Figure 5.1: Platform Landscape

Finally, this first section demonstrate 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

A further set of insights is related with the determinants of the sources overlapping between platforms and linear models. In particular, four insights emerge:

1. **Role of the firm:** considering that the same technological structure can support either a platform or a digital service, in the launching phase, the owner must be aware of their role in the ecosystem. According to the positioning, it must change the way in which past competitors, customers, and stakeholders, in general, are engaged. Hence, the owner needs to shift its perspective from active participation as a supplier to the passive roles of facilitator and orchestrator, providing value even to firms that were once competitors.
2. **Delivery & Payment:** as a consequence of the previous insight, the underlying mechanisms behind how the firm delivers and captures value are different. In the case of linear models, which align with the classic value chain, the firm provides a service directly to clients in exchange for compensation. In contrast, introducing a platform as an intermediary adds another layer to the mix, changing the relationship dynamics.
3. **Role of Data:** for platforms, as with digital services, data serves as an enhancer that improves the quality of the service. However, only in the first case does it stand as a must-have asset that underpins the very existence of the business model.
4. The last aspect of interest is related to the role of **network effects**. In fact, as it happens in the case of data, for platforms, it represents a must-have, while in linear services it is more like a delighter, desired to increase the value but not indispensable for delivering the service.

Up to now, the discussion has focused on how to trigger a platform-based business compared to linear models for an established organization.

Therefore, the findings are analysed from the perspective of Business Model Innovation.

Considering product innovation, it is deeply interconnected with BMI, as it can transform a company's value proposition and prompt a rethinking of its business strategy. This pushes towards the development of new strategies for market engagement, encompassing innovative revenue streams, distribution networks, and customer interfaces [29].

Meanwhile, process innovation acts as a critical support structure for the adaptation and implementation of new business models. It fosters operational effectiveness, reduces expenses, and refines service delivery.

Recalling the unit of analysis, established firms dealing with a business model transformation have to change both internal procedures and their portfolio of outcomes. To achieve this, they can leverage the several categories of platforms identified by the second layer, as these are associated with two streams of innovation: product/service and process innovation.

The study provides evidence on how incumbents can adopt platforms to innovate both their products and processes, as well as their business models. In fact, they encompass both the elements of novelty associated with 'what' is delivered to the client (product) and 'how' the firm is able to sustain its operations (process)

To conclude the analysis of the results, the study reveals that AI is instrumental in the exploration phase of BMI, aiding in generating and testing new ideas. It is effective in both linking current assets to innovative models and assisting individuals in overcoming cognitive challenges associated with new business strategies. However, its use requires careful management. Due to potential errors in generating alternatives, managers must be skilled in evaluating AI outputs, employing techniques like prompt engineering and reinforcement learning to enhance AI effectiveness and ensure the reliability of its suggestions. The significance of these findings is underscored by the lack of performance improvement in tools that leverage updated data as a source, suggesting that even in the future, the quality of answers for specific topics could be compromised and the human evaluation will remain a key driver of success.

To sum up, this study enriches existing platform theory by categorizing current entities into detailed clusters and demonstrating the continuous evolution of the landscape. It also supports business model theory by highlighting distinct differences between linear and platform-based business models and shows evidence of how every incumbent can develop a platform. Additionally, in the realm of BMI, it provides evidence on how platforms can be instrumental in pursuing various innovation streams. Lastly, the study evaluates the quality of results produced by AI, comparing two different tools and offering recommendations to minimize the risk of their improper use for incumbents.

6. Conclusions

The implications of this research are relevant for both the academic research community and managerial practice, as the study contributes to the understanding of platforms, innovation in business models, and the role of AI as a support tool through a structured methodology.

Theoretical implications

Firstly, the research enhances platform literature [24] by categorizing them into subgroups for deeper analysis, which is beneficial for understanding their stakeholder benefits. Then, the study differentiates platforms from digital linear services, adding further information about the concept of platform [17], [18]. Additionally, the study highlights how platforms utilize digital infrastructure [30] and data analytics for innovation, the importance of data [31] and network effects in the success of platforms.

In the realm of business model innovation, the study examines how various types of platforms can be structured with the dual objectives of product and process innovation. It provides evidences on how these platforms are well-suited for innovation [25], [32] and, in general, BMI as framework that encompasses both product and process innovation.

Finally, the thesis contributes to AI research by addressing the challenges that AI tools face in generating relevant alternatives during the exploration phase [33], [34]., especially when

overloaded with information from multiple fields. The study finds that the quality of responses from ChatGPT (model 3.5) and Bard is similar, indicating that updated information sets do not necessarily improve the quality of answers.

Practical implications

Practitioners can leverage this research for four main purposes:

The study identifies twelve distinct entities from the deployment of the main platform classes. Secondly, it investigates potential misconceptions. between platforms and digital services, addressing ineffective implementations and negative effects. Then, it assesses the risks of openness that occur during the transition to a platform model. This change demands catering to diverse user groups, including competitors, and transitioning from a service provider to an orchestrator, which can be challenging and risks harming existing digital services if not managed well. Finally, it explores how AI can be a valuable tool in transitioning to platform models, highlighting how over-reliance without proper understanding can lead to the reinforcement of incorrect solutions.

Limitations & Future Studies

It is important to highlight limitations future research directions of this study:

Firstly, a significant limitation is associated with the data collection and alternative generation process, primarily due to limited information sources. This can result in a potentially incomplete view of the phenomenon, as AI tools may not fully align with the specific strategic context of a firm. Secondly, the sample size of cases for each category may lead to an underrepresentation of certain clusters, affecting the prominence of some patterns. Continuing, the study lays the groundwork for future research in two main areas: The former involves a detailed and in-depth analysis of selected cases to understand individual platform transitions, their challenges, and successes. The latter investigates the effectiveness and efficiency of the outlined solutions, involving experts to identify a list of success and failure cases, in order to offer a holistic view of the best strategies for transitioning to a platform model.

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