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Make it or Break it - Understanding how leadership strategy and business model innovation foster or hinder ecosystems: the case of mobility services in urban centers

Leticia Foerster

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THÈSE DE DOCTORAT

Emergence ou Déclin - Comprendre comment la stratégie de leadership et l'innovation des modèles d'affaires entravent ou favorisent les écosystèmes : le cas des services de mobilité dans les centres urbains

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du grade de docteur en Sciences de gestion
d'Université Côte d'Azur**
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Make it or break it - Understanding how leadership strategy and business model innovation foster or hinder ecosystems: The case of mobility services in urban centers

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Make it or break it - Understanding how leadership strategy and business model innovation foster or hinder ecosystems: The case of mobility services in urban centers

Abstract

In this thesis, I address an important and complex issue in strategic management. For many years scholars, and practitioners have regarded firm strategy through two different and parallel lenses (Attour & Burger-Helmchen, 2014). The first focuses on intra-firm issues, whereas firms' leadership drives competitive strategy by designing and implementing elaborated forms of value capture, creation, and delivery. In management strategy, this process is normally studied under the business model concept (Zott, Amit, & Massa, 2011). The second focuses on inter-firm issues, whereas the aim is to understand the interdependencies and co-evolution of firms within their ecosystems (Moore, 1996). For three decades, these two concepts were mostly studied separately. However, strategic management scholars have recently noted that the joint adoption of the business model concept and ecosystem provides a richer theoretical background to address contemporary phenomena (Demil, Lecocq, & Warnier, 2018). In my thesis, I identified that this joint adoption is emphasized by the need to understand how business model innovation occurs at the ecosystem level. Examining the innovation challenges faced by the urban mobility ecosystem, I also identified that such a framework would help to examine how a leader adopts an ecosystem strategy through business model innovation in two kinds of emergent ecosystems: those that are at the birth phase of their life cycle, and those that are at the renewal phase.

Departing from this perspective, in this thesis, I try to answer the following research question: How can leadership at the ecosystem level foster or hinder ecosystems' emergence through business model innovation? I adopt business models as the unit of analysis and ecosystems as the level of analysis. The aim is to understand how ecosystem strategy can incorporate business model innovation as a source of competitive advantage at the ecosystem level. Generally speaking, I pay attention to the role of leadership when business model innovation occurs at the ecosystem level.

To answer this research question, I analyze two cases in the context of mobility services. The mobility landscape is being completely reshaped (Enoch et al., 2020; Morsche, La Paix

Puello, & Geurs, 2019) posing an important challenge to city authorities and businesses as well as great opportunities. As companies adjust to the changing landscape, mobility players, especially traditional carmakers and suppliers face pressing challenges, specifically, their business model of producing and selling combustion engine cars is being questioned. As a response to this contemporary context, traditional carmakers are revisiting their business models and new ecosystems are emerging. This corresponds to the renewal phase of their ecosystems. The mobility landscape also offers the opportunity for new ecosystems to emerge, like Mobility as a Service (MaaS) ecosystems, that are in a very preliminary birth phase. Considering and comparing two cases of emergent ecosystems (i.e., one at the birth phase and the other at the renewal phase) allowed me to study how leadership strategy impacts business model innovation at the ecosystem level.

The results of this thesis demonstrate that business model design at the ecosystem level raises the chances of ecosystem birth and survival in the context of mobility services. Furthermore, it indicates that the ecosystem-level business model is more successful and accepted by the other ecosystem members when (i) designed and implemented by the ecosystem leader and when (ii) leadership co-evolution exists at all stages of the ecosystem life cycle.

Keywords: ecosystems, business model innovation, ecosystem leadership strategy, ecosystem life cycle.

Emergence ou Déclin - Comprendre comment la stratégie de leadership et l'innovation des modèles d'affaires entravent ou favorisent les écosystèmes : le cas des services de mobilité dans les centres urbains

Résumé

Cette thèse aborde une question importante et complexe à laquelle est confronté le management stratégique : comprendre les enjeux d'innovation de modèle d'affaires et de stratégie de leadership dans un contexte inter-organisationnel et coopératif incarné par les écosystèmes. Deux perspectives différentes ont en effet jusque-là été développées de manière parallèles par la littérature en management stratégique (Attour & Burger-Helmchen, 2014). La première privilégie une approche intra-firme selon laquelle le leadership des entreprises oriente la stratégie concurrentielle en concevant et en mettant en œuvre des formes élaborées de capture, de création et de livraison de valeur. En management stratégique, ce processus est traditionnellement étudié sous le concept de modèle d'affaires (Zott et al., 2011). La deuxième perspective se concentre sur les enjeux inter-firmes. L'objectif est de comprendre les interdépendances et la co-évolution des firmes au sein de leurs écosystèmes (Moore, 1996). Il s'agit donc ici de l'approche par les écosystèmes.

Plus récemment, pour aborder les phénomènes et enjeux contemporains d'innovation, l'intérêt d'adopter une approche mobilisant à la fois le concept de modèle d'affaires et l'approche par les écosystèmes est mis en avant pour la richesse du cadre théorique qu'offre un tel cadre analytique (Demil et al., 2018). Dans la présente thèse, il est montré que le besoin d'adopter un tel cadre analytique est accentué par la nécessité de comprendre comment l'innovation des modèles d'affaires se produit au niveau de l'écosystème. Pour cela, cette thèse s'est intéressée au cas du nouvel écosystème de la mobilité urbaine. Elle pose la question de recherche suivante : comment la position de leadership adoptée au niveau écosystémique peut-elle favoriser ou entraver l'émergence des écosystèmes par l'innovation des modèles d'affaires. Pour répondre à cette question, les modèles d'affaires sont définis comme unité d'analyse et les écosystèmes comme niveau d'analyse. L'objectif est de comprendre comment la stratégie écosystémique peut intégrer l'innovation des modèles d'affaires comme source d'avantage concurrentiel au niveau de l'écosystème. De manière générale, une attention particulière est

accordée au rôle du leadership lorsque l'innovation du modèle d'affaires se produit au niveau de l'écosystème.

Deux cas d'innovation de services de mobilité sont étudiés pour répondre à cette problématique. Le marché de la mobilité est en effet en pleine refonte (Enoch et al., 2020; Morsche et al., 2019) posant un défi important aux autorités municipales et aux entreprises. Alors que certaines entreprises déjà installées sur le marché de la mobilité s'adaptent à l'évolution de l'environnement, d'autres, en particulier les constructeurs automobiles et leurs fournisseurs traditionnels, sont confrontés à des défis pressants. Le modèle d'affaires des voitures à moteur à combustion est remis en question. Pour y faire face, les constructeurs traditionnels revisitent leurs modèles d'affaires et de nouveaux écosystèmes émergent. Cela correspond à la phase de renouvellement de leurs écosystèmes. Un autre enjeu important est observé sur le marché de la mobilité. La conception de nouvelles offres de services permettent à de nouveaux écosystèmes d'émerger. Les écosystèmes de Mobility as a Service (MaaS) sont par exemple dans une phase de naissance très pionnière.

L'analyse et la comparaison de ces deux cas d'écosystèmes émergents (c'est-à-dire l'un en phase de naissance et l'autre en phase de renouvellement) ont permis d'étudier comment la stratégie de leadership peut impacter l'innovation des modèles d'affaires au sein d'un écosystème. Les résultats de cette thèse démontrent que lorsque le modèle d'affaires est élaboré au niveau de l'écosystème, les chances de naissance et de survie de l'écosystème dans le contexte des services de mobilité sont favorisés. En outre, cela indique que penser le modèle d'affaires au niveau de l'écosystème est plus efficace et accepté par ses acteurs membres lorsque (i) est conçu et mis en œuvre par le leader de l'écosystème et lorsque (ii) la co-évolution du leadership existe à toutes les étapes du cycle de vie de l'écosystème.

Mot clés : écosystèmes, innovation de modèle d'affaires, stratégie de leadership des écosystèmes, cycle de vie des écosystèmes.

Acknowledgments

We are all told how arduous the process of pursuing a Ph.D. is. Long hours of work, time away from family and friends, doubt in the process, doubt in oneself, the sentiment of not being good enough. I learned that this is all true, but they are just a small fraction of the entire process. What I retain the most during these years was the possibility to share a passion with people who understand the journey and support you all the way no matter what. They are there to give you that nudge when you think everything is collapsing, they are there to help you find a solution when you think everything is lost, and they are there to celebrate the small and the big victories, every moment counts. I was blessed to have amazing people surrounding me throughout this journey, and I would like to thank them all.

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Thesis Plan

This thesis is made up of five chapters, three of which are devoted to research Manuscripts (chapters 2, 3, and 4). These chapters support the following thesis: How can ecosystem leadership strategy and business model innovation either foster or hinder ecosystem emergence? In order to address this phenomenon, it is important to understand the complementarities between business models and ecosystems as a complex process influenced by multiple factors such as new urban mobility challenges; digitalization; new forms of value capture, creation, and delivery at the ecosystem level; and the important role of the leader, all of which implies fundamental changes to the traditional idea of industry boundaries and traditional corporate strategy.

Chapter 1 introduces the theoretical concepts of this thesis. The first section aims to define and position ecosystems and business models and to present and define the empirical objects that this study is interested in. A second section presents and explains the interdisciplinary nature of this research. Finally, a third section presents my epistemological framework, and in more detail the methodological approach of the thesis. Chapters 2,3 and 4 correspond to three Manuscripts, each one of them answering one of the sub-questions presented in the previous section. Finally, Chapter 5 meets the double objective of synthesizing the results of this work and of discussing them. First, the different results obtained are recalled and some general results that go beyond those presented in the Manuscripts are identified. Secondly, I discuss these results concerning the different works of literature mobilized throughout this work. Finally, the contributions, limits, and perspectives are presented to provide a critical look and propose what could be, I hope, my future research program for the years to come. The following figure summarizes my general research approach (cf. Figure 1).

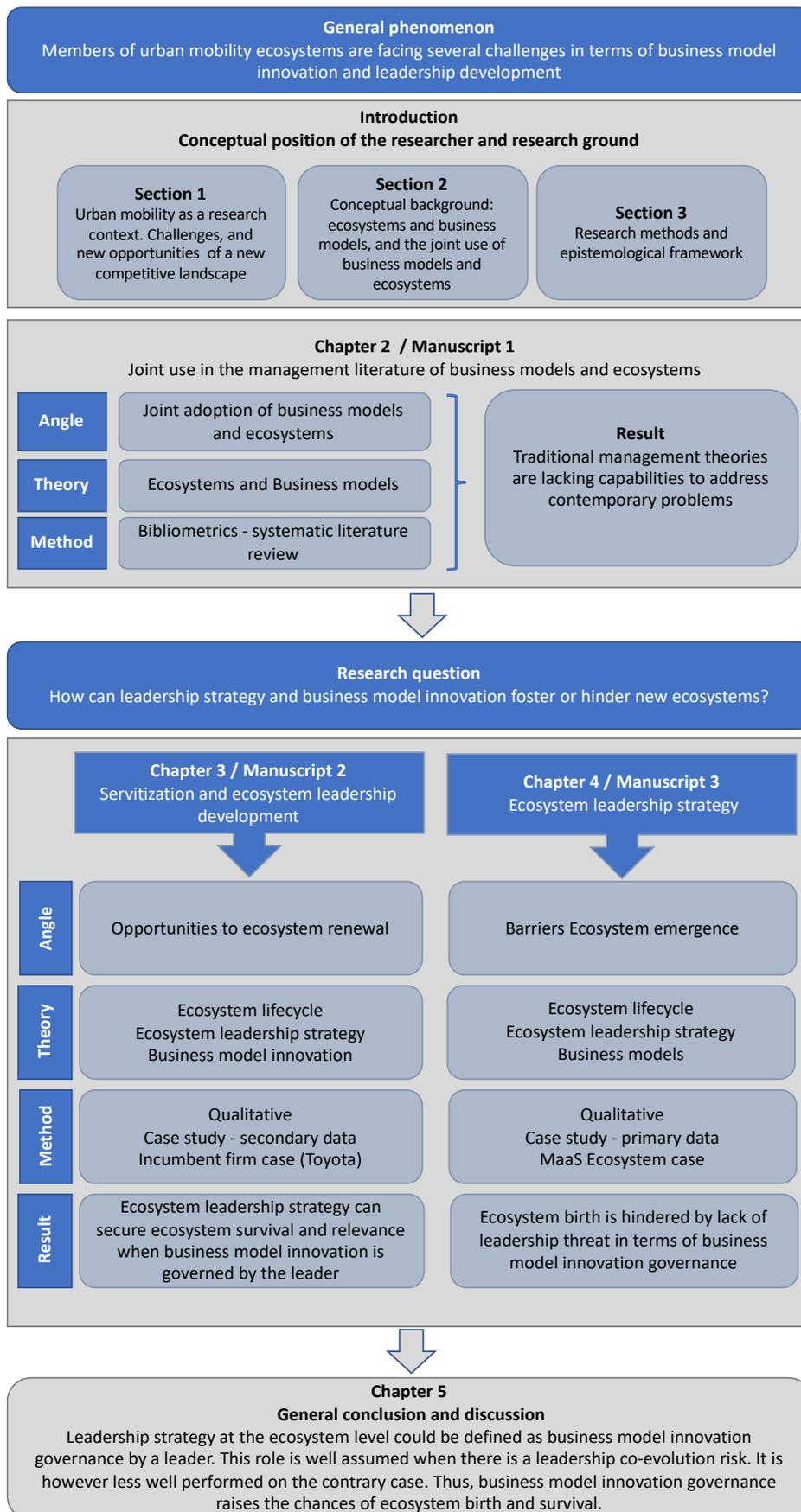


Figure 1:Thesis General Plan

Chapter one: Introduction

General phenomenon
 Members of urban mobility ecosystems are facing several challenges in terms of business model innovation and leadership development

Introduction
Conceptual position of the researcher and research ground

<p>Section 1 Urban mobility as a research context. Challenges, and new opportunities of a new competitive landscape</p>	<p>Section 2 Conceptual background: ecosystems and business models, and the joint use of business models and ecosystems</p>	<p>Section 3 Research methods and epistemological framework</p>
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Chapter 2 / Manuscript 1
 Joint use in the management literature of business models and ecosystems

Angle	Joint adoption of business models and ecosystems	<p>Result Traditional management theories are lacking capabilities to address contemporary problems</p>
Theory	Ecosystems and Business models	
Method	Bibliometrics - systematic literature review	



Research question
 How can leadership strategy and business model innovation foster or hinder new ecosystems?

	<p>Chapter 3 / Manuscript 2 Servitization and ecosystem leadership development</p>	<p>Chapter 4 / Manuscript 3 Ecosystem leadership strategy</p>
Angle	Opportunities to ecosystem renewal	Barriers Ecosystem emergence
Theory	Ecosystem lifecycle Ecosystem leadership strategy Business model innovation	Ecosystem lifecycle Ecosystem leadership strategy Business models
Method	Qualitative Case study - secondary data Incumbent firm case (Toyota)	Qualitative Case study - primary data MaaS Ecosystem case
Result	Ecosystem leadership strategy can secure ecosystem survival and relevance when business model innovation is governed by the leader	Ecosystem birth is hindered by lack of leadership threat in terms of business model innovation governance



Chapter 5
General conclusion and discussion
 Leadership strategy at the ecosystem level could be defined as business model innovation governance by a leader. This role is well assumed when there is a leadership co-evolution risk. It is however less well performed on the contrary case. Thus, business model innovation governance raises the chances of ecosystem birth and survival.

The year is 1898, the place is New York City. This was when and where the first international urban-planning conference was held. On the agenda was an unsolvable problem, the one of urban mobility. The way people got around at that time was with horses. However, as the population grew, so did the number of horses needed to supply all the demand for transportation. That implied numerous environmental and sanitary problems that were putting at risk the lives of the cities' inhabitants. Unable to come up with a solution, in other words, imagine cities without horses, the conference was called short. But then, something incredible happened - a technological innovation. The development of the internal-combustion engine led to the mass production of cars. By 1912, the number of cars outnumbered the number of horses in cities like New York and London. Cars revolutionized transport and were responsible for profound social changes. It gave people more freedom and access to jobs and services, and it impacted the economic landscape. Due to the popularity and mass production of cars, new roads were built, and many spin-off industries blossomed, creating numerous new jobs.

Over a century later, history repeats itself, the contemporary mobility landscape faces similar dilemmas as it did back then. The population continues to grow, and urban centers are getting more densely populated. The potential economic and social benefits of today's transport are significantly offset by the large social, health, environmental, and economic losses associated with traffic congestion, air, and noise pollution, and road crashes. Throughout history, the urban landscape has evolved in response to social, economic, and environmental changes. In this context, new mobility firms and solutions are emerging, incumbent firms are transforming themselves to keep up with the new context, business models are being revisited, and new ecosystems are being forged.

Section one: research context

This section presents the context of urban mobility that motivated the empirical research used in this study.

1.1 The genesis of the research: The urban mobility context

Urban mobility, as defined by the World Bank (Fang, 2015), is about moving people from one location to another location within or between urban areas. Urban mobility services are provided by the engagement of several stakeholders (Weisi & Ping, 2014). Often, it involves a business relationship amongst actors from both private and public sectors. Those actors interact as an ecosystem to attain objectives through the value co-creation (Ben Letaifa, 2015) and value delivery, or in other words, through their business models.

Furthermore, the world is changing at an increasingly fast pace. The population continues to grow, and urban centers are getting more densely populated. In this context transportation and evolving mobility needs are constantly being reshaped. Traditionally, the modal landscape for urban passengers is composed of private cars, public mass transportation, and taxis, this has remained the same for a long time (Enoch et al., 2020). Such a view is now shifting, with decision-makers now appreciating the need to understand the implications of potentially radical changes in the technological, political, economic, social, and environmental spheres (Morsche et al., 2019).

Maybe one of the most important changes to urban mobility services is the 4th industrial revolution. Indeed, the way we live, work, move and experience the world around us is changing. The 4th Industrial Revolution is a term coined by the World Economic Forum in 2015. Water and steam power were used to mechanize production during the 1st Industrial Revolution. The 2nd made mass production possible by using electric power. Electronics and information technologies were employed to automate production in the 3rd. The 4th Industrial Revolution builds on the third, and is characterized by digitalization and by a fusion of technologies (e.g., Artificial Intelligence (AI), Electrification, Blockchain, and Internet of Things (IoT)) that is blurring the lines between the physical, digital, and biological spheres (Schwab, 2017). Moreover, the 4th Industrial Revolution has seen an unprecedented speed of change that is resulting in the transformation of entire systems of production, management, and governance (*ibid.*). In that context, mobility is being redefined again, Table 1 demonstrates this transition in the mobility industry.

This transition to the mobility industry and the adoption of new technologies are having a great impact on how businesses are done and how actors are organized around each other. In other words, leading trends like connected, autonomous, shared, and electric vehicles (CASE) are creating new business models. At the same time, these factors are fostering new market entrants who are beginning to change the mobility ecosystem (Riasanow, Galic, & Böhm, 2017). Given these factors presented here, the urban mobility landscape is fruitful ground for research seeking to understand how firms are crafting their business model strategy to shape and create new ecosystems, and what are the factors that can either foster or hinder this process.

Table 1: Mobility and Industrial evolution

	1 st Industrial Revolution	2 nd Industrial Revolution	3 rd Industrial Revolution	4 th Industrial Revolution
Industry	Steam based technology	Mass production possible by electric power	Electronics and information technologies to automate production	Digitalization Fusion of technologies
Mobility	Expansion of rail and local public transport Steam ships	Expansion of roads Motorization with individual cars	Expansion of air transport Cars are the backbone of mobility	Mobility big data Shared mobility services CASE technology

1.2 Challenges of a new competitive landscape: business model innovation and the emergence of new ecosystems

The mobility landscape is being completely reshaped (Enoch et al., 2020; Johansson, Tornberg, & Fernström, 2018; Morsche et al., 2019) posing an important challenge to city authorities and businesses as well as great opportunities. As companies adjust to the changing landscape, mobility players, especially traditional carmakers and suppliers face pressing challenges, specifically, their business model of producing and selling combustion engine cars is being questioned. Large tech companies, such as Tesla, Google, and Apple are greatly investing in mobility innovations. We are witnessing the breakout of industry boundaries, where no longer carmakers compete only against each other in a well-defined industry (e.g., automotive), but with large incumbent players from different industries (e.g., technology).

This breakout of industry boundaries is the consequence of the spread of digitalization (Teece, 2018b) and new technological innovations. In the automotive industry most of the innovation activity revolves around four automotive technologies: connected, autonomous,

shared, and electric (CASE). A consultancy report¹ found that since 2010 over 200 billion dollars has been invested in CASE technologies. Parallel to and complementary to CASE innovations are the growing forces of digitalization. Digitalization is considered a new industrial scenario in which the convergence of different emerging technologies strengthened by the Internet of things (IoT) results in cyber-physical and intelligent systems that can create value for industrial activities (Alejandro Germán Frank, Dalenogare, & Ayala, 2019). Porter and Heppelmann (2014) propose that digitalization is transforming competition. According to them, the falling costs of obtaining, processing, and transmitting information, digitization is changing the way companies design products, but also services.

As a response to this contemporary context, traditional carmakers are revisiting their business models and new ecosystems are emerging. That is because whereas a few decades ago competition in the automotive industry resided in a handful of large incumbent firms mainly from the USA, Germany, Italy, France, Japan, and South Korea (e.g., GM, BMW, Fiat, Renault, Toyota, Hyundai), today we have strong technology firms entering the “battlefield”. This shift to a rich plethora of competitors, complementors, and partners is changing the economic and business landscape.

Reforming mobility ecosystems is one of the most pressing issues confronting the world today. Research indicates that there are two key strategic paths that cities could take if they are to respond to environmental and capacity challenges. The first approach is to work towards a more sustainable mobility business model; and the second work towards integrated mobility, with the customer at the center (Van Audenhove et al., 2018). In this context, actors in the mobility landscape are adopting services alongside their product portfolio (Mahut, Daaboul, Bricogne, & Eynard, 2017). This supports the opportunity to change consumption offers, historically driven by production and consumption of tangible assets, to a service economy.

¹ Source - consulted 15/09/2021: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/mobilitys-second-great-inflection-point>

1.3 Opportunities within emergent ecosystems: services as business model innovation

Enabled by progressive digitalization throughout the mobility industry, new ecosystems are emerging and with them new forms of business models. More particularly, we see a trend towards services. Indeed, services have become of great importance (Gallouj, Weber, Stare, & Rubalcaba, 2015). That is because value creation can be much more effective when real-time information is flowing seamlessly between devices and is co-created by companies and customers (Genzlinger, Zejnilovic, & Bustinza, 2020). Every carmaker now provides services alongside their product portfolio, as they are a way to enable wealth production and value-added. That is because services allow for a closer customer relationship, higher margins, and additional growth opportunities (Genzlinger et al., 2020). Services vary from product-oriented, to use-oriented, to result-oriented offerings (Tukker, 2004). Examples of services in the mobility sector vary from simple car maintenance (product-oriented) to more complex solutions such as a Mobility as a Service (MaaS) (result-oriented).

The shift towards services in the mobility sector comes with particular challenges. For many decades the automotive industry has been highly concentrated on a small pool of stable incumbent firms (Bailey, 2007). Threats of substitutes were extremely low since automotive companies tend to have weaker financial performances, and capital investment is extremely high (Genzlinger et al., 2020). However, with the emergence of CASE technologies, digitalization, and new social demands, companies from other sectors, especially the technology sector (e.g., Google, Apple, Tesla) feel confident to enter the mobility market. This context has changed the competitive landscape. As a response, carmakers are revisiting the way they do business, and their supply chain and value chains have been replaced by the ecosystem logic. This phenomenon is not unique to the private sector. The mobility landscape is also being reshaped in the public domain. Lawmakers and politicians are being pressured to comply with new social demands (e.g., UN's 17 Global Goals), users' needs, and the emergence of new mobility services. The emergence of new mobility services presents two challenges to ecosystems due to the diversity of innovative services. For firms already in place, (e.g., carmakers) there is a business model innovation challenge that acts on the renewal phase of the existing ecosystem, while at the territorial level, we are seeing the emergence of nascent

ecosystems (e.g., MaaS). As a result, firms and public authorities are rethinking and reshaping urban mobility in cities. Consequently, two perspectives arise. Either new ecosystems are born, or old ones are renewed. In either case, business model innovation happens at the ecosystem level. The aim of my research is to examine this phenomenon, i.e. how business model innovation occurs at the ecosystem level. I then built a conceptual background articulating several theoretical concepts I define in the following next section.

Section two: Conceptual background

The academic field of strategic management has studied business models and ecosystems for more than two decades now. These two concepts have each gained increasing attention in academia. They constitute two distinct but related concepts. Meaning they are each on their own independent research topics that have separate streams of research but are in certain ways intertwined (e.g., Adner, 2017; Demil et al., 2018; Jacobides et al., 2018; Kapoor, 2018). Ecosystems aim to explain how value is created outside the boundaries of the firm (e.g., Adner, 2017; Iansiti & Levien, 2004; Moore, 1993, 1996), and business models aim to explain how value is created at the firm level (Amit & Zott, 2012, 2015; Osterwalder, Pigneur, & Tucci, 2005). To this date most of the work, analyzing ecosystem and business models, has been done in isolation (Attour & Burger-Helmchen, 2014). Only recently have scholars started calling on the need to understand the implication value capture, value creation, and value delivery have to both ecosystems and business models (Demil et al., 2018; Teece, 2018b). The aim of my thesis is to contribute to this debate. For that purpose, it is firstly important to demonstrate the important relations between ecosystems and business models, and that innovating value creation at the firm level will essentially have an impact on ecosystems and vice-versa. This relation is explored and presented in detail in chapter 2 (Manuscript 1). Then, I explored this relationship in the specific context of urban mobility. Such context led me to study in my thesis, the relationship between ecosystems and business models through the support of three theoretical contexts: ecosystem life cycle (more precisely ecosystem renewal and ecosystem birth), ecosystem leadership, and business model innovation.

The following paragraphs of this section define business models and ecosystems as the first two main theoretical concepts used to study the empirical objects in which my work is interested, then it proposes the articulation of the concepts of ecosystems and business models in the context of urban mobility. Such articulation highlights the need to mobilize ecosystem life cycle, ecosystem leadership, and business model innovation as extensions or sub-concepts of respective ecosystems and business model concepts.

1.4 Definitions and typologies

At the origin of my research question, business models and ecosystems prompted me, out of scientific curiosity, to deepen the analysis of these theoretical concepts. This paragraph proposes a definition and typology of these two concepts and their extensions.

1.4.1 Ecosystems: definition and life cycle

The term ecosystem in business studies was borrowed from ecology. The term ecosystem was coined by Tansley, (1935: 306) who defined ecosystem as: “*a particular category among the physical systems that make up the universe. In an ecosystem, the organisms and the inorganic factors alike are components which are in relatively stable dynamic equilibrium*”. Moore (1993) drew a parallel between the ecological system and employed it in the business field to defend the idea that firms should not be viewed as members of a single industry but rather members of an ecosystem. The importance of the ecosystem concept in the management literature can be attested by its exponential growth since the seminal work of Moore (1993), as seen by the evolution of published articles extracted from Scopus² (Figure 2).

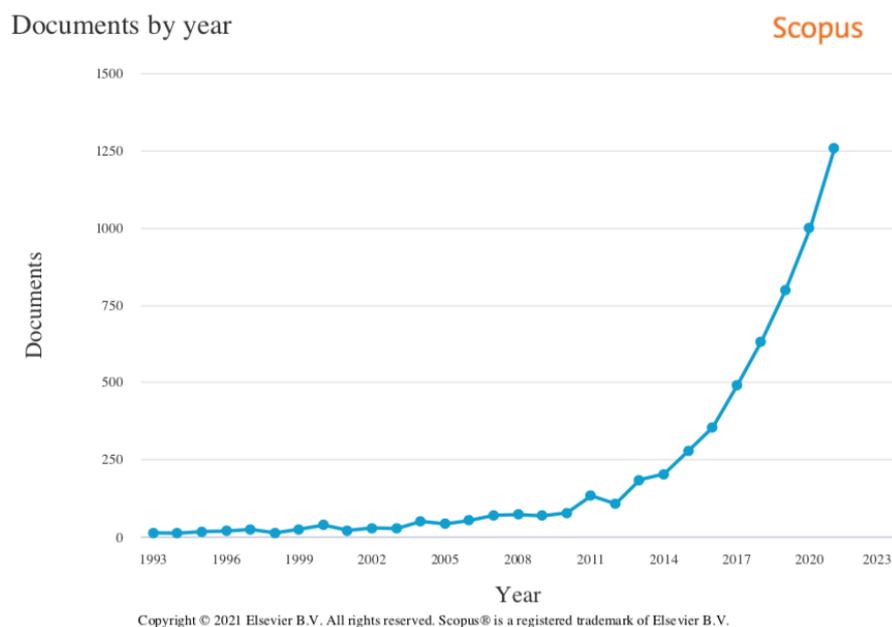


Figure 2: Published articles in management journal from 1993 - 2021 (Scopus)

² Last consulted December 3rd 2021 at:

<https://www.scopus.com/term/analyzer.uri?sid=a8aae97ecb010340b7c58951c5dc178c&origin=resultslist&src=s&s=TITLE-ABS-KEY%28%22ecosystem%22+AND+%22ecosystems%22%29&sort=cp-f&sdt=cl&sot=b&sl=43&count=6168&analyzeResults=Analyze+results&cluster=scosubjabbr%2c%22BUSI%22%2c%22scosubtype%2c%22ar%22%2c&txGid=38e3d9a2828ed8d9743a8bb465fdc713>

Like in biological ecosystems, ecosystems evolve over time with implications for their members in terms of innovation, cooperation, and competition. One thing that distinguishes ecosystems from other forms of networks (e.g., supply chain, value chain, alliances) is that in ecosystems we find the simultaneous presence of complementarities and interdependencies between heterogeneous actors (Adner, 2017; Kapoor, 2018). The interdependencies between actors represent the structural relationship that connects actors, and complementarities represent how one's offer influences the focal offer's value proposition (e.g., iPhone and applications). In a simple form, ecosystems embody a set of actors that contribute to a focal offer's value proposition (Adner, 2017; Kapoor, 2018). However, these relationships are not static, as in biological ecosystems, ecosystems evolve. Moore (1993, 1996) offers an interpretation of this evolution through a four-phase model of the ecosystem life cycle: birth, expansion, leadership, and self-renewal (or death).

Ecosystem life cycle: The birth phase of ecosystems is marked by the definition of the value proposition and how it should be delivered to customers. During this stage, actors come together because they believe in the vision of this value proposition, and they believe they can contribute to its materialization. Given that in this early stage of the ecosystem there are still many unknowns, and actors may lack some capabilities, they are more willing to cooperate. This is also when the figure of a leader emerges (the figure of the leader is of extreme importance in ecosystems at all stages and will be addressed separately later in this subsection). If the birth stage is successful, the ecosystem then emerges and evolves to the expansion stage.

The second stage is characterized by the expansion of the ecosystem to new territories. Moore (1993) indicates that two conditions are necessary for ecosystem expansion: (i) a value proposition that can attract a large pool of customers, and (ii) the potential to scale up. It is therefore vital that the ecosystem leader can maintain strong relationships with the customer and at the same time with suppliers. It is also in this stage that competition becomes apparent, it is thus important to "squeeze competing ecosystems to the margin" (Moore, 1993, p. 80) and focus on tightening the relationship with customers and suppliers.

The third stage of the ecosystem life cycle is a period of consolidation and establishment. It seeks to establish a standard interface and create a modular organization. This stage focuses on consolidating ecosystem leadership and a constant search for innovation. Indeed, in this stage competition within ecosystems and from other ecosystems is fierce, so it is critical to

continually create value that is relevant to the whole ecosystem's continued improvement, all while keeping other ecosystems to expand.

Finally, the last stage occurs when new ecosystems or innovations emerge, thus threatening the existing value proposition. Thus, the final stage is a response of the mature ecosystem to the emerging threat. The leader, in this stage, must be able to create a new vision for the ecosystem and convince old members to follow the new path, and/or attract new members. There are two possible outcomes to this stage, the mature ecosystem finds a way to renew itself and regain its position or it will eventually die and be replaced by a new ecosystem.

To conclude, in all stages leadership is one key element of the ecosystem life cycle. As mentioned before, the figure of the leader is of extreme importance in ecosystems at all stages. This role has been however studied by the ecosystem literature without considering the ecosystem life cycle as a context. It has been addressed through the extended concept of ecosystem leadership, in the genesis of ecosystem literature, as discussed in the next sub-paragraph.

1.4.2 Ecosystem leadership

Ecosystem leadership is a topic well discussed in the strategic management literature. In fact, ecosystem leadership is the core of the ecosystem literature. Since the management ecosystem concept is a biological metaphor, we assume that, as in nature, there is always a leading species, and that without this leader the ecosystem will collapse (Iansiti & Levien, 2004a, 2004b, 2004c; Moore, 1993, 1996). Therefore, when addressing ecosystems, it is paramount that we understand what drives the ecosystem leader and how leadership evolves, its influence on an ecosystem strategy, the risks to the ecosystem's health, and leadership capabilities.

1.4.2.1 Innovation as a driver of ecosystem leadership and co-evolution

The motivation behind ecosystem leaders is the intention to create a program that is meaningful and important (Adner, 2017, 2021; Moore, 1996), in other words, innovative. Several firms want their products and services to become the grounds on which other firms build their products and services (Gawer & Cusumano, 2002), thus forming the basis of an ecosystem. Furthermore, the interdependencies of various products and services are forcing

firms to develop their strategies considering what other companies are doing (Gawer & Cusumano, 2002). This process of innovation trajectory is what Moore (1996) describes as ecosystem co-evolution.

Co-evolving ecosystems are symbiotic, self-reinforcing systems of strategic contributions. Normally, innovation happens as a joint effort of all members (Moore, 1996). Members join ecosystems freely, thus forming a community that is quasi-democratic (Adner, 2017; Moore, 1996). The leader is responsible to provide the necessary alignment around a shared vision of the desired future (Adner, 2017; Iansiti & Levien, 2004c; Moore, 1996). Hence, co-evolution in ecosystems means that a change in member A will incur a change in member B (Iansiti & Levien, 2004c; Moore, 1996). Those changes are usually driven by an external innovation or change in the *status quo* (Adner, 2017). Therefore, the ecosystem leader needs to give attention to the contribution of all key members of the ecosystem. They need to understand these contributions, their sources of innovative potential, and how well they are being realized, so that they can design business relationships to bring in the most powerful players and contributions that will ultimately provide new benefits to customers (Moore, 1996, p. 54). This dynamic is what the literature address as an ecosystem leadership strategy.

1.4.2.2 Ecosystem leadership strategy

The ecosystem leadership strategy differs from the traditional leadership strategy. While traditional leadership strategy focusses on the firm and its industry, ecosystem leadership strategy is much broader. It focuses beyond company, industry, and other boundaries to find unmet needs, new ideas, and convincing models of how to put it all together. Moore (1996, p. 54) describes four premises of ecosystem leadership strategy. First, the goal is not to become the industry leader, but a destroyer of old industries and the creator of new ecosystems. Second, the ecosystem leadership strategy goal is to bring innovation to customers. Third, the leader needs to create and define the scope of the ecosystem. Finally, competitive advantage in an ecosystem stems from knowing when and how to build ecosystems.

To do so, strategy-making in ecosystems should aim to create new microeconomies and new wealth. The new wealth that is created should be shared with all members of the ecosystem. The leader needs to know how to share this wealth to continue to gain in the long term (Gawer & Cusumano, 2002). Therefore one of the key elements of ecosystem strategy is to create value

within ecosystems, failing to do so, will affect the ecosystem's capacity to attract and retain members (Iansiti & Levien, 2004c; Moore, 1996).

As important as sharing the new wealth to attract new members is the creation of a value proposition. The leader's vision of the value proposition not only attracts new members to the ecosystem but also determines the structure of the ecosystem (Iansiti & Levien, 2004c; Moore, 1996). The structure of the ecosystem is defined by the alignment of members, their activities, and roles within the ecosystem (Adner, 2017). It is in fact the reorganization of the economic landscape by recombining previously fragmented capabilities and formerly unmet needs with the goal of materializing the new value proposition (Moore, 1996). Figure 3 demonstrates graphically this cycle of ecosystem leadership strategy.

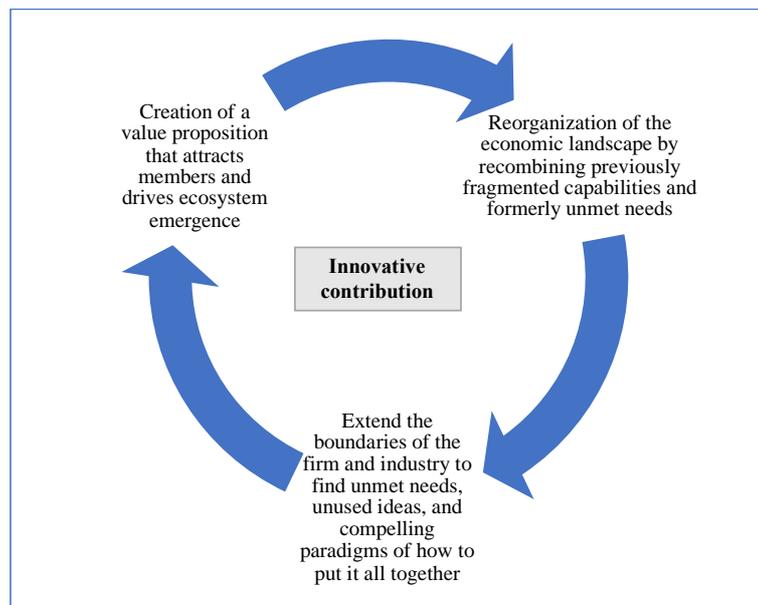


Figure 3: Cycle of ecosystem leadership strategy (based on Moore, 1996, p.49)

1.4.2.3 Risks to ecosystems

Ecosystem leadership does not come without risks. An ecosystem leader needs to be constantly aware of internal and external risks. The literature focus on some risks in particular. The first one of them is the risk of self-delusion. That is the risk of thinking that one can control far more than one can. That goes for the leaders but also for the other members of the ecosystem. Sometimes, a member might think he could replace the leader, thus becoming an internal threat

This is what Moore (1996) describes as the co-evolutionary arms race. Indeed, ecosystems are a place of cooperation, but also of constant competition, hence the leader should be aware of this risk and create a sense of ecosystem consciousness (Iansiti & Levien, 2004c; Moore, 1996).

Similar to the risk of self-delusion is the risk of conflict of interests. Gawer & Cusumano (2002) highlight three main risks of conflict of interests. They are respectively the risk of investments, that is when complementor firms take large investments in uncertain markets and have a short time to get their return back. The risk that the ecosystem leader fails to follow up on some particular commitments, for example when they fail to share the wealth with the ecosystem, and finally the risk of ecosystem leaders competing with its complementors. To avoid those risks leaders must create a trusting relationship with other members of the ecosystem (Gawer & Cusumano, 2002). Indeed, trust-building in ecosystems is fundamental to the health of the entire community (Gawer & Cusumano, 2002; Iansiti & Levien, 2004a; Moore, 1996).

Lastly, one other risk pointed out in the literature is related to the nature of the role of the leader. According to Iansiti & Levien, 2004a, 2004b, 2004c, there are two main types of ecosystem leaders "Keystones" and "Dominators". Keystones are leaders who care about the health of the ecosystem. Their presence improves the overall health of the ecosystem and, in doing so, benefits the sustained performance of the firm. They make up a small portion of the ecosystem, but their presence is key to ecosystem survival. Inversely, the dominator creates smaller ecosystems, and they occupy most of the places. They do not share their wealth, thus ecosystems led by Dominators are prompt to instability and are vulnerable to disruption.

As it can be attested, the role of the ecosystem leader is a complex one. Therefore the leader needs to develop some kinds of capabilities, which it is discussed in the next subsection.

1.4.2.4 Leadership capabilities

In order to create ecosystems, design ecosystem strategies, and avoid ecosystem risks, ecosystem leaders need specific capabilities. They need to be able to work across traditional organizational and cultural lines to form a compelling vision that transcends company, industry, and geographical lines (Moore, 1996). That is because ecosystems are complex systems that need to be properly managed. Most importantly, they need to be constantly vigilant.

They need to have the vision to tackle ecosystem obsolescence. In other words, they need to be aware of the ecosystem life cycle to be able to constantly renew their ecosystem and avoid death. To do that, they need to develop the ability to cultivate a “system mindset”, which requires managerial attention, technical expertise, and resources at the level of the overall ecosystem (Gawer & Cusumano, 2002).

Furthermore, ecosystem leaders need to develop operational capabilities that will allow them to recognize the dynamic nature of the interactions between the market and technical environments (Iansiti & Levien, 2004c). For that, they need to learn how to balance multiple roles, ecosystem evolution, and stimulate external innovation (Gawer & Cusumano, 2002).

To summarize, leadership is a common denominator in every single stage of the ecosystem life cycle. As noted previously, even though in every stage of the ecosystem life cycle the leader has a specific role, they remain essential to ecosystem existence. Ecosystems’ leaders are the regulators of the overall function of the ecosystem. While they represent only small biomass of the ecosystem (Iansiti and Levien, 2004), they are the ones that exercise substantial power within a given ecosystem and command a greater share of the overall profits (Moore, 1993). That is because leaders produce benefits for the ecosystem and its members. The removal of the leader could have devastating effects on the entire ecosystem, while the removal of other members could have little effect (Iansiti & Levien, 2004a). They are the ones that help ecosystems to stay healthy by helping members find a balance between competition and cooperation, by being able to converge on a common vision of the value proposition, and by making sure all members have the necessary amount of incentives to prosper (Gawer & Cusumano, 2002; Iansiti & Levien, 2004a). In other words, they ensure that the necessary conditions are met to allow all members to capture, create and deliver value.

Within the ecosystem perspective, my thesis is interested in understanding how the role of the leader can either foster or hinder ecosystems. More precisely I analyze how they manage to confront death in the renewal phase (cf. chapter 3); and how they navigate the uncertainties and volatilities of the birth stage (cf. chapter 4). Moore (1993, 1996) highlights the importance of the role of the leader in each of the four stages of the ecosystem life cycle. I take his premises one step further, by studying this role through the lens of business model and business model innovation. I defend the idea that both ecosystem birth and renewal success (or failure) are closely linked to the leadership capacity (i) to formulate and implement the business model at

the ecosystem level, and (ii) to govern business model innovation at the ecosystem level. The value proposition is one of the key components of business models and ecosystems, hence understanding the mechanisms of business models is an important step toward understanding ecosystems' success and failure. However, ecosystem literature has studied ecosystems and the role of the leader through many lenses; mainly considering the cases of well-established ecosystems. Failure has been less, if at all, considered. Furthermore, birth and renewal are less studied stages of the ecosystem life cycle, in comparison to the expansion phase. The theoretical angle of the business model has always been avoided.

1.4.3 Business models and business model innovation

In the strategic management domain, there is an ongoing and fundamental debate around the ability of an organization to create, capture and deliver value to gain a competitive advantage (Christensen, 2001; Porter, 1985; Richardson, 2008). This debate has focused its attention on different issues and has been analyzed through different theoretical views, such as Schumpeter's theory of creative destruction (Schumpeter, 1942); the resource-based view (Barney, 1991); Porter's value chain framework (Porter, 1985); and the strategic networking concept (Dyer & Singh, 1998) to name a few. It has also been regarded through the creation of frameworks for understanding how firms compete effectively (Porter, 1985; Richardson, 2008).

Business models: For the last three decades scholars have turned their attention to the phenomenon of business models as an enabler for a firm to create, capture and deliver value (Najmaei, 2016). Other authors have suggested the business model concept as an integrative tool for strategy (Amit & Zott, 2001; Hedman & Kalling, 2003; Osterwalder & Pigneur, 2010; Yip, 2004). Authors use the concept to capture the characteristics of observable elements in the world (Osterwalder et al., 2005), as well as abstract ideal types. Some authors use business models as models in the scientific sense, investigating them as if they were model organisms (Baden-Fuller & Morgan, 2010). Others use business models to describe stories that explain how a firm works (Magretta, 2002), and even as 'recipes' to be replicated, followed, and adjusted (Winter & Szulanski, 2001).

According to some scholars, business models can be generally defined as a blueprint of the business architecture by which managers conceptualize how their business strategy will be developed (Anderson & Markides, 2007). This implies that a business model represents, in its simplest conceptualization, a set of managerial choices and the consequences of those choices

(Casadesus-Masanell & Ricart, 2011). It also defines the nature of transactions (i.e., exchange of goods, services, and information) that a firm needs to perform within its business ecosystem not only to stay viable but also to gain a competitive advantage (Zott & Amit, 2010).

Business model innovation: in the strategic management literature, business model innovation (BMI) represents a new activity system that includes innovation, value creation, and the value capture structure of a firm (Bouncken & Fredrich, 2016). In essence, business model innovation is an extension of the business model concept. It reconfigures the existing business model of a firm in a way that is new to the product /service market in which firms operate (Casadesus-Masanell & Zhu, 2013; Goyal, Sergi, & Jaiswal, 2016; Markides, 2013). Some research in the managerial world has pointed out that, to gain a competitive advantage, most managers prefer to innovate their business models rather than invest in project innovation (Economist Intelligence Unit, 2005). That is because product innovation is expensive and time-consuming, and not necessarily successful. On the other hand, business model innovation represents a valuable source of underused value creation, it is harder to imitate, thus it can give firms a strong competitive advantage (Amit & Zott, 2012; Henry Chesbrough, 2007; Teece, 2010; Zott & Amit, 2015).

Indeed, firms need to constantly innovate their business models to remain relevant. Business model innovation is even more relevant in the era of information and communication technologies (ICT). That is because ICT brought about fundamental changes in the way firms interact with each other. More precisely, three changes are pushing companies to innovate their business models: digitization of business, increasing numbers of “digital natives”, and ratings of services and online comments through the social media (Weill & Woerner, 2013). These trends have given managers numerous combinatorial possibilities to organize and conduct exchange activities with different stakeholders, and restructure their value chain (Zott & Amit, 2015). That means that business model innovation in the ICT era often means boundary-spanning exchanges and activates (Zott & Amit, 2015).

Business model innovation example: servitization

One example of business model innovation is servitization. Servitization is the shift from a pure product offering to a more service-oriented process. For example, when Xerox decided to lease their printers instead of selling the product; or when Microsoft launched Office 365 giving users the choice to subscribe to the software instead of buying the physical product and installing it. These shifts from product-oriented to services involve a change to the business models, in other words, it implies business model innovation. In the examples provided this type of business model innovation is what we address in the management literature as servitization (Cusumano, Kahl, & Suarez, 2015; Kowalkowski & Ulaga, 2017; Martinez, Neely, Velu, Leinster-Evans, & Bisessar, 2017).

1.4.4 Business model innovation within ecosystems

Amongst the various questions studied in strategic management, an important one of them deals with “how companies capture value”. A second question is concerned with “how the competitive environment of a company impacts the strategy of this same company”. The first question is often studied through the business model concept. The second question relies more and more on the firm’s environment that Demil et al. (2018) suggest addressing through the ecosystem approach. These two concepts mobilize two separate and recent bodies of works of literature in management; however, they have been mostly regarded separately. Recently, the need to relate these two concepts has been emphasized in articles by leading authors in strategic management (e.g., Adner & Kapoor, 2010; Demil et al., 2018; Teece, 2018b). This recent demand is explained by the need to understand how the introduction of a new business model can impact a company’s ecosystem; and inversely, how a change in a company’s ecosystem may trigger new forms of business models.

Even though we observe that business models and ecosystems are concepts that are increasingly being used in tandem (e.g., Demil et al., 2018; Teece, 2018b), efforts are still scattered, and little is known about what could be the consequences of business model

innovation for ecosystem development. Understanding how the interdependence³ between business model innovation and ecosystem occur, how they impact each other, and unveiling key components underlying this mechanism is important to shed light on their complementarities. Thus, even though studying them individually is relevant to building theory and solidifying the concepts, studying their interdependencies and what are the respective consequences of it will help us further reinforce their relevance to strategic management (both in theory and in practice).

Recently, three academic domains have begun exploring the implications of business model innovation to ecosystems, these domains are strategic management, service marketing, and information systems (Autio & Thomas, 2020). In this thesis, the focus lies in the strategic management domain, where scholars have explored structural properties and governance mechanisms that allows ecosystems to support collaborative value creation by different hierarchically independent participants (Adner, 2017; Jacobides et al., 2018; Thomas, Autio, & Gann, 2014). In the strategic management domain, ecosystems are commonly investigated from a supply-side perspective (Autio & Thomas, 2020). That is, ecosystems are addressed as multi-stakeholder settings for value co-creation through cooperation and co-production (Adner, 2017).

From this ecosystem perspective, studies have inferred that to co-create and co-produce value, ecosystems' members necessarily share a business model logic (e.g., Demil et al., 2018). However, several theoretical gaps remain underexplored. First, ecosystems are complex systems, and the literature is still nascent. We find different frameworks to address different aspects of the ecosystem (Muegge & Mezen, 2017). For example, we find research streams that focus on ecosystem types, such as business ecosystems (e.g., Kapoor, 2018; Moore, 1993, 1996), innovation ecosystems (e.g., Adner, 2006; Adner & Kapoor, 2010, 2016; Gomes, Facin, Salerno, & Ikenami, 2018), and platform ecosystems (e.g., Gawer & Cusumano, 2015, 2002; Iansiti & Levien, 2004b). The word attached to "ecosystems" aims to distinguish the object of analysis. Others may focus on the architectural structure of ecosystems. Where an ecosystem is viewed as a system comprised of codependent subsystems linked by an architecture of interconnected institutional arrangements (North,

³ By business model innovation and ecosystem interdependence, this research refers to the level of co-evolution and co-dependency between these two dense bodies of literature.

1990; Ostrom, 2005; Jacobides, Cennamo, & Gawer, 2015). Recently, Adner (2017) introduced two perspectives to ecosystems, ecosystems-as-affiliation, and ecosystems-as-structure. The first focuses on the actors and their networks, and the second on the value proposition and the alignment structure. Within this theoretical context, it is difficult to categorize, or even understand the business model logic that supports the value co-creation process in ecosystems. Thus, this thesis has the humble objective to present some of the mechanisms supporting the scarce and underdeveloped literature focused on how business model innovation occurs at the ecosystem level.

1.5 The need for a new analytical framework: joint use of business model and ecosystem literature

In the same way, companies have realized they need to change the way they operate to face the new challenges of digitalization. Management scholars are realizing that using the same theoretical toolkit to answer and understand these challenges is no longer enough (Adner, 2021; Teece, 2018b). Indeed, to better understand and respond to the challenges of the new digital economy, we need to uncover the existing interplay between business models and ecosystems (Adner & Kapoor, 2010; Demil et al., 2018; Teece, 2018b).

The ecosystem concept was borrowed from biology by Moore (1993) to invoke the notion that firms be viewed not as members of a single industry (e.g., automotive) but rather as members of an ecosystem. This metaphor aims to illustrate that ecosystems, just like biological ecosystems, are composed of members that are interdependent and co-evolved. Changes in one (or by one) will incur changes in the whole chain of actors with implications in terms of innovation, cooperation, and competition. Since then, the concept has seen increasing popularity both in practice and academia and it has evolved from a metaphor to become a scientific management concept (Adner, 2017; Jacobides et al., 2018; Kapoor, 2018).

The ecosystem literature is still recent. As often happens with recent works of literature, we find many definitions and applications. Nevertheless, a researcher needs to find their positioning in the domain. Adner (2017) did a good work of conceptualizing the ecosystem construct in the strategic management literature. He presents a clear definition of the ecosystem construct and a grammar for characterizing ecosystem structure. As defined by Adner (2017:40) ecosystems are “*the alignment structure of the multilateral set of partners that need to interact for a focal value proposition to materialize*”. Ecosystems have raised awareness and focused

attention on new models of value creation and capture (Adner, 2017), in other words, in business models innovation.

Indeed, the concept of ecosystems is tightly coupled to the concept of business models (Adner & Kapoor, 2010; Attour & Burger-Helmchen, 2014; Demil et al., 2018; Teece, 2018a; Weiller & Neely, 2013). The challenges of business model within ecosystems have raised new questions in academia, such as how firms, public and private, should create and capture value within the context of industries' convergence (Adner, 2017; Teece, 2018b). That is because, in highly networked and dynamic environments, companies, more than ever, are concerned with interdependence across organizations and activities. Therefore, companies have to innovate their business models to retain competitive advantage (Weiller & Neely, 2013).

Different from the traditional corporate strategy, where competition is between firms, in the current landscape, companies need to design their business models with the ecosystem in mind as competition has changed from between companies to between ecosystems (Adner, 2021). Hence, some theoretical foundations from the traditional competitive strategy are lacking the capabilities to fully explain this complex setting. Due to these challenges, scholars are revisiting concepts, frameworks, and theories to better adapt them to answer contemporary questions, such as the study of business model within ecosystems to understand new models of value capture and value creation (Adner, 2017; Demil et al., 2018; Jacobides et al., 2018; Teece, 2018b; Weiller & Neely, 2013).

Despite management scholars' efforts to understand business model within ecosystems, studies are still scarce, and they remain scattered in the management literature, mostly in the innovation management and entrepreneurship (e.g., Autio, Nambisan, Thomas, & Wright, 2018; Felin, Foss, & Ployhart, 2015; Muegge & Mezen, 2017), strategic management (e.g., Cha, 2020; Helfat & Raubitschek, 2018; Teece, 2018b), and marketing (e.g., Parida, Burström, Visnjic, & Wincent, 2019; Priem, Butler, & Li, 2013). Generally, each management domain has focused on different aspects of the interactions between business model and ecosystems. The innovation management literature mostly focuses on the digital economy, especially concerning value creation and capture within platforms ecosystems (e.g., Sarma & Sun, 2017; Thomas & Leiponen, 2016). The strategic management literature mostly focuses on the theoretical implications and impact of the

current management literature in the competitive strategy (e.g., Adner, 2017; Helfat & Raubitschek, 2018; Teece, 2018b). Finally, the marketing literature focuses on the phenomenon of servitization. Furthermore, these studies usually analyze ecosystems that are already mature, or in Moore's (1993) definition of the ecosystem life cycle, in the expansion and the leadership phase. However, little is known about how business models impacts the birth and the renewal phase of ecosystems. To understand that, this doctoral work pays particular attention to business model innovation within ecosystems that are going through the specific phases of birth and renewal. It pays a close interest to the role of the leading actor in this process of business model innovation. The aim is to contribute to the ecosystem literature which still now has paid more attention to ecosystem leadership at the expansion stage of an ecosystem life cycle. I do so in the context of the mobility sector, which as mentioned previously is going through a transition, and therefore many new ecosystems are being born, and others are trying to survive by renewing themselves.

1.6 Research questions

This context led me to take an interest in leadership strategy through business model innovation at the center of ecosystems, and to formulate the following problem:

How can leadership strategy and business model innovation foster or hinder new ecosystems?

This doctoral thesis challenges the current research streams dedicated to business model innovation and ecosystems. The general idea defended in this doctoral work is that, in the current connected and interdependent business world, business model innovation has become a complex process that cannot be addressed at the inter-firm level. For companies to gain a competitive advantage, and for business models to work, companies necessarily need to design business models that converge to the ecosystem. In other words, business models become an intra-firm level issue. This idea surpasses the current approaches that are mostly focalized on either business models or ecosystems alone.

The answer I provide to the problem addressed in this doctoral work is done in three phases. The first phase is a systematic literature review analysis to identify to what extent and to what purposes scholars have associated the concepts of business models and ecosystems in the

management literature. This literature review helps us to prove (i) if indeed the two concepts are being jointly adopted in the management literature; (ii) to understand for what theoretical and managerial purposes they are being manipulated; (iii) and finally, to draw a clear picture of the emergent research stream that is manipulating business models and ecosystem in the management literature. Results in phase one allow identifying some gaps in the literature. More precisely we see that little has been done to understand the leadership role when innovating business models are at the center of ecosystems. Yet, this is of fundamental importance as an ecosystem leadership strategy cannot be designed without actors' roles identified and the emergence of a leader (Adner, 2017; Iansiti & Levien, 2004a; Moore, 1996), nor one can gain competitive advantage without a clear definition of their value creation, capture and delivery process (Adner & Kapoor, 2010; Amit & Zott, 2012). Furthermore, the works analyzed do not distinguish the different phases of the ecosystem's life cycle. However, in his seminal works Moore (1993, 1996) has demonstrated that each ecosystem life cycle poses different challenges that need to be addressed accordingly when designing and managing ecosystems.

In phases two and three I explore these gaps in the literature. I use the context of urban mobility as mobility ecosystems are going through fundamental changes. In phase two, I analyze the leadership strategy, of an automaker leading ecosystem firm, in the renewal stage of the ecosystem life cycle through business model innovation. The renewal stage of ecosystems rests as an underexplored topic in the management literature. However, this last stage of the ecosystem life cycle is of extreme importance as the alternative is death (Moore, 1993, 1996). How to avoid death and maintain leadership control is a difficult task that needs to be better understood in the management domain, and that is the main goal and contribution of phase two of this thesis.

In phase three, I explore the birth stage of ecosystems by analyzing the barriers to the emergence of the MaaS ecosystem in Nice (South of France). The management literature is full of successful ecosystem cases. Less explored, however, is what hinders ecosystem emergence. The literature thus far has provided some insights on how to identify and manage ecosystem risks, more precisely bottlenecks in the upstream and downstream processes (e.g., Adner, 2006, 2013). However important these studies are, they focus mainly on the materialization of the innovation taking for granted that as important as value creation and value capture, is value delivery. In other words, an innovation without a clear definition of a business model will translate into neither a product nor a service that can be commercialized and utilized by the

final user (Chesbrough & Rosenbloom, 2002). As a result, ecosystems may fail to emerge. These problems have led me to break down the main research question into three sub-questions, which are introduced below.

1. Why and how business models and ecosystem complementarities are jointly addressed in management research?

If both the literature on ecosystems and business models have gained increasing significance in the last two decades, the efforts to analyze the impact one has over the other have been scarce (Attour & Burger-Helmchen, 2014). The existing literature addressing this issue points out that challenges brought by digitalization are creating complex strategic decision environments that can generate unique, emergent, and rare problems that need a new approach to business model design (Demil et al., 2018; Teece, 2018b). Demil et al.'s (2018, p.1213) study indicates that *“business models and ecosystems are not static but co-evolve. Once defined, ecosystems progressively constrain the business models. But ecosystems also change through mutual interaction and therefore offer new opportunities for the evolution of the business models”*. This study is one of the few that highlights the importance of considering ecosystems when designing new business models, this line of inquiry is still recent and scattered in the management literature.

In this doctoral work, I defend the idea that we are witnessing increasing interest from the management community to jointly adopt the concepts of business models and ecosystems. I also point out that some academic efforts are being directed towards this direction, however in an intuitive way, in other words without a proper research agenda in mind. Thus, to test this assumption, with my co-author, I conducted a bibliometric analysis. Very often bibliometrics studies are aimed at doing systematic literature reviews (Gomes et al., 2018; Jan van Eck & Waltman, 2017; Walsh & Renaud, 2017). However, in this case, we employed the bibliometric methodology to (i) test the assumption that scholars are using business models and ecosystems concepts in a complementary way, and (ii) to assess why and how they are doing so.

Such study allows us to better understand how different management domains (e.g., innovation, strategy, marketing) are more concerned with the issue, in other words, through what lenses are they exploring this phenomenon, why, and how. By doing so we clarify how business models and ecosystems could be a complementary unit of analysis, thus contributing

to the development of business models and ecosystems management literature. Furthermore, understanding some important mechanisms of the joint adoption of both concepts allowed us to develop a business model ecosystem framework that can guide managers to build and (hopefully) apply this perspective when crafting their business strategy.

2. How a threatened incumbent firm may reassure ecosystem leadership through the adoption of servitization strategies?

Question one provided important insights into new avenues of research regarding the complementarities of business models and ecosystems in different domains of management, such as strategic management, marketing, entrepreneurship, and industry ecology. In this doctoral work, I focus specifically on the domain of strategic management. More precisely I am interested in leadership strategy within ecosystems through business model innovation. For that, I take two different approaches. First, I investigate ecosystem renewal, with the aim to answer the following question: “How a threatened incumbent firm may reassure ecosystem leadership through the adoption of servitization strategies?”. The second will be presented subsequently in the next subsection.

Servitization strategies refer to a process where a product-oriented firm adopts services alongside its product portfolio (T. Baines et al., 2017; Cusumano et al., 2015; Neely, 2008). This shift from product to services implies a shift in business models, in other words, servitization is a form of business model innovation (Cusumano et al., 2015; Kowalkowski & Ulaga, 2017; Martinez et al., 2017). The knowledge developed around servitization has largely explored the performance effects of the servitization (e.g., Kohtamäki, Parida, Patel, & Gebauer, 2020; Santamaría, Jesús Nieto, & Miles, 2012; Visnjic, Wiengarten, & Neely, 2016), which tended to focus on competitive advantage and competitive strategy. However, these works investigate the results of servitization strategies, and not the process leading to it. Thus, these studies don't consider the evolution of factors along the process of servitization, in other words, they neglect to explore the evolution firms go through when shifting from product to services. Furthermore, even though they consider the ecosystem as a determinant factor in their analysis (e.g., Kastalli, Van Looy, & Neely, 2013; Sklyar, Kowalkowski, Tronvoll, & Sörhammar, 2019; Weiller & Neely, 2013) they fail to identify the ecosystem life cycle stage in their studies. This lack of clarity leaves us wondering how incumbent firms can lead the servitization process, and what impact this process has on their existing ecosystem.

This doctoral work aims to fill this gap by proposing a study that assesses an incumbent manufacturing automotive firm's journey towards servitization. It explores the service categorization in Cusumano et al. (2015), which provides an understanding of the special nature of the services offered by product firms, to analyze the incumbent firm's three paths to servitization. Through the servitization lenses, this approach allows to observe the process of renewal of the incumbent firm's leadership within the ecosystem and to observe how the ecosystem renewed itself to respond to the changes implicated by the different servitization strategies.

3. What are the difficulties that are hindering the birth of new ecosystems?

This final question complements the previous two by raising an important yet under-explored phenomenon in the strategic management literature, which is how ecosystems come to be in the first place and what is the role of business models in this process.

To answer this question, it is important to first understand the different stages of the ecosystem life cycle. Moore (1993, 1996), a pioneer of the ecosystem literature in the management field, points out that an ecosystem evolves through four distinct stages: birth, expansion, leadership, and self-renewal (or death). However, besides the work of Moore (1993; 1996), little attention has been given to the birth stage of ecosystems (Attour & Della Peruta, 2016)(Attour & Della Peruta, 2016). The ecosystem literature provides numerous examples of successful cases of ecosystem emergence (e.g., Adner, 2017; Brock, den Ouden, van der Klauw, Podoyntsyna, & Langerak, 2019; Gawer & Cusumano, 2002; Kapoor & Lee, 2013). This literature pays a lot of attention to two important variables of ecosystem emergence, the role of the leader (e.g., Gawer & Cusumano, 2008, 2002; Iansiti & Levien, 2004a; Moore, 1993) and the importance of a clear value proposition (e.g., Adner, 2017, 2021). This literature assumes that the leader is already established in the ecosystem and that the leader has all the capabilities needed to provide the successful ecosystem coordination that will materialize the value proposition. However, this literature takes for granted that successful leadership is not a given. Attour (2014), Attour & Lazaric (2020) and Attour & Della Peruta (2016) which are interested in the birth of (business) ecosystems showed the role that the public actor can play in this phase. These works show that the public actor plays an important role (of leader) at the birth phase, sometimes a "neutral" role calming the tensions between the member actors. However, the leadership role stops at the end of the birth phase because then the leadership is left to private

actors (Attour, 2014). However, in the case of paper 3 of the thesis, the objective is to study the emergence of a MaaS ecosystem where the public actor is led to remain the leader. Through a case study, together with my co-authors, I investigate how a public actor is elected as the leader and what happens when he is not ready to assume this role.

This doctoral work answers these sub-questions, and more generally the main research question, through three Manuscripts, which are later presented in chapters 2,3, and 4 respectively. Figure 4 graphically demonstrates the links between the literature review that motivated this work, the context and scope.

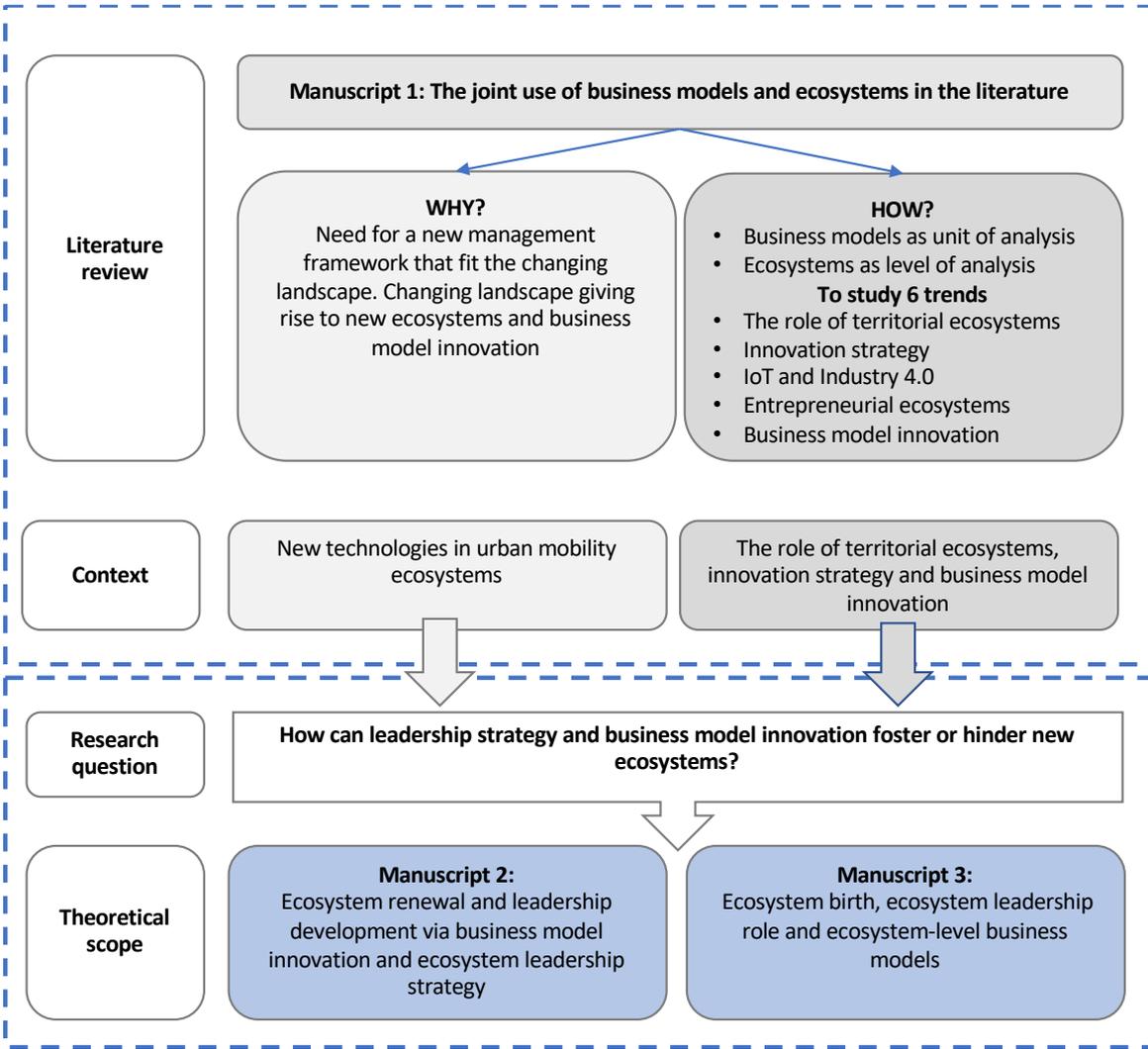


Figure 4: Thesis links between motivation, context and scope

Section three: research methods and epistemological framework

The objective of this section is to detail my research strategy, and in particular to present the empirical and methodological devices mobilized within the framework of this doctoral work aimed at studying the impact of business model innovation on ecosystem structure.

In the previous section, I presented my research object using a review of the literature, to shed light on the emergence of management scholars' interest in correlating business models and ecosystems. In this section three, I detail the empirical devices implemented, which best respect the principle of research coherence. The research design encompasses different important elements, such as: the research problem, the literature review, the collected data, the analysis and the results (Royer & Zarlowski, 1999), as well as the fundamental epistemological elements for the production of scientific knowledge (Avenier & Thomas, 2015).

Firstly, I present the general design of the research and pay particular attention to detailing the choice of my epistemological position, namely critical realism. I also present my research method based on an abductive approach which consists of going back and forth between theory and the field. By seeking to identify how business model innovation and leadership strategy can foster or hinder ecosystem emergence, I adopt a process approach, considering the different leadership strategies stages that make up the birth and renewal stages of ecosystem life cycles.

Secondly, I present the methodological choices that guided this work. I justify the use of the case method. More particularly, I expose the sampling process. Then I present in detail the selected cases as well as the data collection process, which is based among other things on primary data (20 semi-structured interviews), and secondary data. I also detail the data processing process, following the recommendations of Miles & Huberman (2003), by adopting an iterative content analysis. Finally, I address issues related to the reliability and validity of the research and highlight the limitations and difficulties encountered.

1.7 Epistemological framework

When starting a research journey, especially in the context of doctoral work, we are confronted with choices of research methods and approaches to answer our research question. Indeed, the choice of method is crucial to the success of the research. However, as important as choosing the right method to adopt when conducting research, is which epistemological

framework applies to the research (Avenier & Thomas, 2015; Guba & Lincoln, 1994; Saunders, Lewis, & Thornhill, 2009). According to Guba & Lincoln (1994: 107), an epistemological framework “*may be viewed as a set of basic beliefs (or metaphysics) that deals with ultimate or first principles. It represents a worldview that defines, for its holder, the nature of the world, the individual’s place in it, and the range of possible relationships to that world and its parts, as, for example, cosmologies and theologies do.*”

The epistemological framework adopted by the research contains important assumptions about how the researcher sees the world. It ultimately defines for the researchers what falls within and outside the limits of the research. Indeed, many methodological works emphasize the importance of epistemological positioning. Guba & Lincoln, (1994) point out that since early on researchers need to position themselves regarding the nature of their reality (ontological paradigm), their relationship with their object of research (epistemological positioning), and their access to knowledge (methodological approach).

Thus, all scientific research presupposes an epistemological position (Avenier & Thomas, 2015). In other words, the epistemological framework reflects the researcher's definition of knowledge, the assumptions that underpin his/her idea of knowledge, and how he/she justifies the validity of the knowledge he/she develops. Fail to consistently mobilize the research method to the researcher’s epistemological framework may lead to limited and superficial results (Gephart, 2004).

1.7.1 Summary of the main epistemological paradigms

Even though the epistemological debate has been around for a while, to this date there is no general agreement amongst scholars on how to classify the epistemological framework within the management domain (Avenier & Thomas, 2015). There is, however, some epistemological frameworks that are mutually consistent and shared within the management community, they are respectively: positivism, interpretivism, constructivism, and critical realism (Avenier & Thomas, 2015). In this subsection I summarize these frameworks, to then present my chosen epistemological position.

Positivism suggests the existence of an objective world. The positivist approach postulates the existence of a reality independent of the researcher and the interest that he/she may bring to it. This reality is notably governed by natural, universal, and immutable laws, which impose

themselves on the researcher in the form of truth (Avenier & Thomas, 2015; Guba & Lincoln, 1994; Saunders et al., 2009). Often a researcher that stands by the positivist approach will choose research methods based on hypotheses that can be empirically tested to verify them, and search for results that can be replicated and generalized (Guba & Lincoln, 1994).

Opposite from positivism we find interpretivism. Interpretivism advocates that the management world is too complex to be reduced to “laws” as is the case in hard sciences (Sandberg, 2005). Moreover, if we do that, we lose rich insights that come from exploring this social complex context. For interpretivism is crucial to adopt an empathetic approach, where the challenge is to enter the social world of the object of research and understand their world from their perspective (Saunders et al., 2009). Hence, the knowledge produced, unlike the positivist approach, is contextual and subjective.

Close to interpretivism, there is the constructivist approach. Even though they follow the same logic that the management world is too complex to be reduced to “laws”, they have different objectives. While interpretivism is concerned with understanding social realities, the constructivist approach seeks to build an instrumental representation for action that is more informed than any of the predecessors' constructions (Guba & Lincoln, 1994). Thus, constructivism is perceived more as a methodology, that may be regarded as an intricate set of ontological and epistemological assumptions (Mir & Watson, 2000). Even though constructivism is more attached to methodology rather than methods, some techniques seem to be more used by constructivism in strategic management. As pointed out by Mir & Watson (2000), they are respectively ethnography, institutional analysis, textual analyses, appreciative inquiry, and historical analysis.

Finally, critical realism defends a strong realist ontological approach. As in positivism, it posits that there is a world independent of our knowledge. However, as in constructivism and interpretivism, it accepts the relativism of knowledge, which is socially and historically constructed. Thus, this approach, which was first developed by Bhaskar (1978) seeks a middle ground between the two extremes. One particularity of critical realism is that the reality is stratified into three spheres, they are respectively: generative mechanisms (producing patterns of events that we observe), the actual domain (where observed events occur), and the empirical domain (where we experience events). Bhaskar's (1978) argument is that as researchers we will only be able to understand what is going on in the social world if we understand the social

structures that have given rise to the phenomena that we are trying to understand. In other words, what we see is only part of the bigger picture (Saunders et al., 2009).

1.7.2 The chosen epistemological position: critical realism

Every scientific research calls for an epistemological positioning on the part of the researcher (Avenier & Thomas, 2015). Moreover, according to their epistemological position the nature of the knowledge attained will be different (Avenier & Thomas, 2015; Bhaskar, 1978; Guba & Lincoln, 1994; Saunders et al., 2009). After learning about the main four epistemological paradigms presented here, and reflecting on the matter, it is clear to me that my doctoral work follows the critical realism approach.

First, I share with critical realism the ontological assumption of reality. Bhaskar (1978, p.18) explains well how I perceive the managerial world, that is: “society, as an object of inquiry, is necessarily “theoretical” in the sense that, like a magnetic field, it is necessarily unperceivable; so that it cannot be empirically identified independently of its effects, i.e., it can only be known, not shown, to exist”. Indeed, my doctoral work, which studies leadership strategy and business model innovation as levers to hinder or foster ecosystem emergence, is based on a dual descriptive and comprehensive aim, corresponding to the underlying assumptions of critical realism. I consider leadership strategy and business model innovation at the ecosystem level as a social phenomenon that, if it cannot exist independently of the actors and subjects, exists independently of the individual who is studying it. This existence, which is still under-explored given its novel nature, is influenced by factors similar to the generative mechanisms specific to critical realism.

As Mir ad Watson (2000) points out, recognizing the role of actors and their strategic choices is not an exclusive feature of constructivism. In particular, it is not incompatible with critical realism (Avenier & Thomas, 2015). Indeed, critical realism does not deny the perceptions and interpretations of actors and does not reject their role in the development of theories, it actually defends the idea that these processes represent a means of accessing or explaining reality (Bhaskar, 1978). For my part, I consider that my research process, including when I used qualitative methods, has not significantly influenced my research object and that the knowledge resulting from my work is not independent of the interpretations and conceptions of actors.

Considering that the reality of my research object exists in itself, my ambition is to explain the generating mechanisms. For this, I consider reality as an open system whose generative mechanisms are multiple and prompt to change. This corresponds to the ontological hypotheses of critical realism which postulate that reality, in addition to existing in itself, is stratified, considered from an open system perspective and susceptible to diverse and varied explanations, through multiple generative mechanisms (Avenier & Thomas, 2015; Bhaskar, 1978).

Finally, as explained previously, understanding leadership strategy and business model innovation at the ecosystem level is a recent subject of research from both an academic and managerial point of view. Even though I humbly aim to explain their relationship and their underlying mechanism, I am also convinced that the results from this work represent only one way of studying this object of research among others.

1.8 Research Approach

The research design poses also the question of “how do I research” (Charreire-Petit & Durieux, 2014; Saunders et al., 2009), or in other words the research strategy. There are two main research approaches – deduction and induction (Saunders et al., 2009). Deduction “involves the development of a theory that is subjected to a rigorous test. As such, it is the dominant research approach in the natural sciences, where laws present the basis of explanation, allow the anticipation of phenomena, predict their occurrence, and therefore permit them to be controlled (Collis and Hussey 2003)” (Saunders et al., 2009, p.124). Induction, on the other hand, is concerned with moving from the particular to the general. In other words, inductive inference is the steps we take to generalize our empirical findings (Ketokivi & Mantere, 2010). It starts with obtaining data, making empirical observations about some phenomenon of interest, and forming concepts and theories based on them (Locke, 2007).

1.8.1 An inductive research based on contextualization reasoning

The epistemological positioning of critical realism that guides this work, aims to identify and explain social phenomena through generative mechanisms, with the aim of better understanding the phenomena studied, instead of testing them. Inductive reasoning, as presented by Locke (2007), is entirely consistent with this aim. Meaning, that the descriptive and comprehensive aim of this doctoral thesis of studying the impact of business model innovation and leadership strategy to foster or hinder ecosystems, fall on the inductive approach

logic. Furthermore, this research is particularly concerned with the context in which the events are taking place (the context of mobility services in urban centers), which also falls in the inductive approach logic (Saunders et al., 2009).

A researcher who uses an inductive approach to research begins by gathering data that is relevant to his or her research topic. Once a significant amount of data has been gathered, the researcher will take a step back to assess the information. The researcher looks for patterns in the data at this stage and works to construct a theory that can explain those patterns. When researchers use an inductive technique, they begin with a set of observations and work their way up from there to a more general set of propositions regarding those data. To put it in other words, they go from data to theory, or from the specific to the broad.

According to Ketokivi & Mantere (2010), there are two strategies for inductive research – idealization and contextualization:

- Idealization involves the simplification of a complex phenomenon in an attempt to make it tractable. The goal of idealization is to provide normative guidelines for justifying inductive arguments. Idealization is based on the epistemic virtues of objectivity and truth; inferences - the mechanism that bridges the empirical data with the theoretical conclusions - is evaluated as an autonomous process governed by normative, intersubjective standards. Thus, idealization epistemic virtue is not truth but empirical adequacy, in other words, the ability of the theory to produce empirical predictions.
- Contextualization seeks to establish the contextual authenticity of reasoning, where reasoning is perceived as a context-dependent process. The goal is for the researcher and audience to arrive at what they believe is the best explanation for the evidence in light of the epistemic virtues adopted. Ketokivi & Mantere (2010) have identified three distinct forms of context-dependent reasoning. The first is subjective contextualization, which is based on the premise that all researchers have idiosyncratic background and knowledge basis. The second is empirical contextualization, which aims to provide the maximal access to the empirical contact by discussing examples and giving contextual details. Finally, the third is theoretical contextualization, which seeks warrants through establishing the

relevance of explanations with respect to a particular theory. Table 2 summarizes the two strategic paths to inductive research.

Table 2: Two strategic paths to inductive research (adapted from Ketokivi & Mantere, 2010)

Strategy	Idealization	Contextualization
Characteristic form of inference	Primarily induction (eliminative, enumerative) but also deduction	Inference to the best explanation (abduction)
Inference and explanation	Separate activities: explanation follows after inference has been assessed	Intertwined, assessed simultaneously
Epistemic virtue	Empirical adequacy	Simplicity, plausibility, interestingness, novelty
Rhetorical strengths in argumentation	Explicit and established rules and procedures; generalizable results	Transparency; openly partial to the explanation; authentic to data and the research process

As part of this thesis work, I have adopted an inductive approach based on contextualization reasoning. In line with the research premises proposed by Ketokivi & Mantere (2010), from the start of the thesis, I confronted myself with the field while developing a new conceptual framework based on the context of my terrain of research. The first empirical feedback thus enabled me to look for patterns to conduct my analysis and start the process of developing theory. More precisely my research follows a theoretical contextualization logic, where theory plays an integral role in the reasoning process that produces the explanations, as opposed to just methodological principles (Ketokivi & Mantere, 2010). The epistemic virtue driving the reasoning process when theoretical contextualization is applied is the conservation and consolidation of a given theory (Sklar, 1975). The interpretation of the mobility cases introduced in this thesis as an example of the impact of business model innovation and leadership strategy to foster or hinder ecosystems is a proper example of theoretical contextualization. It conserves business models, leadership strategy, and ecosystems as a theoretical discourse by demonstrating its utility in producing explanations of relevant empirical phenomena.

1.8.2 An approach through inference of the best explanation (IBE)

Inference of the best explanation (IBE) is a descriptive formulation of induction that admit the idea of active reasoner. “Inference to an explanation sometimes labeled abductive reasoning (Niiniluoto, 1999; Peirce, 1878), focuses on the descriptive rather than the normative aspects of scientific reasoning” (Ketokivi & Mantere, 2010, p. 319). According to IBE, the researcher is the one who selects the “best” explanation from among competing ones. The selection criteria of the “best” explanation are defined by pragmatic virtues such as interestingness, usefulness,

simplicity, or conservativeness. Thus, IBE effectively makes inference and theoretical explanation integral parts of a single process (Harman, 1965). IBE is then a candid description of how empirical researchers in practice make choices in their reasoning.

When it comes to the inductive approach, IBE enables new theories to emerge. The IBE approach, like abduction, allows the researcher to report, illustrate and explain a phenomenon, making it possible to go beyond the sole descriptive aim of the deductive approach (Charreire-Petit & Durieux, 2007). Furthermore, the IBE approach, as a form of reasoning originated in the scientific realist philosophy (Harman, 1965), which is perfectly adequate to my critical realist epistemological positioning.

This section aimed to present the main lines of the research design, in particular through my epistemological choice, to emphasize its coherence to the research approach (Avenier & Thomas, 2015). To do this, I have tried to respect the principle of consistency between the different elements presented in this section. First, I have tried to position this work in the line of the critical realist epistemological paradigm. The positioning of research work in an epistemological paradigm is an essential step before ensuring the development and the validity of knowledge (Saunders et al., 2009). Once I positioned this work with an epistemological paradigm, I presented how the research was conducted. The construction of exploratory knowledge was enabled by an induction approach based on contextualization reasoning. Finally, I applied the inference of best explanation as a descriptive formulation of induction, which is in line with the critical realist paradigm.

1.9 Research Method

The choice of the method falls to the researcher when he/she thinks about the design of his/her research. This research work is built on a qualitative methodology based on case studies. The purpose of this subsection is to explain this methodological choice as well as to present the cases. I detail the method of data collection as well as the processing approach, to then address the precautions taken to offer reliable and valid research.

1.9.1 The qualitative methodology

Different reasons explain my choice to favor a qualitative methodology. First, my epistemological positioning, critical realism, supports this choice. Even though, critical realism

does not imply the choice of qualitative research over quantitative, qualitative research is well suited for it (Archer, Bhaskar, Collier, Lawson, & Norrie, 2013; Fletcher, 2017). As such, critical realism is consistent with qualitative studies that explore the interactions between structure, events, actions, and context (Miles & Huberman, 2003).

Second, because the line of research that addresses business models (Belussi, Orsi, & Savarese, 2019) and ecosystems (Bogers, Sims, & West, 2019; Jacobides et al., 2018; Kapoor, 2018) are still recent in the management literature and not stabilized. In cases such as this where the literature is new and/or not yet stabilized, qualitative methods are recommended (Charreire-Petit & Durieux, 2014). In the case of this doctoral study, this is even more true as we are jointly mobilizing the concepts of business models and ecosystems. An initiative that has been encouraged however still very recent (e.g., Attour & Burger-Helmchen, 2014; Demil et al., 2018; Teece, 2018b).

Third, qualitative methods and data make it possible to assess complex situations and phenomena (Miles & Huberman, 2003). That is because qualitative data can produce dense and powerful descriptions, nested in a real context. The impact of business model innovation and leadership strategy on ecosystems involves multiple organizational dimensions and can be influenced by different factors. Given the level of novelty and complexity embedded in this research, a qualitative approach then makes it possible to better understand this phenomenon, and in particular its adoption, thus allowing for a more detailed understanding.

Finally, the choice of my research strategy is guided by my research question and objectives (Saunders et al., 2009). The nature of my research question – How can business model innovation and leadership strategy foster or hinder new ecosystems? – seeks to gain a rich understanding of the context of the research and the processes being enacted. In situations like this, where studying actors and their perceptions are needed, qualitative methods are recommended (Saunders et al., 2009).

Different research methods are appropriate for the qualitative research (Saunders et al., 2009; Yin, 2009), some of the most applied are:

- Experiments: the purpose of experiments is to study causal links. It can either be simply concerned with whether there is a link between two variables, or in a more complex form, it may be concerned with the size of the change and the relative

importance of two or more independent variables. Usually, types of research questions seek to answer the “how” or “why” questions.

- Ethnography: the goal of ethnography is to depict and explain the social reality that the research participants live in in the same way that they would. Ethnography may be particularly appropriate if one wishes to get insights into a certain situation and better understand and interpret it from the perspective(s) of those involved
- Archival research: archival research, makes use of administrative records and documents as the principal source of data. Although the term archival has historical connotations, it can refer to recent as well as historical documents (Bryman 1989). Research questions about the past and changes over time can be answered using an archive research technique.
- Case studies: the purpose of case studies is to investigate a particular contemporary phenomenon within its real-life context using multiple sources of evidence. Thus, case studies are particularly interesting to gain a rich understanding of the context of the research and the processes that are being enacted. Case studies generate answers to questions of “why”, “what” and “how”.

1.9.2 The case study methodology

To qualitatively study my research question, I opted for the case study strategy. That is because case studies are helpful when the research aim is to answer the “how” questions, during which the researcher has little control over the observed contemporary phenomena. The goal of case studies is to understand complex and social phenomena and real-life events. A case study is an empirical investigation that looks into a current phenomenon in depth and within its real-world environment, especially when the lines between phenomenon and context are blurry (Yin, 2013).

Case studies are widely used in qualitative methods in management research, and are a proven research strategy in the field (Eisenhardt, 1989; Saunders et al., 2009; Yin, 2009, 2013). Case studies can be used either to describe, test, or generate new theories and they can also be affiliated with the critical realism epistemological positioning, such as the one guiding this research (Eisenhardt, 1989). There are two main types of case studies, single cases and multiple cases (Yin, 2009, 2013). Case studies typically combine data collection methods such as archives, interviews, questionnaires, and observations (Eisenhardt, 1989). There are different

types of case studies (see Figure 5). Yin (2013) notably distinguishes, in the form of a matrix, the case studies according to the number of cases studied and their embeddedness.

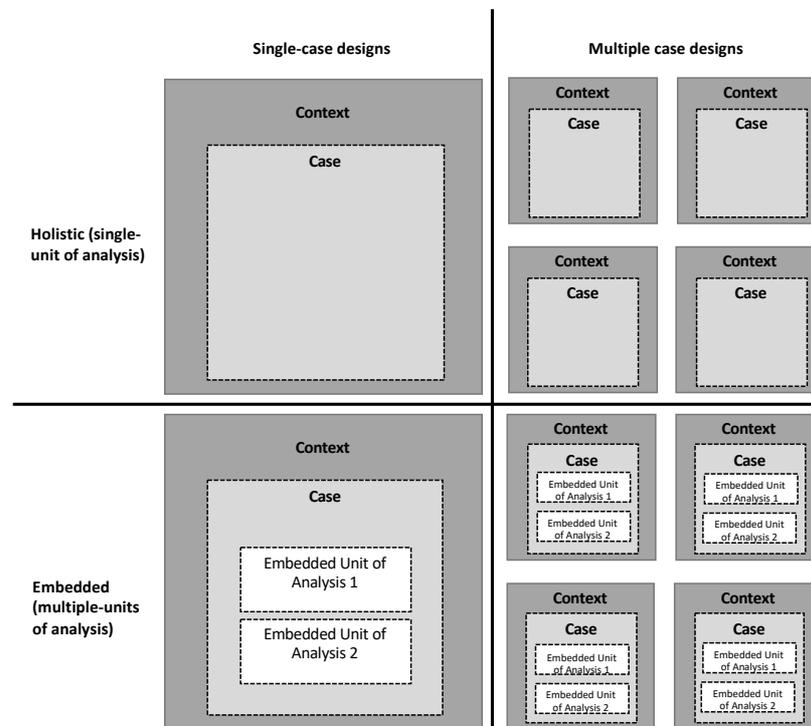


Figure 5: Case study design based on Yin's (2013)

In this work, I have mobilized inductive single case studies in the studies of Manuscripts 2 and 3. Single case studies are recommended when the case is unusually revelatory, or when it is extremely exemplar, or when it offers opportunities for unusual research access (Dyer Jr & Wilkins, 1991; Eisenhardt & Graebner, 2007; Yin, 2009). Even though Eisenhardt & Graebner (2007, p 30) are well-known advocates for multiple case studies, they recognize the importance of single case studies: *“Somewhat surprisingly, single cases can enable the creation of more complicated theories than multiple cases, because single-case researchers can fit their theory exactly to the many details of a particular case. In contrast, multiple-case re-searchers retain only the relationships that are replicated across most or all of the cases”*.

If the particulars of the case are considered as possibilities to make further changes to an already crystallized understanding of reality, single case studies can make a significant contribution to theory development. Therefore, without the specificity of particular cases, new distinctions are not possible (Mariotto, Zanni, & de Moraes, 2014). Thus, the main goal of single case studies is not to seek the general laws that operate in the particular case but to allow a better understanding.

Because I am interested in two different phases of the ecosystem life cycle (birth and renewal), I opted to study two different cases. Each addressed in a different Manuscript as detailed below.

Manuscript 2: a single case study based on secondary data

Manuscript two adopts a qualitative single case study based on secondary data. Similar to Snihur et al., (2018) this study follows the longitudinal theorizing method (Burgelman, 2011) by choosing an exemplary case (e.g., Burgelman, 1991; Danneels, 2011; Snihur et al., 2018) that illustrates the phenomenon of interest and enables theory generation and elaboration rather than theory testing (Siggelkow, 2007). The design was based on one in-depth case of an incumbent automotive firm and different levels of analysis (incumbent-level challenges, and ecosystem-level responses). The goal of this study is to explore the development of leadership over time through business model innovation in the renewal stage of ecosystem life cycle. To do that, I examine the disruption in the automotive industry caused by technological changes (e.g., connected, autonomous, shared, and electric vehicles) to an incumbent carmaker firm.

Manuscript 3: a single case study based on primary data

Manuscript three demonstrates how a successful incumbent leader was able to retain leadership while renewing its ecosystem. This case is insightful as it shows how leadership can foster ecosystems and change the fate of ecosystems from death to renewal. However insightful, this study sheds light on one side of the coin. In other words, ecosystem leadership is not always successful, and understanding what makes leaders fail to foster ecosystems is as important as understanding what makes them succeed. Thus, Manuscript three proposes an in-depth study to understand how an ecosystem leader can hinder ecosystem emergence in the context of mobility services. The case chosen is the case of Mobility as a Service (MaaS) in the city of Nice in the South of France. Data was collected from March 2020 to March 2022, from interviews, observations, archives, regulations, reports, and media outlets.

1.10 Presentation of the research terrain

Three conditions justify the use of a single case study (Yin, 2013). The first that it is a critical case where the theoretical foundations are well defined. Second, it is an unveiling case allowing to reveal a phenomenon inaccessible to ant scientific investigation. Finally, third it is an extreme case allowing to study a rare phenomenon.

1.10.1 The choice of the urban mobility ecosystem case

The case of qualitative research work carried in the thesis concern the urban mobility service ecosystem. Mobility services are a new phenomenon that is transforming the transportation industry, it is giving rise to new forms of ecosystems, new business models and challenging leadership strategy. Traditionally, the mobility landscape is mainly and generally composed of mobility demanders, servicer provider operators, service provider integrator, infrastructure provider operator, infrastructure provider integrator and the end user. Each one of these actors have a specific role within the ecosystem and they hold a certain degree of relationship amongst them. Table 3 summarizes those roles and relationship.

Table 3: Actors role and relationships within urban mobility ecosystems

Actors	Role	Relationship to other actors
Mobility Demanders	Generates the demand for the urban mobility service. Can either be the regulatory mobility authorities (RMA), local governments or citizens.	RMAs and local governments provide guidelines and the legal framework for service and infrastructure providers. Citizens generates the end-user demand to local governments, when demand is suppressed they are the channel for disruptive service providers (e.g., Uber)
Service Provider Operator	Supplier of mobility services operations (bus, trains, airplanes, taxis, etc.), payment and billing.	User of infrastructure network.
Service Provider Integrator	Integrator of different technologies (payment solutions) equipment (contactless validation terminals).	Supplier to service provider operators.
Infrastructure Provider operator	Developer of mobility network (roads, rails, etc.), information (control centers), payment and billing (tolls).	Supplier to all mobility service provider operators.
Infrastructure provider integrator	Integrator of mobility network technologies and equipment (tolls payment terminals).	Supplier to infrastructure operators.
End-user	Has a double role of demander and client.	Buyer of mobility services. Plays an important role as a catalyzer for disruptive services.

For many years the urban mobility ecosystem was latent, as there were no changes to the traditional architecture. Typically, the organization of transport is done by the public authorities (AOM), which is guided by the demand of the city and its citizen, enabled by third party operators to deliver the final mobility services; typically bus, tramway, subway, etc. The model coordinated by the government consolidated a rigid architecture oriented towards adherence to public tender to provide the urban mobility services. Given this rigid architecture, and the high level of capital investment, the renewal of the mobility ecosystem and its organization was limited to a select group of actors. Figure 6 depicts the traditional urban mobility ecosystem.

Traditional urban mobility architecture

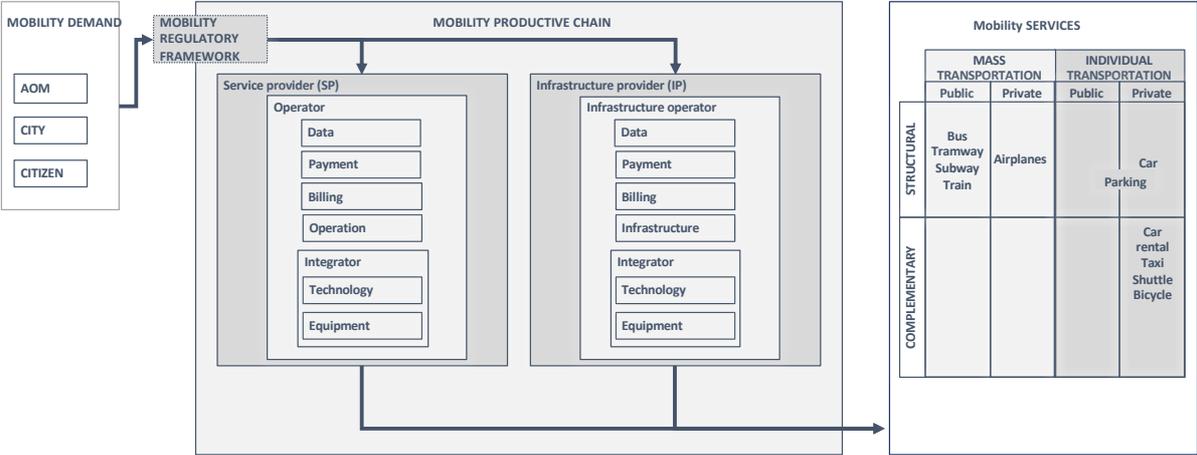


Figure 6: Traditional urban mobility architecture

However, technological innovations, citizens repressed mobility demands and increasing concerns with the environment have pushed companies to innovate and propose new mobility solutions (Audouin & Finger, 2019). Technologies such as electric powertrains, mobile data connectivity are emerging alongside new transportation services, like ride-hailing and car sharing, to form integrated mobility services. Often, this new services bypass the regulatory framework imposed by the traditional architecture and proposed by most (if not all) cities, thus enabling the emergence of new urban mobility ecosystems (Jittrapirom, Marchau, van der Heijden, & Meurs, 2018), as represented in Figure 7.

Disruption of the traditional urban mobility architecture

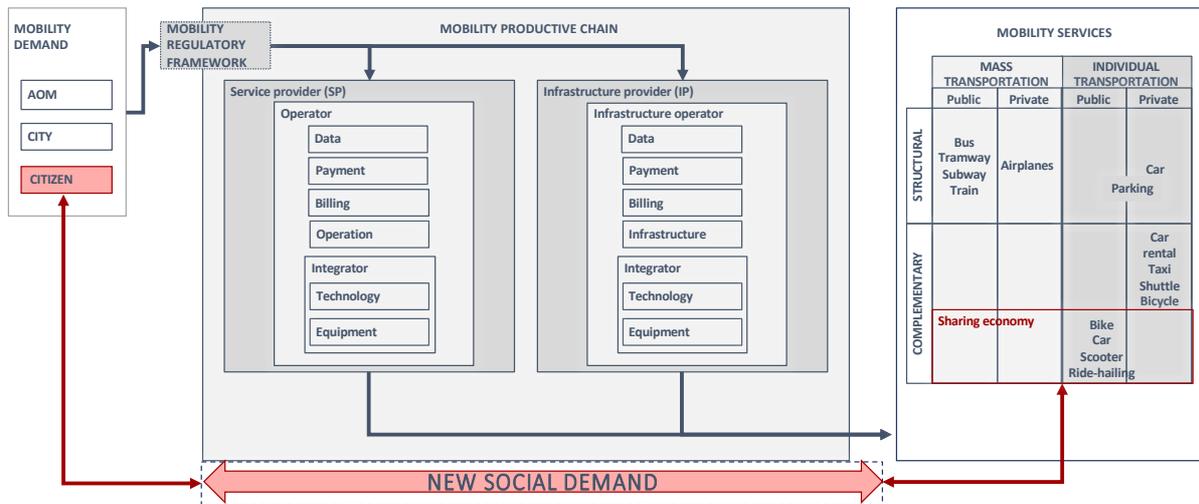


Figure 7: Disruption of the traditional urban mobility architecture

The popularity of the new services puts pressure on governments that, on the one hand, need to keep authority and control over them, and on the other hand need to find ways to incorporate these new services into their cities. Initiatives are varied given that there is a variation in transportation modes, and the innovations proposed are numerous. This context implies that there is a transition in the mobility landscape, where new ecosystems are emerging, and old ones are renewing themselves, or dying. In addition, new business models are being introduced and old ones are being challenged. All that calls for new forms of leadership and ecosystem leadership strategy. That is why the urban mobility case is a very appropriate setting to study how ecosystem leadership strategy and business model innovation can foster or hinder ecosystems.

1.10.2 Case selection criteria

The selection of cases, or sampling, is a key step for the researcher who will have to confront several questions relating to their theoretical representativeness, variety, their nature, etc. (Dyer Jr & Wilkins, 1991; Eisenhardt, 1989; Miles & Huberman, 2003). I selected the case of Mobility as a service (MaaS) which I evaluated from two different perspectives. The first is through the close analysis of a traditional carmaker (Toyota) seeking to renew its ecosystem and transition from a transport company to a mobility company. The second perspective concerns the birth stage of the ecosystem life cycle. I selected the city of Nice in the South Region of France to explore the challenges faced by public authorities when leading the ecosystem emergence.

The cases were selected respecting Rispal's (2002) sampling criteria (cf., Table 4). The cases have in common that they face similar challenges in the following ways: (i) both seek the transition to mobility-oriented service delivery; (ii) both are incumbent leaders of the transportation industry; (iii) both are being challenged by the same technological disrupters, technological changes, and societal demands for sustainable mobility solutions. They differ in terms of ecosystem life cycle stage, leadership positioning, and ecosystem leadership strategy. While a carmaker is a private company, its main concern is to remain competitive and relevant in the mobility landscape. Their interest is in their survival. The public actor's goal, on the other hand, is to provide structure, control, and convey taxpayers' resources into reliable services. The combination of these two perspectives forms a rich research ground to explore and understand the conditions in which ecosystem leadership strategy can foster or hinder new ecosystems.

Table 4: Choice of cases for the constitution of a theoretical sample (adapted from Rispal, 2002)

Theoretical sampling criteria	Implications	Application to doctoral thesis
Theoretical representativeness	Homogeneity of the cases, from the point of view of the question to be studied or the entities examined.	Common points between cases: <ul style="list-style-type: none"> • Transition to a mobility-oriented service delivery • Focus on the leadership role Similar ecosystem challenges
Variety	Case studies very different in terms of the ecosystem architecture, leadership role and business model innovation.	<ul style="list-style-type: none"> • Different leadership perspective • Different ecosystem leadership strategy motivations • Different business model innovation challenges • Different ecosystem life cycle
Balance	Complementary cases that allow the analysis from different perspectives of the same phenomenon.	<ul style="list-style-type: none"> • Two cases that their different perspective that complement each other, allowing to a more reliable and rich analysis
Discovery potential	Selection of rich cases (data accessibility, easy access to key actors, participant observation, abundant historical data).	<ul style="list-style-type: none"> • Easy access to actors and to the field, • Participant observations have been carried out, and numerous secondary data collected • Access to key players and to R&D

1.10.3 Toyota: The incumbent carmaker who foster ecosystem emergence

As mentioned above, there is a very close and selected number of global companies that have dominated the transportation landscape for decades (e.g., Volkswagen, Toyota, Daimler, Ford, GM, Honda, BWM). They are all facing the same challenges, and they are all seeking the transition from transportation to mobility, therefore all these companies are rich research grounds. However, while conducting research we are confronted with choices in terms of data accessibility, variety and resources (Dyer Jr & Wilkins, 1991; Eisenhardt, 1989; Miles & Huberman, 2003). I chose Toyota as my case due the company's market leadership⁴, the available data on the company's history, leadership strategy, ecosystem leadership strategy, transition plan, and a very well documented history of their partnership with service providers (e.g., Uber, one of the largest mobility disrupters).

In 2016 Toyota announced a partnership with Uber, launching the company's transition strategy to a mobility company. In 2018, at the end of August, Toyota invested \$500M in Uber's Autonomous Vehicle program. While confirming the role played by the two companies in terms of the mobility of the future, this partnership above all witnessed the imminent emergence of new mobility services such as MaaS. This new initiative, however, stands out for Toyota's particular interest in the Autonomous Vehicle technology, which at that time was being developed by Uber. Later in 2020, Toyota announced an operation management system to support the providing of services that will enable practical use of the e-Palette, a battery-electric vehicle for autonomous mobility as a service application that will realize future mobility services.

More broadly, for Toyota, it is a question of adapting to the change in the consumption model underway among customers in the automotive sector, with an increasingly palpable "servitization" of the market. Manufacturers have indeed understood their interest in developing a range of mobility services in the face of the decline in ownership. There is why this make such an interesting and rich case to explore leadership strategy and business model innovation within ecosystems.

⁴ According to statista, in 2020 and 2021 the company was the top car seller in the world. Last accessed September 2022 at: <https://www.statista.com/statistics/239229/most-sold-car-models-worldwide/>

1.10.4 Nice: the city that hinders ecosystem emergence

There were three main reasons why I chose the city of Nice to study what hinders ecosystem emergence, (i) the city's reputation as a smart city; (ii) the city's investment in mobility projects; (iii) and access to data. Below I describe the steps followed for each item.

The city's reputation as a smart city: It comes as no surprise that urban mobility services are closely linked to cities. Lately, the term smart mobility has been employed to describe all the new emerging mobility solutions. Therefore, there is a tendency to connect the emergent mobility services to smart cities. This logic led me to study the IESE Cities in Motion Index⁵ (CIMI) from 2014 until 2020. CIMI is an index that aims to evaluate cities in relation to the nine key dimensions: human capital, social cohesion, the economy, governance, the environment, mobility and transportation, urban planning, international projection and technology. This index has, over time, become a reference as a smart city ranking.

Given that I wanted to study what hinders ecosystem emergence in the context of MaaS, by analyzing the CIMI Index over time I was able to identify cities that were struggling to keep their ranking position, more precisely when it comes to the mobility challenges. The city of Nice figures amongst those cities. The city of Nice has been presented in the rank from 2014 and 2020. However, Nice's position in the rank has fallen from 40th place to 83rd (c.f. Figure 8), which serves as an indication that something is not running well. When looking closely, we see that mobility is one dimension that has contributed to this decline. In 2014 Nice Mobility dimension was ranked in the 39th place, a much better result than in the year 2020 when the city Mobility dimension was ranked in 61st place.

⁵ IESE Business School - IESE Cities in Motion Index 2020 / ST-542-E p. 2. Last consulted May 9th 2022: <https://media.iese.edu/research/pdfs/ST-0542-E.pdf>

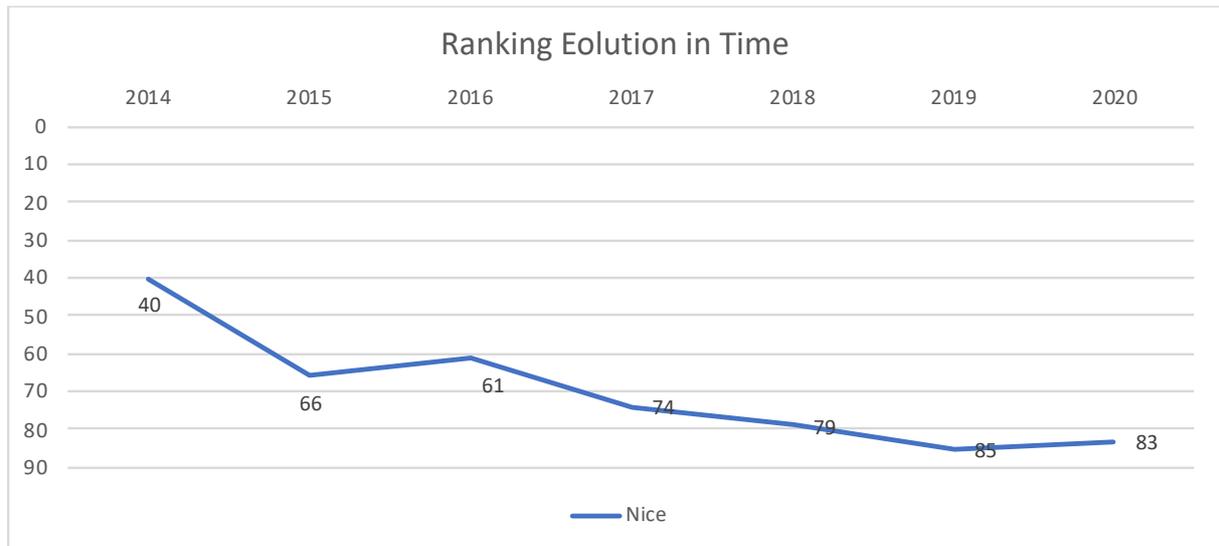


Figure 8: Nice ranking decline from 2014 until 2020 – cimi index

The city's investment in mobility projects: After identifying Nice's fall within smart city CIMI Index, I conducted several studies to map the mobility landscape in Nice. Indeed, the city is heavily investing in new mobility systems. In 20 years, the city has more than double their mobility offer to passengers. In 2000 the only alternative to private cars proposed by the city were buses, train, car rentals, private shuttle services and taxis. In 2009 those offers increased with the inauguration of the tramway, car and bike sharing offers. 2019 saw a boom in new modes of mobility, in part due to the surge of the sharing economy (e.g., car sharing, scooter sharing, and carpooling), and due to the entrance of mobility disrupters companies such as Uber. It was also in 2019 that we started to see that the city was adopting some sort of MaaS solutions, however the service is still very limited to a few public transport modes (tramway, bus, and train). Figure 9 below graphically summarizes the city's urban mobility services evolution.

	2000	2009	2019	MaaS 2019
 Tramway		✓	✓	✓
 Bus	✓	✓	✓	✓
 Train	✓	✓	✓	✓
 Rental	✓	✓	✓	
 Carpooling			✓	
 Car sharing		✓	✓	
 Scooter sharing			✓	
 Shuttle	✓	✓	✓	
 Ride sharing			✓	
 Taxi	✓	✓	✓	
 Bike sharing		✓	✓	

Figure 9: Nice's mobility evolution between 2000 and 2019

Thus, to better understand why the MaaS is struggling to emerge in Nice I analyzed some of the most prominent projects conducted in the past years. I then interviewed the members involved in each project to understand what is hindering the MaaS ecosystem's emergence. They are respectively City & Tram Connected, Tramway and Parcazur, Pass Sud Azur, and Régie Linge d'Azur (RLA) and Uber. Each project is presented below.

City & Tram Connected: The goal of this project was to design, test, and imagine new features and services for the city of Nice tramway. Four partners combined their means to imagine the tram of tomorrow by opening the tram data to entrepreneurs. In 2017 a public contest was open for start-ups and project leaders to propose their ideas. The selected cases would benefit from different outlets to explore their solution in the city of Nice tramway. The project was part of a Public Private Partnership. The *City & Tram Connected* project is part of a collaborative approach that brings together research labs from the Université Côte d'Azur,

leading companies in smart cities (Alstom), Régis Lignes d'Azur⁶, and the Nice Côte d'Azur Metropolis. The winning contestants were

- **Start-up Facebots/ TramBots:** A personal assistant to help with trip planning. The idea behind is that a bot that uses the Facebook messenger platform communicates with users to propose the best solution to his/her mobility needs. The company no longer exists. There is a replacement called ROOTE, but it is not present in Nice.
- **Start-up Myvizito:** An intelligent software system with easy-to-use customized solutions to book things to do in cities. It helps users plan trips, tours, and experiences through one single platform. It is still running in Nice and other cities, however, the project related to the tramway is disconnected from the main solution.
- **Project TramDam :** It proposes games where you accumulate points that you can use as money at local commerce. It still has a Facebook page but hasn't been active since 2018. Very low flow, only 4 people following the page. It can be assumed that the project did not work.
- **Project OptiFlow:** Based on a predictive model of frequentation of public transport, the aim is to bring flexibility and adaptability to the urban transport networks. There is no available information, apparently, the project has never left the paper.

Tramway and Parcazur: The goal of this project is to promote public transport, improve travel and user comfort towards the city center, and park-and-ride facilities known as “*Parcazur*”. This is a Public Public Partnership set up by the Nice Côte d'Azur Metropolis, Régis Lignes d'Azur (RLA) and Région Sud. There is a total of 8 car parks in the city (Figure 10), of which 1 offers the possibility to park bikes, and 1 parking is exclusively for bikes. The targeted audience is everyone who wishes to park and ride. The service is free to subscribers of Régis Lignes d'Azur or for those who hold the multi-modal “*Carte Azur*”.

⁶ The Régie Ligne d'Azur (RLA) is a public establishment of an industrial and commercial nature created in 2013, to which the Nice Côte d'Azur metropolis, as the organizing authority for mobility (AOM), has entrusted the operation of the urban network.

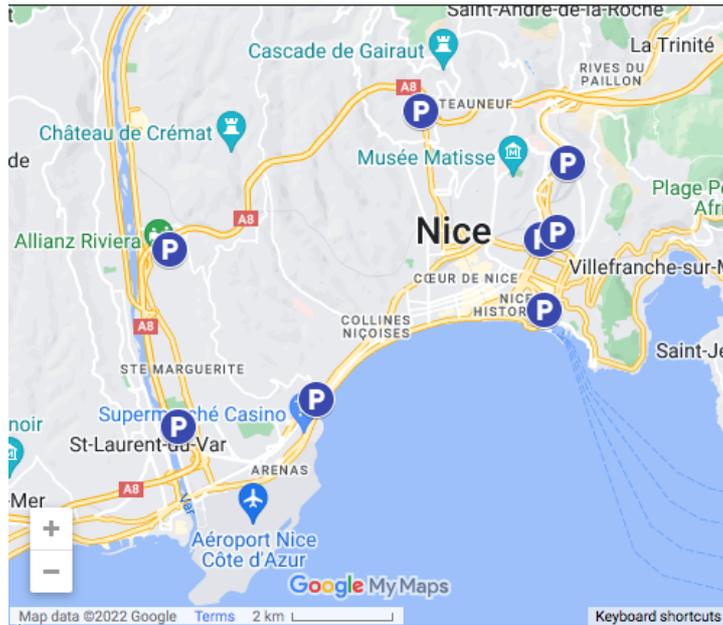


Figure 10: Location of the 8 parking Parcazur in the city of Nice

Pass Sud Azur: The goal of this project is to offer the possibility of traveling by bus, train, or tram, throughout the entire Alpes-Maritimes, or by area, depending on one’s needs. Fully modular, it has been designed to be adapted to the needs of users, covering seven different zones (Figure 11). This is a multiple Public Partnership, collaboration between the metropolis of Nice-Côte d’Azur, the agglomeration communities of Pays de Grasse, Cannes Pays de Lérins, Sophia Antipolis, the Community of the French Riviera, and the Princely Government of the Principality of Monaco (September 1, 2020). In addition to the networks operated by the partners, the Pass gives access to all regional networks: interurban networks, LER, TER, or Provence Railways in the selected areas. The fare rates are lower than the cumulative cost of several subscriptions or a private car. It is possible to subscribe only to certain areas or to extend the Pass over the entire department of Alpes-Maritimes. The targeted audience is the general population. By the time of the interviews, the result of the project was below expected. According to informants, the project was launched too early and it had a poor communication and marketing scheme.



Figure 11: The 7 areas covered by the Pass

Régie Linge d'Azur and Uber: The goal of this project was to reduce individual car ownership, expand transportation access, and help governments plan future transportation investments. This was a Public Private Partnership of a one-year pilot to provide RLA subscribers with on-demand transportation services in addition to the existing public transport offer. Subscribers could request a ride from/to one of the six stops of the L1 tram for €6. This flat fare was available from 8 pm until 2:30 am when the trams service closed for the day. The targeted audience was the 50,000 RLA subscribers above 18 years old to navigate the first and last mile that separated them from the nearest public transit station. The project was financed by Uber and Lignes d'Azur, each invested 30,000 euros. This experimental partnership worked until its budget was exhausted, however, the project was not renewed.

Access to data: The potential for discovery, is as important for the selection (Rispal, 2002), which allows the researcher to ensure access to sufficiently rich data and to available, welcoming, and interested interlocutors. This was the case with Nice. There I had open access to a wide array of information from both the private and public sectors, research centers, and start-ups. This open access enables me to achieve the thesis objectives related to theory testing, theory generation, and theory validation. The process of data collection and analysis will be further explored in the following subsections.

1.11 Data collection

Regarding the adoption of case studies, it is recommended multiplying the sources of data to ensure the diversity (Eisenhardt, 1989; Rispoli, 2002; Yin, 2013). According to Yin (2013) there are six sources of qualitative data: interviews, participant observation, direct observation, documentation, research documents, archives, and physical artifacts. Those sources of data can either be primary data or secondary data. Primary data, are data that the researcher will have collected by himself/herself, and secondary data, are data which already exist independently of the researcher and his work (Saunders et al., 2009). In this work I have collected both primary and secondary data.

1.11.1 Primary data collection

To deepen the information collected from the cases, a sample of actors involved in the cases were interviewed: CEOs, founders, directors, and managers.

When conducting interviews for case studies, there are three main types of interviews that are the most commonly used (Baumard, Donanda, Ibert, & Xuereb, 2007). They are respectively:

- Non-directive interviews, where the researchers choose a topic, but she or he will not intervene in the direction of the respondents' comments.
- Semi-directive interviews, where the researcher uses a structured interview guide to address defined sub-themes.
- Directive interviews, which are similar to a questionnaire.

The interviews conducted were used in the study of the case of MaaS in the city of Nice. All the interviews carried out as part of this thesis (20 in total) were considered from the perspective of the semi-structured interview for several reasons. Unlike the non-directive interview, the semi-directive interview allowed me to consider the elements observed in the literature. And, unlike the directive interview, the semi-directive interview allows to respect the principle of coherence and thus to position ourselves in an exploratory approach, leaving respondents a relatively significant freedom of expression. Furthermore, given my research questions, the purpose and logic was not confirmatory but exploratory in the sense that the

challenge was to understand and explain the process that can foster or hinder ecosystem emergence through leadership strategy and business model innovation.

The choice of actors and respondents is a determining criterion in the data collection process (Rispoli, 2002). In order to best respect the principles of sampling and the potential for discovery, we ensured access to various actors both in terms of their function and their hierarchical level. Table 5 details the interview characteristics developed for the case of Maas in Nice.

Table 5: Interviews conducted for the purpose of the thesis

Interview	Interview date	Position	Recording duration
1	25/09/2020	Engineer-Researcher	54min
2	25/09/2020	Technical Solutions Architect	55min
3	14/09/2020	Energy and Forecasting Engineer, Transport & Mobility	41min
4	10/09/2020	Transportation Planning and Modeling Specialist	44min
5	09/09/2020	Community Development Manager	45min
6	08/09/2020	Project Manager - Key Accounts Division	58min
7	31/07/2020	Deputy Director Mobility Travel Transport	55min
8	28/07/2020	Director of mobility, transport and travel	45min
9	28/07/2020	Director of Communication and Brand	46min
10	24/07/2020	Project Director	47min
11	24/07/2020	CEO & co-founder	52min
12	22/07/2020	New Mobility Director	55min
13	20/07/2020	CEO & co-founder	53min
14	17/07/2020	Travel service manager - community transport	57min
15	15/07/2020	Tramway Director	58min
16	30/06/2020	Transportation Planning and Modeling Specialist	48min
17	26/06/2020	Mobility Director	52min
18	22/06/2020	Marketing, Strategy and Digital Services Solutions Director	57min
19	15/06/2020	Planning, Housing and Mobility Director	58min
20	02/06/2020	CEO	57min
Total			1,037 minutes

The interviews were conducted, as shown in Table 5, between June and September 2020. All the interviews were conducted by Zoom, Teams, or by phone given that we were

constrained by the COVID sanitary crisis. All interviews were recorded, conducted in French, then transcribed, and translated to English by me. All 20 interviews, lasted a total of 1,037 minutes, i.e., more than 17 hours. At the beginning of each interview, I made sure to introduce myself, present the objectives of this work and recall the commitment to confidentiality regarding the use of this data in order to reduce the fears of some respondents.

1.11.2 Secondary data collection

The secondary data was collected for both cases. Over 2000 documents were analyzed for both cases. For the first case (Toyota and the renewal of a new mobility ecosystem), I used a longitudinal design based on the incumbent firm's journey to transition from an automotive company to a mobility company. I collected archival data covering the incumbent actions and reactions from disruptors and ecosystem actors. I used archival data including press releases, annual reports, websites, and specialists' reports. I also searched Factiva, and media interviews with the CEOs and top management team during the period 2016–2021. To evaluate audience (i.e., media, analysts) perceptions of leadership success or failure, I collected press coverage from specialized online outlets in mobility and automotive industries news (e.g., Contify Automotive News, Just-Auto, Auto Business Daily) and from generalist newspapers (e.g., Dow Jones, Reuters, Forbes, Financial Times), sourced from Factiva using the keywords Toyota and Uber. These were the leading technology and business newspapers of the time, providing active commentary about the emerging mobility ecosystem. Archival data are appropriate to study this case as the large number of documents provides detailed insights into the renewal of an ecosystem, relatively free of bias (Snihur et al., 2018).

For the case of MaaS in Nice, in addition to the primary data collected, I collected secondary data. At every interview I asked the participants, if possible, to provide written communication elements, (organization chart, studies produced internally, mobility contracts, commercial proposals, etc.). Regarding the external documentation, I also visited the websites of all the companies prior to the interviews conducted, I collected information regarding all their mobility projects related to MaaS in Nice and elsewhere. I also subscribed to mobility, and consulting firms' weekly and monthly newsletters. The newsletters, when available, have enabled me to identify trends that I used to inquire about during the

interviews. I also attended different mobility conferences (some online due to the COVID crisis), visited mobility research labs, and attended mobility round tables.

The diversity of the sources mobilized within the framework of this research work makes it possible to triangulate the data (Saunders et al., 2009). Data triangulation is important for any researcher implementing a qualitative method as it combines different sources to study the same phenomenon (Eisenhardt, 1989; Yin, 2013).

1.12 Data analysis

The data analysis phase included different approaches depending on the focus of the study, and the nature of the data (primary data or secondary.) They are each presented in detail in Chapters 2-4. However, generally speaking, qualitative data is, by nature, rich and complex and their analysis demands a high level of rigor (Gioia, Corley, & Hamilton, 2013).

1.12.1 Primary data analysis

The analysis of the primary data took advantage of an iterative dynamic process (Saunders et al., 2009). The data processing method that I have chosen to apply to the primary data is the iterative and cyclical content analysis suggested by Miles and Huberman (2003), which makes it possible to understand and contextualize the data collected in depth. Miles and Huberman (2003) state that qualitative data analysis consists of four concurrent flows of activity: data collection, data reduction, data display, and conclusion drawing/verification (Figure 12). Furthermore, although there are multiple modes of data processing, Miles & Huberman, (2003) point out that the choice of iterative content analysis is compatible with a critical realist epistemological position.

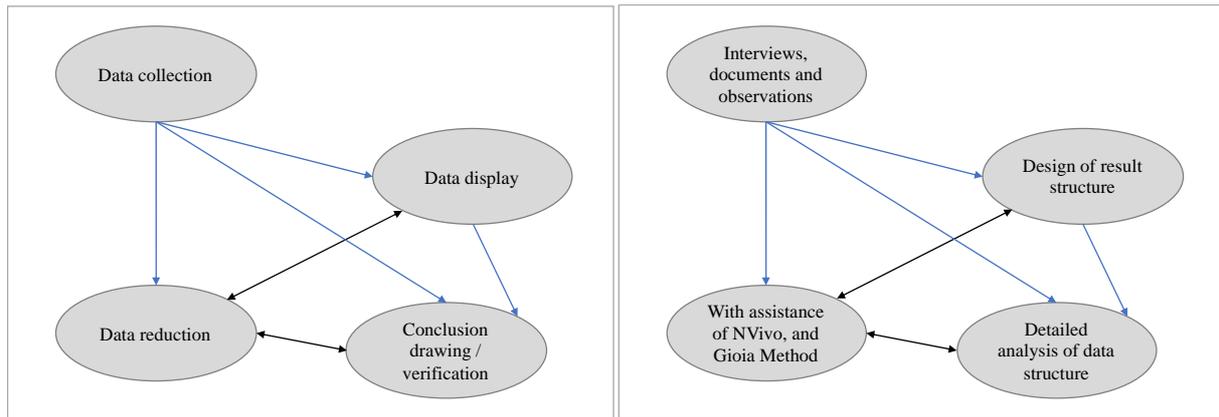


Figure 12: The general iterative data analysis by Miles & Huberman (2003) (left), and how it was applied in this study (right)

To complement this iterative approach I also used coding following Gioia et al (2013). The Gioia method is recommended when building single case studies. While collecting the data I analyzed it starting with open coding. This process helped me to find lower-level meanings or first-order concepts. Once I have done the coding of the first-order concepts, I started to combine them into more abstract categories, or second-order concepts. Finally, the second-order concepts led to the creation of the lowest level of coding, or the aggregated constructs. This process produced what Gioia et al. (2013) call the data structure. Table 6 provides one example of how different quotes led me to establish the first-order and second-order concepts that were then used to create one of the aggregate constructs of the data structure (example taken from interviews used in Manuscript 3).

To help me with coding all the data from the interviews I used NVivo. NVivo is a qualitative data analysis software. All interviews were translated and transcribed with the support of NVivo software. NVivo helped me analyze and find insights into the interview data. During the data analysis process, reflections on the theoretical foundations were performed. Several rounds of discussion were conducted over a period of 1.5 years until the final data structure model was decided. This process of long reflections was very important as it led to new elements in the data structure (e.g. ecosystem leadership and ecosystem leadership strategy) (Adner, 2017; Cusumano & Gawer, 2002; Iansiti & Levien, 2004c; Moore, 1996).

Table 6: Example of data coding based on Gioia et al. (2013)

Representative quotes	First order concept	Second order concept	Aggregate Construct
<p><i>“In fact, what you have to understand, what I’m telling you is that in order for it to work [MaaS], the public actors need to co-finance. It is essential” (Pri5)</i></p> <p><i>“I think MaaS is mainly a strategy of the City. We can propose things but is the city that should manage and finance it” (Pri2)</i></p>	<p>Expectation of public subsidization/ financing</p>	<p>Uncertainties about financial model</p>	<p>Absence of MaaS ecosystem business model</p>
<p><i>“There are often small companies that do not want to get into MaaS because they are afraid of being eaten by big companies” (Pri7)</i></p> <p><i>Overall, MaaS is a comparison tool. Private companies not necessarily want to be compared, between each other and especially with other modes” (Pri10)</i></p>	<p>Fear of entering MaaS and losing market share</p>	<p>Leadership lack of capacity to align ecosystem members</p>	<p>Leadership failure</p>
<p><i>“From a regulatory point of view, it is from the region that everything starts. It’s the law, but it’s not necessarily what we experience on a daily basis. For example, in terms of accessibility, when we look at carpooling areas, we still work at the departmental level, sometimes under the umbrella of the region, sometimes not. But I say there is not yet a very deep real cooperation with the region.” (Pub7)</i></p> <p><i>“We are often confronted with problems of territorial segmentation (the LOM law). So, we have the territory of the metropolis, territory of Cannes, etc. With the 4 territories, that’s almost 4 administrations to manage with 4 different trends.” (Pri11)</i></p>	<p>Changing regulations</p>	<p>Lack of ecosystem configuration to complex regulatory systems</p>	<p>Absence of ecosystem leadership strategy</p>

1.12.2 Secondary data analysis

For the different case studies, the analysis of secondary data was carried out as follows: data from documentation were first subjected to a pre-analysis phase. In the pre-analysis phase, the challenge was to choose the documents to be used, formulate hypotheses and objectives and then develop indicators on which the final interpretation was based. Secondly, I conducted a content analysis, following the recommendations of Bardin (2003). The content analysis made it possible to iteratively identify key units of analysis.

For both cases, Toyota and Nice, the formulation of the proposals were developed on an inductive logic where discovery has an exploratory status. In the inductive approach, the codes (or categories of units of analysis) emerge from the collected data. Thus, by analyzing the data collected in the case of Toyota and in the case of Nice, and on the basis of factors that could foster or hinder ecosystem emergence, two first works of literature were mobilized: ecosystems and business models. They were then enriched by literature on the ecosystem life cycle, ecosystem leadership strategy, and business model innovation (Figure 13).

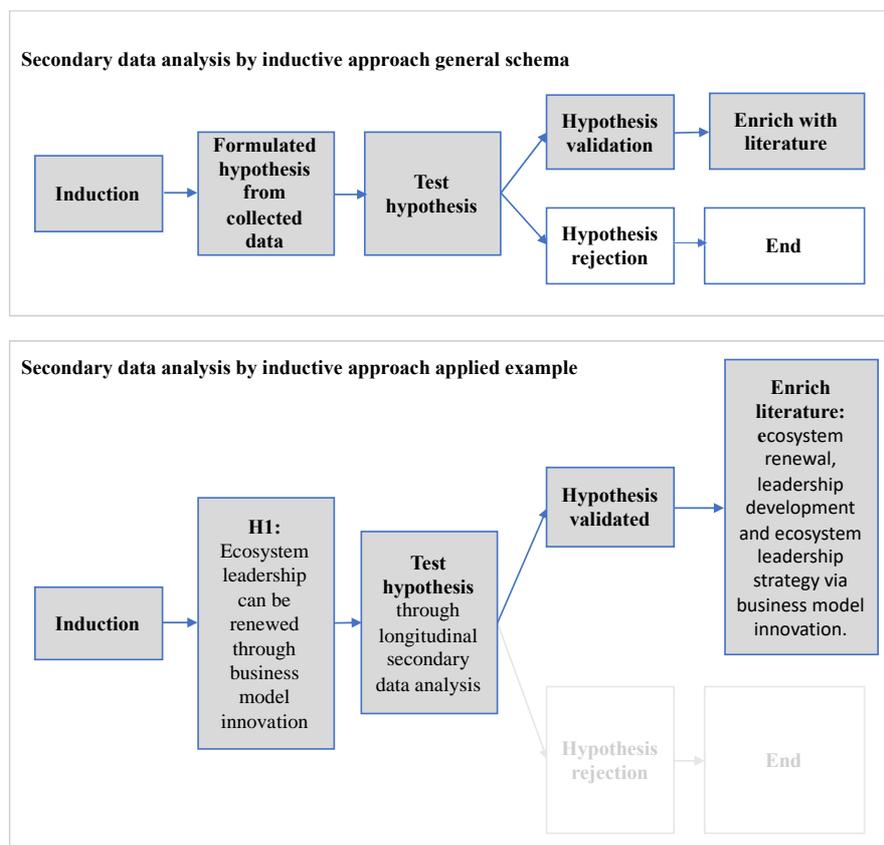
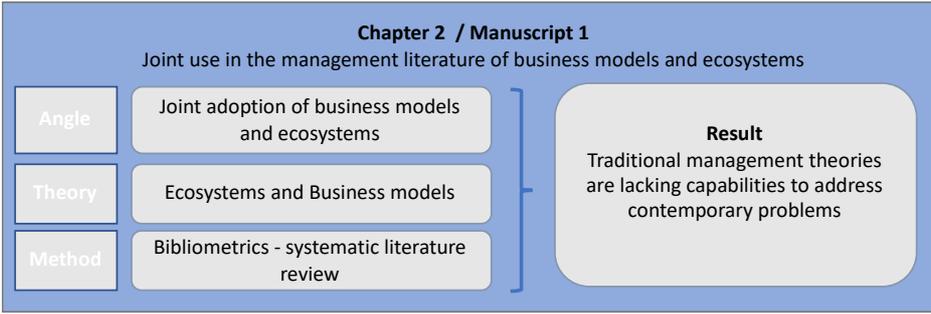
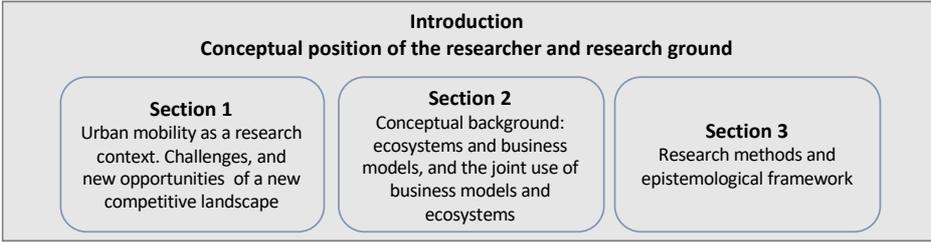


Figure 13: Secondary data analysis by inductive approach general schema, and applied example

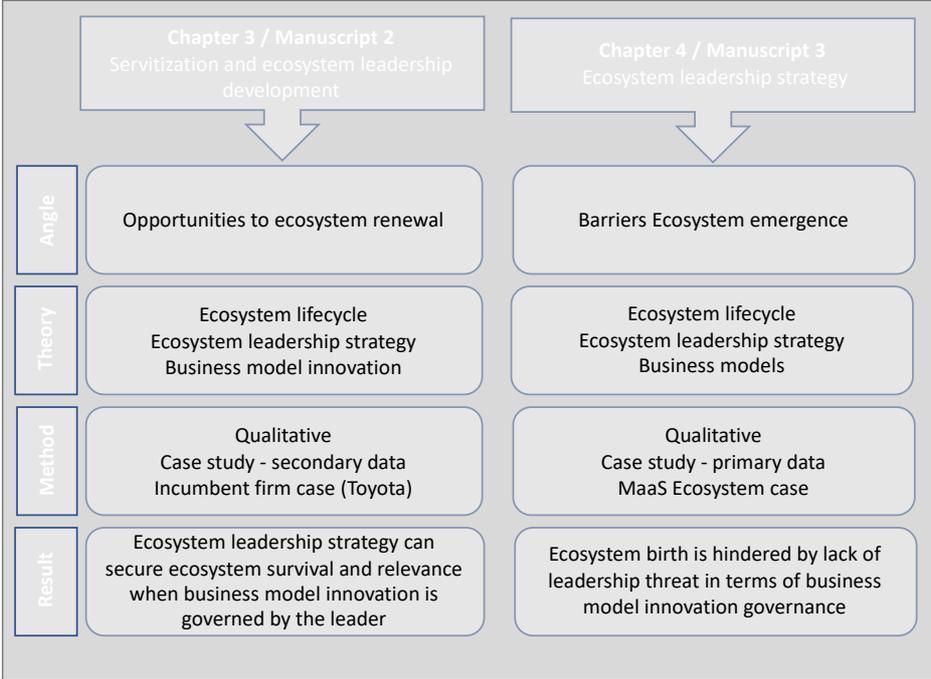
To conclude, the diversity of the sources mobilized within the framework of this research work makes it possible to triangulate the data (Quinn Patton, 2002) in the sense of Denzin (1978), that is to say, to take care to combine different methods and sources to study the same phenomenon. Data triangulation is important for any researcher implementing a qualitative method (Eisenhardt, 1989; Guba & Lincoln, 1994; Yin, 2013).

Chapter two: Joint use in the management literature of business models and ecosystems

General phenomenon
Members of urban mobility ecosystems are facing several challenges in terms of business model innovation and leadership development



Research question
How can leadership strategy and business model innovation foster or hinder new ecosystems?



Chapter 5
General conclusion and discussion
Leadership strategy at the ecosystem level could be defined as business model innovation governance by a leader. This role is well assumed when there is a leadership co-evolution risk. It is however less well performed on the contrary case. Thus, business model innovation governance raises the chances of ecosystem birth and survival.

Joint use in the management literature of business models and ecosystems

2.1 Motivation Extended Summary

This Manuscript is a co-authorship with Amel Attour

2.1.1 Motivation

More and more companies face fierce competition and disruptive changes that are forcing them out of their comfort zone. To face this competition, companies are becoming more creative when designing new business models, and they are creating new ecosystems. In practice, many times, these two activities overlap. Until very recently the literature addressing business models and ecosystems have evolved each in their separate and parallel ways. However, some scholars understood that, even though these concepts have their own merit, some contemporary phenomena can only be understood and explained when jointly adopting both concepts.

Encouraged by this new line of thought and motivated by a real-world context (mobility landscape), I decided to do a systematic literature review to investigate for what theoretical and managerial purposes scholars were utilizing both concepts. To the best of my knowledge, this is the first effort in that direction. While the literature has so far dealt with few emblematic cases, it seemed to me that such work would make it possible to better organize the scientific landscape.

2.1.2 Objectif

The objective of this Manuscript is to understand for what theoretical and managerial purposes scholars are adopting the joint application of ecosystems and business models in the management domain.

2.1.3 Implication for the doctoral thesis

This Manuscript is the cornerstone of the thesis. It gives us a first glimpse of the joint adoption of ecosystems and business models in the management domain. This work supports the idea that the joint adoption of business models and ecosystems is key to the unveiling, analyzing, and understanding of current phenomena, that could not have been unveiled by adopting only one of the two concepts. Furthermore, this study fills a gap in the literature, as

(to our knowledge) it is the first study to systematically analyze the joint adoption of business models and ecosystems in the management literature. Thus, this study is the solid foundation that I use to build up the structure of my thesis.

2.1.4 Valorization

2.1.4.1 *Conference*

- Foerster, Attour. 2021: “The convergence of business model and ecosystem concept in management literature” Conference DRUID Academy 2021

2.1.4.2 *Submissions*

- 03/2020 “The convergence of business model and ecosystem concept in management literature” submitted to Long Range Planning.
- 06/2020 Decision: Rejected after the evaluation of two reviewers
- 06/2022 “Joint use in the management literature of business models and ecosystems” submitted to Long Range Planning
- 06/2020 Decision: Desk rejected
- 07/2022 “Joint use in the management literature of business models and ecosystems” submitted to Technological Forecasting & Social Change
- 07/2020 Decision: Desk rejected
- 07/2022 “Joint use in the management literature of business models and ecosystems” submitted to the Scandinavian Journal of Management and currently under review

Manuscript one: Joint use in the management literature of business models and ecosystems

Abstract

The use of business models and ecosystems has increased in work on strategy, innovation, and entrepreneurship. Each new research strand has triggered literature reviews and essays synthesizing the respective developments of these two concepts. However, their joint use in management research requires further investigation. The present paper examines the complementarities between business models and ecosystems and investigates how and why they are exploited in management research. We conduct a systematic literature review and a hybrid methodology that combines descriptive, bibliometric, and content analysis of a sample of articles published in academic journals in different disciplines. Our findings demonstrate that while joint employment of the two concepts is increasing in the management literature there are wide differences in terms of the journals publishing the research, the theoretical lenses used, and the topics addressed. We identify different streams of research that use business models and ecosystems in tandem to study topics ranging from territory, public actors, the private sector, and new forms of ecosystem business models; the digital economy, sustainability, and business model innovation within emergent ecosystems; business model innovation and ecosystem dynamics; and ecosystem business models or business model ecosystems. We highlight the need for more theorizing around these concepts.

Keywords: Business models, ecosystems, systematic literature review, strategic management.

2.2 Introduction

Today firms operate in a complex and volatile environment. Firms need to balance the expectations of society, customers, and shareholders while maintaining competitive advantage and long-term sustainability. Global geopolitical and economic changes are putting increased pressure on firms to achieve better performance and results. New entrants are disrupting markets and threatening incumbent firms, and incumbent firms are having to make supreme efforts to match the speed and scale of disruptors in order to remain competitive. They are experiencing pressure to meet customers' expectations and to deliver outputs in a socially responsible manner. In addition, firms need to satisfy shareholders' demands and achieve predictable and consistent performance.

All of these conditions are raising questions about how firms can capture value in a context of “mega-convergence” of industries (Teece, 2018). Some theoretical foundations are lacking the capabilities to fully explain this complex setting and scholars are revisiting existing concepts, frameworks, and theories in a bid to adapt them to contemporary issues. Attention in the management literature has turned recently, to the notions of business models and ecosystems and their joint application to enable value creation, value delivery, and value capture which are activities that take place both inside and outside firm boundaries (Demil et al., 2018).

The business model idea emerged in the mid-1990s alongside the more widespread adoption of the internet which allowed firms to conduct business in new ways (Demil et al., 2018; Zott et al., 2011). The use of the internet combined with growing globalization increased firm competitiveness; the digital transformations taking place in today's economy are forcing firms to further change their business strategies and ways of doing business. In this context, the business model concept appeared as a very helpful tool as it integrated the various ways to deploy resources to create and capture value and introduce changes to firms' strategic management (Massa, Tucci, & Afuah, 2017).

The importance of research on these topics is evidenced by the number of literature reviews on business models. The more recent literature reviews are based on systematic bibliometric or scientometric analysis to explore trends in management (e.g. strategic management, innovation, entrepreneurship) to understand the current state of business model research and its theoretical foundations (Belussi et al., 2019; Maucuer & Renaud, 2019). Belussi et al.'s (2019) study reveal

that, in most articles, the business model application has both conceptual and empirical validity. Several authors point out that the term business model is confined mainly to the strategic management, innovation management, and entrepreneurship literatures, and offers a useful tool for practitioners (Foss & Saebi, 2018). These authors also try to forecast the future of the business model concept. For instance, Belussi et al. (2019) conduct a bibliographic coupling analysis (BCA) to examine emerging trends. Two of the most important topics identified by the authors are *Business models and open innovation* and *Business models and social innovation* which take account of the part played by external partners (e.g. other actors in the ecosystem) in business model innovations.

Tansley (1935, p. 306) used the term ecosystem to describe: “*a particular category among the physical systems that make up the universe. In an ecosystem, the organisms and the inorganic factors alike are components which are in relatively stable dynamic equilibrium*”. . Moore, (1993) draws a parallel with ecological systems and applies this notion to the business field. Several other scholars have proposed descriptions and developments of the ecosystem concept. Based on bibliometric analysis, Gomes et al. (2018) conducted a thorough examination of the development of the ecosystem concept in the fields of strategy and innovation. This study helped to consolidate the knowledge related to the ecosystem concept. Other authors have contributed by analysing the relationship between ecosystems and other theories, such as business models (Demil et al., 2018; Snihur et al., 2018; Teece, 2018b), entrepreneurship (Autio et al., 2018; Calmé et al., 2016; Neumeyer & Santos, 2018), and platforms (Gawer & Cusumano, 2014; Jacobides et al., 2018; Watanabe, Naveed, & Neittaanmäki, 2016).

We build on these works to examine the relationship between business models and ecosystems. We address the following research question: *why and how business models and ecosystem complementarities are jointly addressed in management research?* To address this question, we examine how business models and ecosystems might be complementary and used as units of analysis on the one hand and to suggest new avenues of research on the other hand. Our systematic literature review is aimed at revealing the relationship between business models and ecosystems in the field of management. We adopt a hybrid methodology combining descriptive, bibliometric, and content analysis, to examine a sample of articles on business models and ecosystems, published in academic journals in different fields. This paper contributes to the management literature in several ways. It

highlights the emergence of a new and recent research trend, which is the pursuit of understanding value capture in interdependent firms.

The paper is structured as follows. Section 2 describes sample selection and data analysis. Section 3 reports the main findings of the bibliometric and the content analysis. Section 4 concludes by suggesting future directions for research on business models and ecosystems and discussing some of the limitations and implications of this study.

2.3 Methods and data

This study consists of a systematic review of the management literature which focuses on the complementarities between business model and ecosystem theories. We systematically identify and synthesize research on this topic using a structured process. Bibliometric analysis involves a set of quantitative analytical conceptual tools used to quantitatively analyse academic literature (White & McCain, 1986). Bibliometric techniques include objective measures to allow assessment of scientific publications and minimize potential bias in subjective evaluation (Appio, Cesaroni, & Di Minin, 2014). Compared to other approaches, bibliometric analysis is more impartial and less influenced by theoretical and interpretative preconceptions.

Bibliometric studies are gaining relevance, considering the growing numbers of scientific publications and techniques available to quantify published articles (Ikpaahindi, 1985; Perianes-Rodriguez, Waltman, & van Eck, 2016). Bibliometric analysis can be used to identify the most important scientific papers and their interrelationships (Chai & Xiao, 2012). It allows the identification of the most relevant topics, approaches, methods, and definitions (Carvalho, Fleury, & Lopes, 2013). It is useful also, for proposing future research agendas. We employ bibliometric analysis to investigate the joint use of business models and ecosystems in strategic management and the reasons for their joint adoption.

This systematic review of work on joint use of the business model and ecosystem concepts includes (1) citation relation⁷, (2) keyword co-occurrence relations, and (3) content analysis.

⁷ In the case of citation relations, we distinguish among direct citation relations, co-citation relations and bibliographic coupling relations (Van Eck & Waltman, 2014). Direct citations occur when paper A directly cites paper B; co-citation occurs if papers A and B are both cited by paper C; bibliographic coupling occurs if papers A and B both cite paper C.

Bibliometric techniques are insufficiently detailed and provide only a macro view of how the literature has evolved; we augment the bibliometric analysis with a content analysis of the main articles identified.

2.3.1 Data collection and sample

Data collection involved several steps (Figure 14). The bibliometric dataset was extracted from Scopus, which is a source-neutral abstract and citations database, curated by independent experts. It is also one of the largest indexed journal databases. Scopus provides metadata such as abstracts, references, numbers of citations, lists of authors, and several different metrics including CiteScore, all essential for bibliometric analysis.

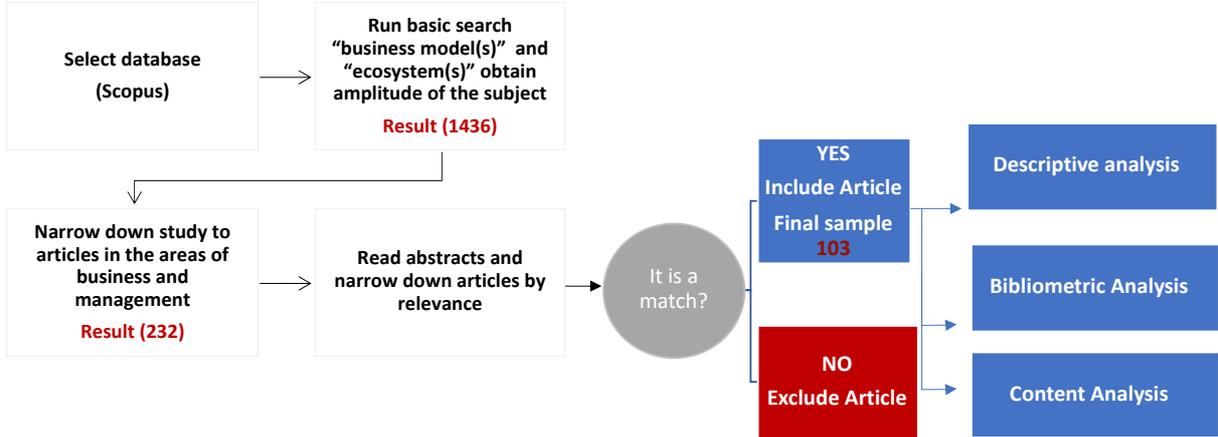


Figure 14: Multi-step systematic review

The sample was identified by searching the titles, abstracts, and keywords of articles in Scopus, using the terms “business model(s)” and “ecosystem(s)”. The initial search resulted in 1,436 documents. We reduced these to 232 articles by retaining the subject areas of business, management, and accounting, and documents described as "articles" and published in English. We read all the abstracts to ensure that they focused on the complementarities between business models and ecosystems. This step reduced the number of articles to 103. Although some of the excluded articles include the ecosystem(s) and business model(s), they did not address their complementarities. The final sample of 103 articles was published in 58 journals between the years 2007 and 2020.

2.3.2 Bibliometric analysis

We employed a similar bibliometric analysis process to Gomes et al. (2018). For the quantitative analysis, we were assisted by the bibliometric analysis tools for descriptive statistics available in Scopus. For the citation network analysis, we used VOSviewer 1.6.15. We identified the number of articles published by a particular journal each year; we identified the most frequent journals and how the publications on the complementarities between ecosystem and business model have evolved. We also classified the articles according to research method and research domain and produced a list of the most cited articles. Highly cited articles can be considered influential in the research field. The most cited articles and the references cited by them were employed to construct the citation networks: keywords, bibliographic coupling, and co-citation.

The keyword network considered the period 2007 to 2020. To identify the rise and decline of certain themes, we examined keywords occurring in the following intervals: 2007–2010; 2011–2015; and 2016–2020. We then embarked on our bibliographic analysis – bibliographic coupling and co-citations analysis. Bibliographic coupling occurs when documents cite the same publications hence, the relatedness of the items is determined based on the number of common references. Bibliographic coupling is particularly important to study subject areas characterized by dynamic and rapidly evolving publication activity. Finally, we conducted the co-citations analysis. Co-citation occurs when two publications are cited by a third publication that is, both are included in the third paper's reference list (Chen, 2006). This allowed us to identify similarities among articles. Articles that cite the same references tend to indicate common research interests. Since these references might be included in books or conference papers, which may not be indexed in Scopus, we incorporated them into the analysis.

2.3.3 Content analysis

Content analysis is the qualitative analytical method used to analyse data and interpret its meaning (Schreier, 2012). It provides a systematic and objective way to describe and quantify phenomena (Schreier, 2012). In line with the recommendation in Elo et al. (2014), we employed an inductive method that involves three main phases: preparation, organization, and reporting of results. Preparation consisted of selecting our sample of 103 articles and the business model and ecosystem as our joint unit of analysis. We read all the articles and organized their content into categories and abstractions. This organization phase involved several rounds of discussion

to decide on our four main themes: (i) strategic management research on building an ecosystem approach to business model thinking, (ii) using a business model framework to understand the entrepreneur’s role, (iii) a marketing approach to business model thinking at the ecosystem level, and (iv) business model innovation within a sustainable and circular ecosystem - the industry ecology alignment approach. Reporting of our results consisted of describing the contents of each category (see section 3.1).

Using content analysis to study written material and address open-ended questions (Elo et al., 2014) allows us to study the joint use of business models and ecosystems in the strategic management literature.

2.4 Results: business models and ecosystems - the development of the literature

In this section, we present and discuss the results of the descriptive, bibliometric, and content analyses.

2.4.1 Descriptive analysis

The descriptive analysis shows that 62% of publications are concentrated in the top 20 journals. It shows also that the top 10 most cited journals (CiteScore 2019) published 38% of our sample papers. *Technological Forecasting and Social Change* and *Journal of Cleaner Production* are the journals that published the most papers on this topic. The number of articles that analyse business models and ecosystems jointly has increased in the last decade. Table 7 presents the number of publications per year and each journal’s CiteScore (2019)⁸.

CiteScore is an impact index based on Scopus data. It measures the yearly average number of citations to published journal articles. It considers a three-year citation window to calculate the average citations per document that a title receives. It is calculated as follows:

$$\text{Equation 1. } CS_y = \frac{Citations_y + Citations_{y-1} + Citations_{y-2} + Citations_{y-3}}{Publications_y + Publications_{y-1} + Publications_{y-2} + Publications_{y-3}}$$

⁸ CiteScore™ 2019. Calculated by Scopus on May 2020.

Table 7: Evolution of the number of publications over the years and citescore (2019)

Journals	Publication year														CiteScore (2019)	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		Total
<i>Technological Forecasting and Social Change</i>							1			1		4	2		8	8,7
<i>Journal of Cleaner Production</i>					1				1	1		2		2	7	10,9
<i>Journal of Business Research</i>													4		4	8,9
<i>Business Strategy and the Environment</i>												1	2	1	4	8,4
<i>Revue Francaise de Gestion</i>				1					1	2					4	0,6
<i>Research Policy</i>		1										2			3	10,4
<i>Industrial Marketing Management</i>								1						2	3	9,1
<i>R and D Management</i>					1		1			1					3	6
<i>IEEE Transactions on Engineering Management</i>													3		3	3,9
<i>Journal of Business and Industrial Marketing</i>												2	1		3	3,5
<i>Journal of Theoretical and Applied Electronic Commerce Research</i>				3											3	3,4
<i>Thunderbird International Business Review</i>												1		2	3	3,1
<i>Research Technology Management</i>			1						1	1					3	2,4
<i>International Journal of Technology Management</i>							1				2				3	1,9
<i>International Journal of Production Economics</i>										1			1	2	10,5	
<i>Journal of Management Studies</i>												1	1		2	9,4
<i>Technology in Society</i>										1			1		2	3,4
<i>International Journal of Automotive Technology and Management</i>							1				1				2	1,3
<i>International Journal of Business and Globalisation</i>									1			1			2	1
<i>Other journals with 1 publication each</i>	1	1		1	1	4	4	2	2	3	6	5	5	4	39	
Grand Total	1	2	1	1	5	6	5	7	6	9	10	20	19	12	103	

We conducted complementary research to identify the top journals publishing work focused on either business model or ecosystem. In the latter case, we based our assessment on (Gomes et al. (2018) which because it is relatively recent was deemed acceptable. They identified the top publisher as the *International Journal of Technology Management* with 5.6% of publications but work on this topic was highly dispersed. In the case of business models, we conducted our own analysis (see appendix 1). We found *Long Range Planning* was the top publisher accounting for 32% of total publications. In this case, the literature is less dispersed and more concentrated in a specific community.

Table 8 presents the trend in publications classified by management domain and methodological approach during the periods 2007-2010, 2011-2015, 2016-2020. Most of the

articles are qualitative, supporting the notion that business models and ecosystems require more exploration and consolidation.

In all three periods, case studies predominate although the number of theoretical-conceptual papers and literature reviews increased greatly in the last period (2016-2020). There are fewer quantitative studies although these also increased in the last period which might be an indication of efforts to consolidate research in these areas and produce more generalizable results.

Innovation and strategy are the dominant research disciplines in every; however, in the last period work on entrepreneurship and sustainability has increased.

Table 8: Publication trends by management domain and methodological approach

	Periods			Total
	2007 2010	2011 2015	2016 2020	
Domain				
Entrepreneurship	0	0	8	8
Innovation	4	14	29	47
Strategy	1	12	24	37
Sustainability	0	2	9	11
Total	5	28	70	103
Qualitative methods	5	27	60	92
Case Study	3	22	29	54
Theoretical-conceptual	2	4	21	27
Fuzzy set theory	0	0	1	1
Literature review	0	1	9	10
Quantitative methods	0	1	10	11
Total	5	28	70	103

Table 9 presents the list of the 20 most cited articles - cited at least 40 times. It also presents the percentage of citations in total citations in the sample and field-weighted citations. Field-weighted citation impact (FWCI) is the ratio of total citations received by the paper (the denominator), and total expected citations based on the average in the field. FWCI is calculated as:

$$\text{Equation 2. } FWCI_i = \frac{C_i}{e_i}$$

where c_i is the citations received by publication i in the publication year plus the succeeding 3 years, and e_i is the expected number of citations per publication in the same time period by similar publications (Purkayastha, Palmaro, Falk-Krzesinski, & Baas, 2019). A value greater than 1.00 means the document is more cited more frequently than expected. Therefore,

based on the FWCI an article's citation ranking can change. In our sample, all articles have very high FWCI.

The analysis shows that with the exceptions of Chesbrough and Appleyard (2007) and Garnsey, Lorenzoni, and Ferriani (2008) all the articles (18) articles were published after 2010. This indicates that scholarly interest in the complementarities between business models and ecosystems although recent is increasing.

Table 9: The 20 most cited articles in the sample with more than 40 citations

Authors	Year	Source title	Cited by	Citations %	Field-Weighted Citation
Chesbrough and Appleyard	2007	<i>California Management Review</i>	570	19%	12,5
Adner	2017	<i>Journal of Management</i>	303	10%	22,55
Zott and Amit	2013	<i>Strategic Organization</i>	145	5%	7,62
Autio et al.	2018	<i>Strategic Entrepreneurship Journal</i>	133	4%	25,57
Sánchez and Ricart	2010	<i>European Management Review</i>	126	4%	2,1
Priem, Butler, and Li	2013	<i>Academy of Management Review</i>	97	3%	6,97
Carayannis et al.	2015	<i>Journal of Technology Transfer</i>	94	3%	10,42
Lee and Shin	2018	<i>Business Horizons</i>	86	3%	15,24
Teece	2018	<i>Research Policy</i>	84	3%	15,21
Van der Borgh et al.	2012	<i>R and D Management</i>	81	3%	2,88
Helfat and Raubitschek	2018	<i>Research Policy</i>	64	2%	11,69
Gomes et al.	2018	<i>Technological Forecasting and Social Change</i>	62	2%	13,11
Wei et al.	2014	<i>R and D Management</i>	61	2%	3,89
Roundy et al.	2017	<i>Journal of Business Venturing Insights</i>	60	2%	8,89
Garnsey et al.	2008	<i>Research Policy</i>	57	2%	1,61
Tsvetkova and Gustafsson	2012	<i>Journal of Cleaner Production</i>	51	2%	2,21
Müller et al. Martens	2011	<i>Journal of Theoretical and Applied Electronic Commerce Research</i>	45	2%	3,78
Neumeyer and Santos	2018	<i>Journal of Cleaner Production</i>	44	1%	5,1
Watanabe et al.	2016	<i>Technology in Society</i>	41	1%	4,99
Hellström et al.	2015	<i>Journal of Cleaner Production</i>	40	1%	2,14

Figure 15 depicts how citations have evolved over time. Based on the 2,971 citations in the total sample, 76% are among the top 20 most cited papers. Most articles were published since 2010 with 2018 showing the highest concentration, 6 papers.

Chesbrough and Appleyard (2007) is both the most cited and the earliest article. Citations have remained fairly stable. The authors discuss the importance of rethinking traditional business strategies which motivate firms to fight competition in the value chain. The proposed adoption of an open strategy which involves achieving a balance between open innovation and new business model forms. Next is Adner (2017) which although published more recently has been frequently cited. Adner (2017) proposes a structuralist approach to conceptualize the ecosystem concept and provides a close examination of the relationship between ecosystems and alternative constructs such as the business model. Zott and Amit (2013) adopt a similar approach but assume a business model perspective. They review several bodies of literature that are adjacent to the business model literature to distinguish the business model idea from other similar concepts.

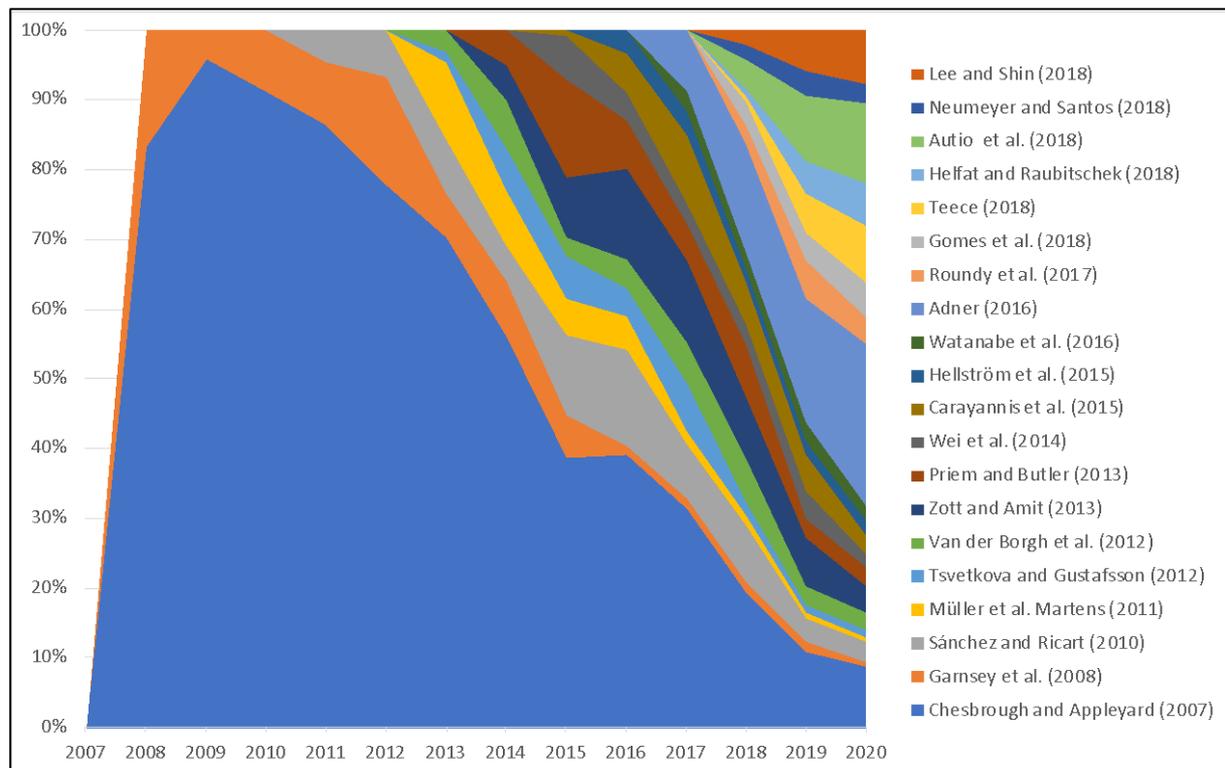


Figure 15: Evolution of the citation's distribution of the 20 most-cites articles over the years

Three articles - Teece (2018), Autio, Nambisan, Thomas, and Wright (2018), and Lee and Shin (2018) stand out in terms of citation counts which have doubled each year. Teece (2018) argues that the firm's boundaries in the digital economy have become more blurred but that dynamic capabilities enable the firm to create and capture value through the construction of an appropriate ecosystem and design of an appropriate business model. Helfat and Raubitschek (2018) build on Teece (2018) and provide a theoretical analysis which explains

how dynamic capabilities underpin value creation and capture by platform leaders. Autio et al. (2018) address the particularities of entrepreneurial ecosystems, one of which is an emphasis on business model innovation. Similar to Autio et al. (2018), Roundy, Brockman, and Bradshaw (2017) also focus on entrepreneurial ecosystems. They theorize about entrepreneurial ecosystem resilience and argue that entrepreneurial ecosystems differ in their diversity of participants, ventures, business models, and support organizations. Another paper with an entrepreneurial ecosystem focus is the article by Neumeier and Santos (2018) which analyzes the influence of organizational-level and individual-level factors that influence the social network connectivity of ventures based on sustainable and conventional business models.

Lee and Shin (2018) focus on a particular ecosystem – fintech. The authors discuss the various fintech business models and the impact of fintech on the financial industry. Van der Borgh, Cloudt, and Romme's (2012) interest is in knowledge-based ecosystems. Based on a field study, the authors identify what makes technology-based firms join, remain part of, or leave an ecosystem.

Priem, Butler, and Li (2013) propose an expanded boundary model which includes the demand side, business models, and business ecosystems. Their aim is to extend the scope of strategy research from being firm-centric to encompass different stakeholders in the value capture and value creation process. Similarly, Carayannis, Sindakis, and Walter (2015) focus on the role of different stakeholders predominantly customers and partners to explore the effects of business model innovation on organizational sustainability in particular.

Several articles use case studies. Garnsey et al. (2008) explore an innovative information technology firm and propose the notion of techno-organizational speciation to address how technologies branch and advance. Tsvetkova and Gustafsson (2012) show how a modular approach affects the business model in firms based on industrial ecosystem thinking. In the context of the mobile ecosystem, Müller, Kijl, and Martens (2011) analyze different business models to explore competition among app stores for smart mobile devices. Sánchez and Ricart (2010) adopt a multiple case study method to compare isolated and interactive business models in low-income markets. They conclude that interactive business models (i.e. models that co-evolve with the ecosystem) enhance the socio-economic context, allow value creation, and become the source of more sustainable competitive advantage compared to only

a business model. Hellström, Tsvetkova, Gustafsson, and Wikström (2015) use a business model lens to study collaboration among companies in the energy business ecosystem.

Watanabe, Naveed, and Neittaanmäki (2016) perform an empirical study using the case of Uber to analyze and explain the revolutionary nature of a disruptive business model. Wei, Yang, Sun, and Gu (2014) build a theoretical model based on technological innovation, business ecosystem theory, and the business model literature to investigate how technological innovation fits the business model design to affect firm growth. Finally, Gomes, Facin, Salerno, and Ikenami (2018) provide a systematic literature review to clarify the concept of innovation ecosystems. They conclude their review by proposing the merging among various research streams including innovation ecosystem leadership strategy, strategic management, value creation, and business models to consolidate the notion of innovation ecosystems. This work questions how firms create value in an innovation ecosystem context.

2.4.2 Bibliometric analysis

In the following sections, we introduce and discuss the main findings from our bibliometric analysis conducted to examine *why and how the complementarities between business models and ecosystems are addressed jointly in management research*. The analysis included keywords and keyword evolution (keyword network and the ten most-cited keywords by time period), theoretical foundations (co-citation network), and research trends (bibliographic coupling).

2.4.2.1 Keyword analysis and keyword evolution

The keyword analysis (Figure 16) identifies concepts discussed in papers that examine the complementarities between business models and ecosystems. Co-occurring keywords are linked, and the strength of the ties between keywords represents the intensity of the relationship. The ten most frequent terms are business model(s), ecosystem(s), innovation, business ecosystems, ecology, sustainable development, business development, sustainability, business model innovation, and case study. All ten terms are associated in the management literature with ecosystems and business models. As expected, the concepts of business model and ecosystem are closely linked. Their connections to other keywords show some overlaps and variations. While the term ecosystem is strongly connected to business ecosystems, innovation, business model innovation, and sustainable development, business model is more strongly

Table 10: The 10 most cited keywords by time period

Time period					
2007 - 2010		2011 - 2015		2016 - 2020	
Keyword	Centrality	Keywords	Centrality	Keyword	Centrality
Business models	0.01	Business models	0.38	Business models	0.40
Business ecosystem	0.00	Innovation	0.35	Business ecosystems	0.39
Co-development	0.00	Ecosystems	0.31	Ecosystems	0.35
Commercialization of technology	0.00	Business model innovation	0.26	Innovation	0.29
Ecosystems	0.00	Innovation management	0.15	Sustainability	0.14
Industrial development	0.00	Network effect	0.11	Sustainable development	0.14
Innovation	0.00	Sustainable development	0.09	Business model innovation	0.12
International strategy	0.00	Business ecosystem	0.04	Collaboration	0.10
Networking	0.00	Resource-based view	0.00	Platform	0.08
Technological Innovation	0.00	Value creation	0.00	Circular economy	0.06

2.4.2.2 Identifying theoretical trends and foundations

We then conducted a BCA. Bibliographic coupling occurs when two documents cite the same publication. The more two documents cite the same references, the higher their coupling index and the closer they are. This would suggest that the more they cite the same literature, the more likely the focus is on the same research theme. Since the references cited in a given document cannot change, BCA is static, in other words, it does not change over time. Since documents that include the citations are logically more recent than the documents they cite, BCA is appropriate to detect current trends and future priorities (Vogel & Güttel, 2013). Bibliographic coupling is particularly useful in subject areas such as business models and ecosystems characterized by dynamic and evolving publication activity.

The BCA involved identifying papers included in the Scopus bibliographic database. Since we were interested in identifying the most recent trends in the literature, we selected papers published between 2016 and 2020 which correspond to the last period used for the whole study. We considered a minimum of seven citations to an article as qualifying for inclusion in this network.

We identified six groups. Each group addresses an area of research interest related to the complementarities between business models and ecosystems. We organized them into the following themes (see Figure 17):

- The role of territorial ecosystems:* This involves investigating the effects (positive or negative) of territorial ecosystems on sustainable business models in different industries such as waste management (Peltola, Aarikka-Stenroos, Viana, & Mäkinen, 2016; Zucchella & Previtalli, 2019), manufacturing (Radziwon & Bogers, 2019; Radziwon, Bogers, & Bilberg, 2017); mobility (Ma, Rong, Mangalagiu, Thornton, & Zhu, 2018); and food and agriculture (Brennan & Tennant, 2018; Swaffield, Corry, Opdam, McWilliam, & Primdahl, 2019; Zucchella & Previtalli, 2019). These studies focus on ecosystem members' roles, and how central ecosystem members are able to shape the value capture and creation potential of the whole system (Peltola et al., 2016). They also highlight the important role of focal firms as orchestrators of ecosystem business models (Zucchella & Previtalli, 2019). Specifically, they consider public sector leadership or regulation of certain ecosystems (e.g. mobility, agriculture, waste) (Ma et al., 2018; Peltola et al., 2016; Zucchella & Previtalli, 2019) which they suggest is detrimental to ecosystem functioning and success. They find that value creation in ecosystems is feasible but that value capture is generally a firm issue (Peltola et al., 2016) although in a platform context (Isabelle Calmé, Onnée, & Zoukhoua, 2016) value capture is more distributed. Thus, the authors that contribute to this group of studies focus on the joint adoption of business models and ecosystems to demonstrate the influence and responsibilities of ecosystem members in the design of sustainable business models within territorial ecosystems.
- Innovation strategy / digital innovation: new challenges for strategic management and information systems research:* The authors that contribute to this group are interested in the phenomenon of change. They note that industry convergence driven by digital disruption requires a shift from firm-level innovation to ecosystem-level innovation (Adner, 2017). Teece (2018, p. 1367) describes it as: "The value-capture problem for innovators in the digital economy involves some different challenges from those in the industrial economy. It inevitably requires understanding the dynamics of platforms and ecosystems". The scholars involved in these studies investigate the challenges related to value capture in emergent ecosystems such as big data (L D W Thomas & Leiponen, 2016), semiconductor industry (Sarma & Sun, 2017), and new

energy markets (Lynch, Power, Hickey, & Messrevey, 2017). The novelty of this research area requires systematic literature reviews (Gomes et al., 2018; Takey & Carvalho, 2016; L D W Thomas & Leiponen, 2016). The findings from these studies suggest that digital convergence and multi-level ecosystems are creating complex strategic decision environments which are generating unique, emergent, and rare ecosystem-level problems, such as the design of business models (Helfat & Raubitschek, 2018; Lynch et al., 2017; Sarma & Sun, 2017; Teece, 2018b; L D W Thomas & Leiponen, 2016).

- *The internet of things and Industry 4.0*: This group of studies focuses on Industry 4.0's catalyzing effect on ecosystem emergence and business model disruption (Leminen, Rajahonka, & Westerlund, 2017; Leminen, Rajahonka, Westerlund, & Wendelin, 2018; Snihur & Tarzijan, 2018; Watanabe et al., 2016). Some authors take the business model as the unit of analysis and ecosystems as the context (Hakanen & Rajala, 2018; Snihur et al., 2018; Watanabe et al., 2016), and vice versa (Leminen et al., 2017). However, all conclude that business models and ecosystems are part of an intertwined and co-evolving relationship in which a change to one triggers a change in the other and a subsequent evolution. Similar to the previous cluster, the motivation for this research is understanding change. However, the studies in this group are concerned not with innovation but with competition and strategy. They use the concepts of business model and ecosystem to show that the contemporary context requires an ecosystem rather than a firm-level strategy.
- *Emergence of an entrepreneurial ecosystem*: the authors in this group exploit the notions of business model and ecosystem to explain ecosystem emergence (Autio et al., 2018; Neumeier & Santos, 2018; Roundy et al., 2017) or ecosystem transformation (Goyal, Esposito, & Kapoor, 2018; V Parida et al., 2019; Shaw & Allen, 2018). Some studies focus on business models as leading to ecosystem redesign (Goyal et al., 2018; V Parida et al., 2019; Roundy et al., 2017; Shaw & Allen, 2018). Others argue that emergent ecosystems allow horizontal sharing and dissemination of experience from experimentation with business models (Autio et al., 2018). There is a focus on sustainable business models (Neumeier & Santos, 2018; Shaw & Allen, 2018), entrepreneurial ecosystems (Autio et al., 2018; Neumeier & Santos, 2018; Roundy et al., 2017),

and the circular economy (Goyal et al., 2018; V Parida et al., 2019). All of this work suggests that the key to successful creation of a new ecosystem is business model conception (or innovation) at the ecosystem level.

- *Business model innovation in a new era*: the increasing significance of business model innovation in a connected economy is the motivation for the studies in this group (Demil et al., 2018; Lüftenegger, Comuzzi, & Grefen, 2017; Viswanadham, 2018; Wei, Song, & Wang, 2017; Weking, Stöcker, Kowalkiewicz, Böhm, & Kremer, 2020). The transition to industry 4.0 is crucial for manufacturing firms' sustained competitive advantage and exploitation of new opportunities and requires business model innovation (Nieuwenhuis, Ehrenhard, & Prause, 2018; Wei et al., 2017; Weking et al., 2020). The problems involved in this transition are the motivation for Wei et al.'s (2017) investigation of internal manufacturing flexibility. They find that ecosystems in a contemporary context are important moderators of the effect of manufacturing flexibility on business model design. Similarly, Demil et al. (2018) argue that business models are conceived as ecosystem actors, and thus business models are related to the relevant competitive landscape. Some of the work in this group is practitioner-oriented; Lüftenegger et al. (2017) propose a management strategy to enable formulation and communication of service-dominant logic while Viswanadham (2018) identifies eight ecosystem business model components to help managers capture the value from their firms' products/services.

Servitization: the work included in this group studies business models and ecosystems jointly to understand the impact of a particular type of business model innovation known as servitization. Servitization is the process used by manufacturing firms to introduce services into their traditional business models (T. Baines et al., 2017). However, because servitization is an ecosystem activity that involves not just the servitizing firm but all the actors in the firm's ecosystem, servitization is a complex and risky strategy (Bustinza, Lafuente, Rabetino, Vaillant, & Vendrell-Herrero, 2019; Jamie et al., 2016; Kohtamäki, Parida, Oghazi, Gebauer, & Baines, 2019; V Parida & Wincent, 2019). The risks include tensions which are especially prominent in servitization since the process of moving from products to services necessarily involves not just the manufacturer but its entire value chain (Jamie et al., 2016). It also involves a new business model configuration and new service capabilities which can be difficult for the

firm to achieve on its own. Most firms need to rely on ecosystem partners to deliver their servitization model (Bustinza, Lafuente, et al., 2019; V Parida & Wincent, 2019). Some studies suggest new research directions, for example, Parida and Wincent (2019) suggest investigating how servitization is providing opportunities for sustainability through ecosystem-level transformation, and Kohtamäki et al. (2019) call research on digital servitization business models within ecosystems.

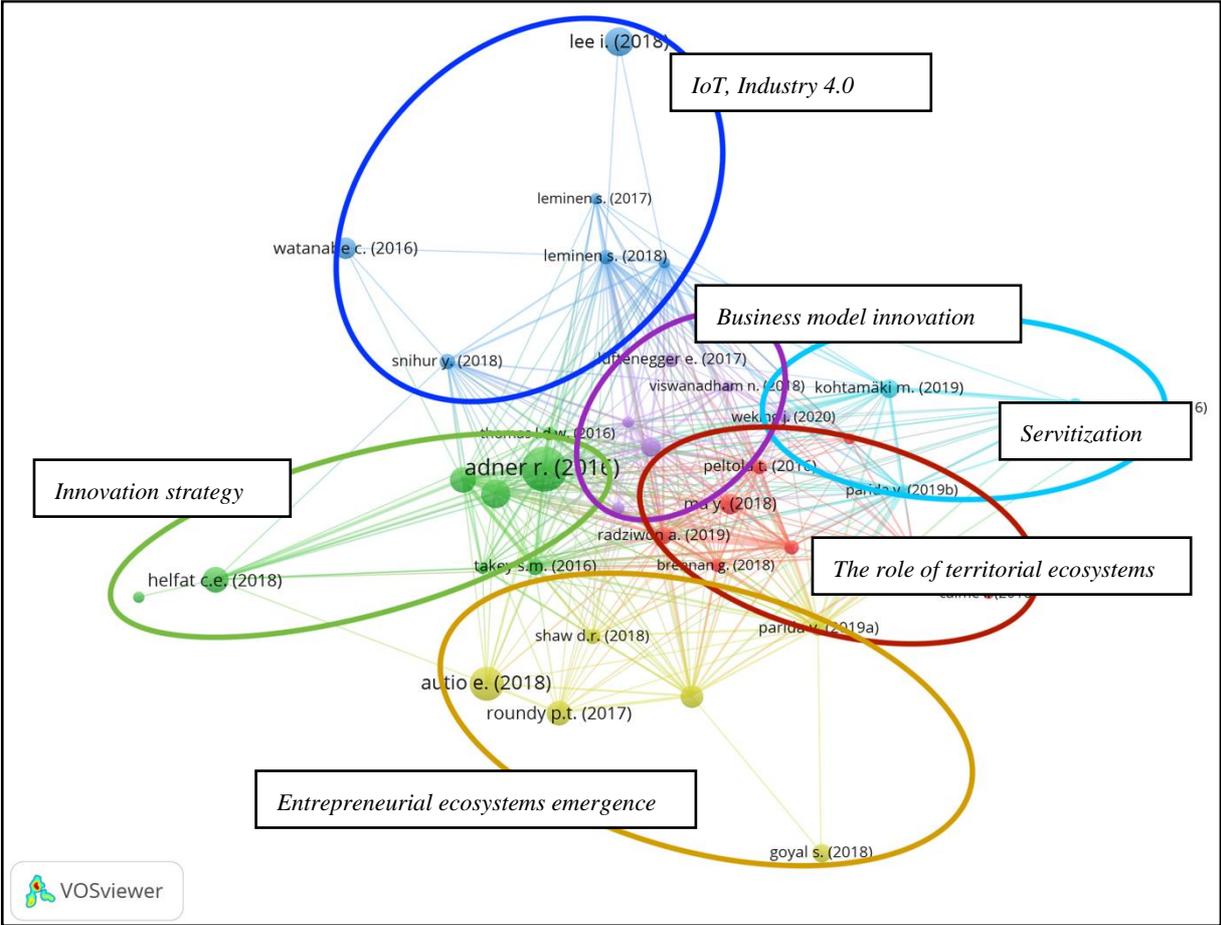


Figure 17: Bibliographic network analysis

Figure 18 depicts our co-citation analysis (CCA). Co-citation occurs when two publications are cited by a third paper that is, both citations are included in that paper’s reference list (Chen, 2006). Co-citation analysis identifies similarities among articles. To obtain a minimum citation count, we ran several different tests and chose a minimum of three citations for the paper’s inclusion in the co-citations network. Citing the same literature indicates a shared interest and suggests that the cited works are the most relevant to that particular field and add to our understanding of key concepts, methods, and the current state of the art in the

focal discipline. Co-citation is often related to key concepts, methods, and theoretical frameworks used to map the relationships between certain ideas.

The co-citation analysis includes 41 articles, most not included in our initial sample. With the exception of Westerlund, Leminen, and Rajahonka (2014), none of these articles focus explicitly on the complementarities between business models and ecosystems. This is because until recently these ideas have been addressed by two different streams of work, and scholars interested in their complementarities would likely base their research on the most relevant articles on one or other of these concepts. We observe that authors exploring the complementarities between business models and ecosystems (Adner, 2017; Demil et al., 2018; Hakanen & Rajala, 2018; Neumeier & Santos, 2018; Peltola et al., 2016; Snihur et al., 2018; Takey & Carvalho, 2016; Teece, 2018b; J West & Bogers, 2017) refer to the traditional innovation and strategic management literature (Adner & Kapoor, 2010; Chesbrough & Rosenbloom, 2002; Chesbrough, 2007) and work on business models (e.g., Zott & Amit, 2007, 2010), ecosystems (e.g., Iansiti & Levien, 2004; Moore, 1993) and servitization (e.g., Oliva & Kallenberg, 2003; Tukker, 2004; Ulaga & Eggert, 2006; Vandermerwe & Rada, 1988) to build their theory. Finally, the co-citation analysis provides evidence that research on business models and ecosystems is located mostly in the strategic management literature. Figure 5 depicts the four main themes highlighted by the co-citation analysis - business models, business model innovation, ecosystems, and inter-firm business models.

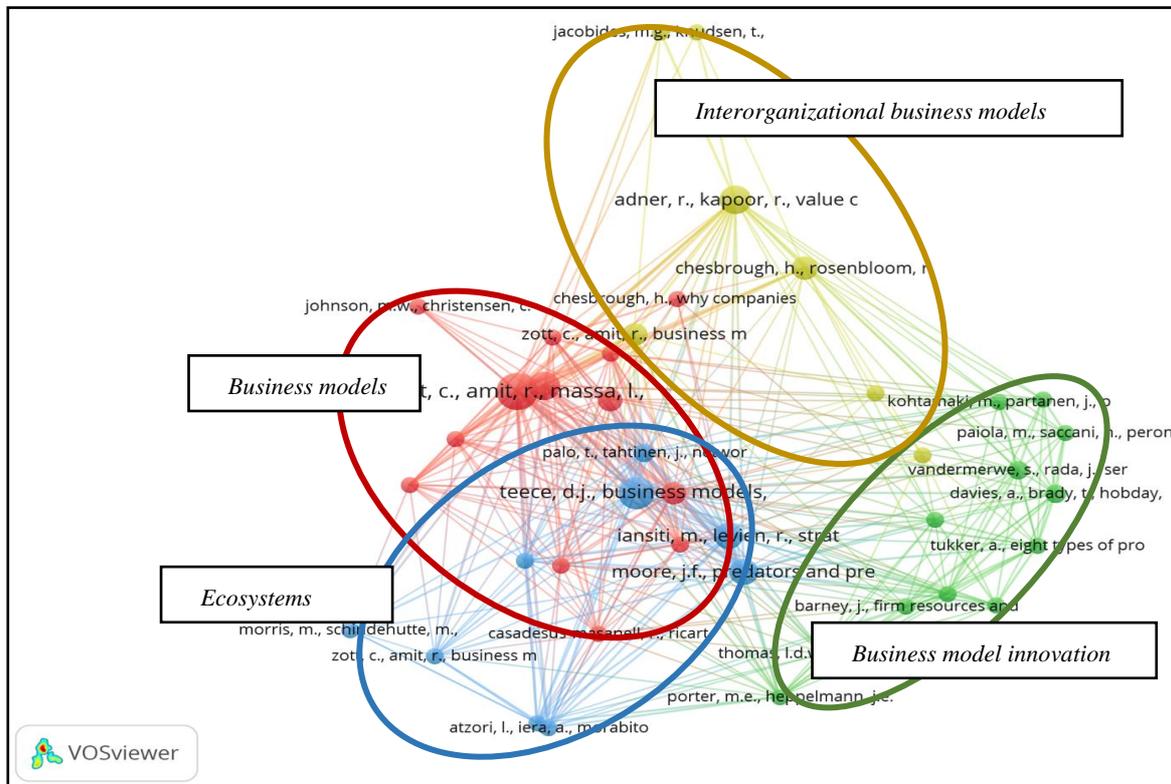


Figure 18: Co-citation network analysis

2.4.3 Content analysis

In this section, we present and discuss the content analysis. We find that most papers are aimed at a better understanding of (i) the shift from firm-level to ecosystem-level business model thinking, and/or (ii) business model innovation at the ecosystem level. By analyzing the joint study of business models and ecosystems in the management literature, we identified that in the early strategic management literature ecosystems were seen as providing opportunities and means to shape business models and the competition. Chesbrough and Appleyard (2007) and Teece (2007) are pioneering works on this topic. More generally, the importance of context has been acknowledged by several management research fields (organization theory, strategy, entrepreneurship, and marketing) (Muegge & Mezen, 2017). It has emerged as central to business model innovation due to digitalization, servitization, and the notion of circular economy (V Parida & Wincent, 2019) all of which stress the need for a re-thinking of the business model and ecosystem concepts and a new perspective on value creation and value capture.

Work in this area has built on a range of theories from management and non-management fields. In the case of management areas, our content analysis identified three streams of work in strategic management, innovation and entrepreneurship, and marketing. Strategic management literature includes studies that include the ecosystem level in business model thinking and contributes progressively to new strategic management theory. The innovation and entrepreneurship literature includes work that tries to clarify what is meant by an entrepreneurial ecosystem and how it affects business model innovation. Work in the marketing field on business models and ecosystems is more recent and tends to focus on how marketing research could benefit from and contribute to strategic management and ecosystems. While the strategic management literature is interested in theory building, the other two streams of work are focused more on how business model innovation occurs in an ecosystem context. Amongst the non-management literature, we identified a stream of work in industry ecology in which the growing interest in business model and business model innovation issues is motivated by the emergence of new types of ecosystems such as sustainable ecosystems and circular ecosystems.

2.4.3.1 Strategic management research and an ecosystem approach to business model thinking

In the current economy, the locus of value creation has changed from the focal firm's technological innovations to the whole ecosystem (Wei et al., 2014). In this context, research in the field of strategic management exploits ecosystems as a useful approach to describe the business models at the multi-system level. However, this work lacks the theoretical foundations to explain why, when, and how firms benefit from ecosystems (Cha, 2020). In an attempt to fill these gaps Cha (2020) has suggested that ecosystem theory could consider the extensive literature on complex adaptive systems, dynamic capabilities, and organizational learning (especially in relation to ambidexterity) as possible theoretical building blocks. Several authors engaged in research on strategic management have tried to follow this suggestion by stressing the role of dynamic capabilities and concepts such as legitimacy, disruptor gambit, agility, etc. Others have made efforts to qualify the types of institutional contexts that can be considered ecosystems, and their co-evolution with business models.

2.4.3.1.1 The role of dynamic capabilities within ecosystems

Leading authors in strategic management have extended traditional strategic management theory to include ecosystems in their frameworks. For example, Teece (2018) adapted his 1986 profiting from innovation (PFI) framework by including ecosystems as an additional component that better represents the new complex firm environment. He argues that dynamic capabilities can enable firms to create and capture value by building ecosystems and designing appropriate business models (Helfat & Raubitschek, 2018). In line with Teece (2018), Helfat and Raubitschek (2018) show that platform owners which are leaders in their markets, react to both ongoing opportunities and competitive pressures which promotes innovation via a product sequencing process. This environment can be described as coopetitive. In a platform leadership and value capture context, Helfat and Raubitschek (2018) emphasize three dynamic capabilities critical for ecosystem leaders: innovation capabilities, environmental scanning/sensing capabilities, and integrative capabilities allowing ecosystem orchestration. Innovation capabilities allow the firm to develop innovations, environmental scanning capabilities enable the identification of opportunities and threats, and integrative capabilities are crucial for increasing platform leaders' ability to capture value. The three types of capabilities identified by Helfat and Raubitschek (2018) are concerned with coevolution, that is, co-evolution of the platform's ecosystem and the capabilities activated by its owner with interrelated products, knowledge, and skills both over time and at a given moment in time. Since platform ecosystems are subject to continuous evolution by the leading player, the acquisition of these three capabilities is temporally progressive.

Along similar lines, Rong, Patton, and Chen (2018) examine the process of business model dynamics and business model formulation and how the associated ecosystems evolve alongside this process and support its development. They identify a three-stage process, 'initiation', 'execution', and 'extension', and suggest three capabilities - 'scalability', 'flexibility', and 'extensibility' - which enable business model development. They suggest also that the structure of the ecosystem (product-based, platform-based, or some combination of the two) influences the potential impact of these capabilities on business model development. In a study that is focused more on the antecedents to business model innovation and design, Zhao, Wei, and Yang (2019) contribute to the business model literature by identifying the importance of intra-industry search and extra-industry search preceding business model innovation within an ecosystem, and their fit with different types of dynamic capabilities. In research focused on

the cybercrime ecosystem, Kraemer-Mbula, Tang, and Rush (2013) show that business models arise from changing capabilities and concomitant innovations and strategies.

2.4.3.1.2 Business ecosystems: a new view of firms' environment that interact with business models

The business model tends to be specific to the particular organizations whereas the business ecosystem refers to a specific view of the environment. The firm's environment or ecosystem is directly or indirectly identified by the chosen business model. Several strategic management researchers have recharacterized the firm's competitive environment by describing it explicitly as a business ecosystem (Demil et al., 2018; Hannah & Eisenhardt, 2018). We suggest that the ecosystem is a part of the environment in which and with which the organization interacts. In deciding on its business model design, the firm is identifying its stakeholders and defining its bargaining power in the ecosystem. Consequently, the ecosystem depends on the choices made by the organization in relation to its business model (Warnier et al. 2018) since the complementarities and interdependencies which are attributes of the business ecosystem depend on the firm's openness to actors with complementary assets (Cha, 2020). Thus, business ecosystems and business models co-evolve (Demil et al., 2018). The characteristics of the ecosystem⁹ constrain the business models of the members of that ecosystem, and evolutions in one or several components of the firms' business models can result in a major reconfiguration of the ecosystem. Thus, ecosystem members need to attain legitimacy within their ecosystems.

2.4.3.1.3 Enablers of business model shifts at the ecosystem level

The results of our analysis demonstrate that the co-evolution between business models and ecosystems has gained relevance in particular in the strategic management literature. Work in this area is aimed at identifying the enablers allowing the shift from business model thinking at the firm level to business model thinking at the ecosystem level. For example, Sánchez and Ricart (2010) highlight how the low-income market ecosystem can alter the business model choices and consequences, and how business model choices can influence the behavior of the ecosystem. Laudien and Daxböck (2017) show that managing a business model portfolio to

⁹ These characteristics are heterogenous actors that are legally independent but are related through technologies, regulations, high investments, or physical infrastructure.

face changing ecosystem conditions requires two main enablers - strategic foresight and ambidexterity which ensure that firms are not trapped in their existing business models.

Snihur et al. (2018) introduced the concept of the “disruptor gambit” to develop a model analyzing ecosystem-level processes. The authors use a business model innovation framework to study how the incumbent’s ecosystem can be replaced by a radically new system through business model disruption. Hou, Cui, and Shi (2020) study how the business model’s owner can exploit the corporate ecosystem to launch a new business model. They show that the actor’s attributes (i.e. capable or incapable, willing or unwilling) are malleable and can affect the (re) deployability of stakeholders’ activities. They show also that manipulated interaction between an established ecosystem and the launch of a new business model can identify knowledge complementarities among the actors, capability complementarity among activities, and service complementarity across business models.

Finally, Madsen (2020) examines how different components of business model innovation (value creation, value delivery, value capture, innovation), dynamic networks (inter-organizational level personal interactions built over time), and innovation ecosystems (Adner, 2006) interact in dynamic ways. Clearly identifying risks, being open to new opportunities, and being agile in the development of innovations to respond to market needs are key to the success of these dynamics. “Agility to the right provides a non-linear feedback loop to new value creation, allowing the organization to continue its ongoing innovation process. Openness to new opportunities and up-front risk identification to the left provides a non-linear feedback loop to value capture” (Madsen, 2020, p.7).

As attested the search for coevolution between business model and ecosystems has been investigated, however, each work has mobilized a complementary management concept (ambidexterity, disruptor’s gambit, agility, etc.) in their framework. This demonstrates that this field is in the early stage of theory building. The positive side is that the adoption of business models and ecosystems is very malleable, but on the negative side, efforts are scattered and lack a concrete theoretical positioning.

2.4.3.2 Understanding the role of entrepreneurial ecosystems using a business model framework

Business models and ecosystems are mobilized jointly in recent research in the entrepreneurship literature. While entrepreneurship is a fundamental topic in work on innovation management, entrepreneurial ecosystems are attracting growing interest. There is a need to clarify (i) what is an entrepreneurial ecosystem and how it differs from the other types of ecosystems, (ii) what contributes to the development of the institutional context, and how it favors business model innovation for entrepreneurs. The business model and ecosystem literatures have addressed these questions in different ways and in the next section we discuss these different approaches.

2.4.3.2.1 Understanding entrepreneurial ecosystems and how they differ from other types of ecosystems

For a long time, ecosystems have lacked a clear operational representation (Muegge & Mezen, 2017) which highlights the need to clarify what an entrepreneurial ecosystem is and how it differs from other types of ecosystems. Drawing on industrial districts and agglomerations (geographical economy), clusters (innovation and economic management), and systems of innovation theories Autio et al. (2018) describe entrepreneurial ecosystems, unlike innovation and business ecosystems as not specific to a given (set) of industry sector(s) or technology domain(s). Rather they represent “the only cluster type where the dominant cluster-level benefit is business model innovation, and not process, product, or technology push innovation” (Autio et al., 2018, p. 16).

Based on this definition Banc and Messeghem (2020) point to the lack of micro-level analysis of entrepreneurial ecosystems. While organizational level analysis highlights that individual factors and social network connectivity can influence both conventional and sustainable business models, at the micro-level analysis what factors influence business models within entrepreneurial ecosystems remains unclear. Based on Felin, Foss, and Ployhart (2015) and Adner's (2017) works, Banc and Messeghem (2020, p. 603) propose the notion of a micro-ecosystem as “a localized open system interacting with the entrepreneurial ecosystem and driven by an actor or group of actors in order to build a dynamic of innovation and entrepreneurship”. The business model framework combined with the legitimation and cooperation frameworks is used to understand how newcomers enter and settle in the entrepreneurial ecosystem to capture resources and strategic attributes from the entrepreneurial

ecosystem and deliver value. More precisely, the business model framework is mobilized to understand (i) how entrepreneurial micro-ecosystems and corporate accelerators need to position their strategies, their targets, and their offers to adapt to the entrepreneurial ecosystem; and (ii) how the micro-ecosystem creates value.

2.4.3.2.2 Reciprocal impact between entrepreneurial ecosystems development and business model innovation

A growing stream of work in the entrepreneurship literature provides evidence of a positive reciprocal impact between the development of a local entrepreneurial ecosystem and business model innovation in this institutional context. Most studies demonstrate the benefits derived from applying both ecosystem and business model approaches to firm strategy that may illuminate issues for innovators elsewhere who aim to leverage policy resources. For example, Radziwon et al. (2017) examine how a set of small and medium-sized enterprises (SMEs) contributed to the development of a local ecosystem by creating and capturing value while developing collaborative manufacturing solutions. In line with Zott et al. (2011), the authors adopted business models as the unit of analysis and mobilized the business ecosystem literature as the theoretical framework to identify the conditions enabling successful SME collaboration and creation and capture of value within a collaborative project while developing their local ecosystem. At the managerial level, the authors highlight that successful SME collaboration leads to the development of a local ecosystem and orchestration of the business ecosystem. At a theoretical level, their work bridges some of the gaps among the various proposed approaches to investigate the practical aspects of business model development and application of an open innovation paradigm by SMEs in the larger ecosystem context.

Charue-Duboc and Midler (2011), Calmé et al. (2016), and Li and Garnsey (2014) show that creating a supportive (not necessarily local but entrepreneurial) ecosystem is a prerequisite for exploring new markets and business model innovation. Calmé et al. (2016) mobilize the concept of business model to study how cooperation among entrepreneurial actors and crowdfunding platform actors contributes to the definition or redefinition of the respective business models. The authors highlight the usefulness of cross mobilizing business models and multi-sided platform theory to better understand the positive results of cooperation strategies. Those effects are valuable at the territorial and ecosystem levels. Crowdfunding platforms are perceived by support actors as attracting new project leaders and diversifying client portfolios. Calmé et al. (2016) show that the arrival of crowdfunding platforms facilitated exploration of

new market spaces and development of an entrepreneurial support ecosystem through the integration of two types of decision-makers: the crowdfunding platform which supports and the crowd whose expert and enthusiast members can affect the success or failure of the project or allow the project leader to evolve its offer.

Li and Garnsey (2014) examined how entrepreneurial ecosystems can facilitate (and benefit from) new business models which promote effective private and public partnerships for new technology commercialization. They highlight the value of relationships between private firms and public bodies in diverse public contexts. They conclude that *“When there is a need to scale up activities using cost-effective methods, ecosystem strategies that link public policy with private sector entrepreneurialism often result in new cost-effective business models for creating and delivering shared value”* (Li and Garnsey, 2014, p. 771). These studies stress the role of both the institutional context represented by the entrepreneurial ecosystem, and the institutional ecosystem actors. A co-creation process involving multiple actors in the entrepreneurial ecosystem is highlighted by several authors. Driven by institutional entrepreneurs¹⁰ in a high-velocity market, this co-creation process leverages innovation and produces phenomenal growth (Sarma & Sun, 2017). To support start-ups to launch their business through a co-creation process, institutional actors and particularly incubators, need to adopt new tools to replace traditional business incubators (Carvalho, Galina, & Sánchez-Hernández, 2020).

2.4.3.3 A business model thinking at the ecosystem level marketing approach

Since 2010, marketing research has studied ecosystems as an institutional context that legacy firms embrace to innovate their business models. This idea has gained popularity in the context of current trends such as digitalization, circular economy, and servitization which highlight the need to understand how actors integrate and evolve within new ecosystems to create value (V Parida & Wincent, 2019). This is in line with leading authors in the strategic management literature such as Priem et al. (2013) who early stressed the need to extend business model thinking from an approach that focused mainly on the producer-side resource-based view (RBV) to include the consumer – or demand – side knowledge. The authors did not consider

¹⁰ “Institutional entrepreneurs have been defined as evangelists and visionaries who break barriers by proactively and aggressively initiating institutionally contested and disruptive practices, standards, and policies into the existing institutional framework” (Sarma and Sun, 2017, p. 1).

that this would involve the inclusion of “every day” marketing issues in the strategic management field. “Instead, when an understanding of consumer heterogeneity can contribute to the discovery of corporate-level or business-level strategies that produce differential performance, the decisions involved are strategic decisions” (Priem et al., 2013, p. 482). Our content analysis shows that contrary to Priem et al.'s (2013) view, recent marketing research highlights how traditional strategic management theories can help our understanding of the shift from firm-level to ecosystem-level business model thinking. However, we also identified a strand of work that borrows theories from the strategic management domain to understand how traditional marketing thinking integrates the ecosystem context in its analyses. The most frequent theories are from the business model and/or ecosystem literature.

2.4.3.3.1 Contribution of marketing theory to an ecosystem view of business model thinking

To study how firms create value in an ecosystem context, marketing research has adopted a horizontal view of business model innovation within an (IT, sustainable, or circular) ecosystem as opposed to the vertical business model employed by most infrastructure and technology providers. A vertical business model is generally developed by firms whose competitive strategy is built on the need to create value for customers. The horizontal business model is mostly employed by service-oriented and consumer business firms whose competitive strategies are built on the need to serve and retain a wide clientele and reach across different segments. Those firms try to capture as much value from their customers as possible. Their business models are built on a value-sharing perspective and co-evolve within an ecosystem.

There are two main approaches in this context. The first adopts a consumer behavior perspective, and the second employs a service-oriented logic. The former approach is favored mostly by studies investigating the digital transformation that has been accelerated by the IoT. To create value within digital ecosystems, firms need to develop a new digital customer orientation capability (Kopalle, Kumar, & Subramaniam, 2020; Santoso, Hadiansah, & Christoni, 2018). In an investigation of the disruptive potential of the multi-sided platform business model, Santoso et al. (2018) find significant differences for consumers between two types of online transportation services. In a study of how firms transition toward a digital

orientation to customers, Kopalle et al. (2020) combine the transformative marketing TM¹¹ and digital ecosystem ideas. They identify three attributes of digital natives that allow them to exploit the digital ecosystems to serve customers: in-use information, digital customers, and digital experience. They propose a three steps process that allows the firm to develop the capabilities for digital customer orientation. Whereas strategic management research sheds light on the types and roles of capabilities for business model innovation within an ecosystem, marketing research highlights how specific capabilities are developed.

The latter approach mobilized by marketing research is the service-oriented or service-dominant– SD logic. Quero, Díaz-Méndez, and Gummesson (2019), consider the SD logic useful because it helps to achieve a balance and positive relationships among the actors. The SD logic considers balance centrality as an institution and the basis for developing institutional arrangements. Also, Van Riel et al. (2019) examine the destruction-creation of value in service ecosystems using a SD logic-based theoretical framework, two-sided market theory, and configuration theory. Thus, marketing research extends the business and platform ecosystem literatures which borrow the SD logic and apply it to marketing science (Pütz, Murphy, Mullins, & O'Malley, 2019) to analyze market-structure and strategic positioning in business sectors such as software and hardware. The SD logic has been mobilized extensively by studies focused on servitization.

2.4.3.3.2 Mobilization of business model and ecosystem literatures by marketing research

To examine the digitalization and servitization processes in the firm and in the firm's ecosystem, marketing research borrows from other management fields. In the servitization literature, business models are defined as holistic units of analysis, and ecosystems are studied as both a business model component and as one of three levels of analysis of servitization (the organization level, the ecosystem/network structure level, and the market level). For example, in considering the shift to a circular economy, Parida et al. (2019) show how firms adopt a new business model based on ecosystem-level logic. They mobilize the ecosystem literature, and especially Moore's (1993) view of business ecosystems to clarify what constitutes orchestration activities and how these activities enable the servitization process in a business model at the

¹¹ TM recognizes that the marketing function is not only influenced by but also influences the broader business environment (Kumar, 2018, p. 2) i.e. the ecosystem.

firm and ecosystem levels. Other works draw on organization and management theories to understand how parallel (product and service-based) business models frame and change the organizational practices of servitization performed by multiple actors at the firm and ecosystem levels (Palo, Åkesson, & Löfberg, 2019).

In the digitalization literature, most marketing studies are interesting in how the IoT i.e. material intelligence, changes value creation within new digital business ecosystems. It has been indeed observed that legacy software firms are racing to transform their existence and the way they create value (Rahul C. Basole & Park, 2019). Marketing research that contributes to the IoT literature and works on change employ business model and/or ecosystem frameworks. For example, Leminen, Rajahonka, Wendelin, and Westerlund (2020) and Hakanen and Rajala (2018) mobilize business model and ecosystem respectively to study the industry IoT business model in a machine-to-machine context. Leminen et al. (2018) complete their proposed framework by drawing on the modular architecture literature¹². They introduce the concept of ecosystem business model in the industry IoT (IIoT) ecosystem and propose three new concepts - 'value space', 'value base', and 'value potential' - in the context of complex systemic business models. Their main contribution to the marketing literature is the description of the business-to-business marketing relations and business models in ecosystems.

In addition to business models and the ecosystem literature, some marketing studies borrow theories from non-management fields. For example, the analytical framework in Wei et al. (2017) is built on the theory of constraints and business ecosystem theory to examine how manufacturing flexibility affects the efficiency- and novelty-centered business model designs and consequent firm performance. The results indicate that manufacturing flexibility promotes both types of business model design and subsequent firm performance. The relationship between manufacturing flexibility and an efficiency-centered business model design is strengthened by the intensity of the competition but weakened by demand heterogeneity. In contrast, the relationship between manufacturing flexibility and a novelty-centered business

¹² Modularity is one of the most popular frameworks borrowed from the non-management field by the ecosystem literature (Tsvetkova & Gustafsson, 2012; Jacobides et al., 2018; Lee et al., 2010; Schilling, 2000; Cha, 2020). Modularity has been identified as a key characteristic of platform and business ecosystems and can be used to explain the technical aspects of platforms and business ecosystems. Modularity has been used also in relation to strategy in which the business model acts to serve certain functions in the industry ecosystem.

model design is weakened by the intensity of the competition and strengthened by demand heterogeneity.

One other example is the work of Hakanen and Rajala (2018). The authors build on IoT studies in the computer science literature combined with work on business models in the innovation management literature, to investigate firms' sharing of information on materials. They conclude that to motivate firms to share this information requires (i) empirically grounded scenarios showing how information can be created, stored, and shared through the IoT, (ii) an understanding of the incentives for companies to share data within an ecosystem, (iii) "Evidence of the ways in which the IoT provides competitive advantages in business ecosystems is essential for establishing the practices for sharing value among the actors involved" (Hakanen and Rajala, 2018, p. 861), (iv) increased mutual trust and interest in participating in novel industry ecosystems, (v) clear understanding of the business risks associated with sharing data via the IoT, and (vi) methods to assess the economic outcomes of investment in IoT to foster materials intelligence.

2.4.3.4 Business model innovation within sustainable and circular ecosystems: the industry ecology approach of alignment

In the industry ecology field, there is growing interest in emergent sustainable and/or circular ecosystems. The primary focus of sustainable ecosystems studies is how business model innovation occurs in the context of ecosystem transition (Hellström et al., 2015; Peltola et al., 2016). The authors adopt a system perspective to understand changes in value creation. These changes concern the need for collaboration among traditionally unconnected companies, and complementarity among products, services, and side-streams of various companies. Those studies are aimed at examining how unconnected or weakly connected companies align these elements to form functioning business ecosystems or to build ecosystems. The development of new and inter-organizational business requires redesign of the respective business ecosystem. The business model is the unit of analysis in Zott et al. (2011) who integrate the notion of change (Demil and Lecocq, 2010) as promoting transformation of existing business models or sectors through the integration of new entrants or system changes. Ecosystems are defined as pathways of interlinked business models (Shaw & Allen, 2018). These studies identify the structure of a specific emergent business ecosystem, the mechanisms that trigger system change or links to new businesses, and how closer collaboration and sustainability can create value.

In the waste and energy business ecosystems studied respectively by Hellström et al. (2015) and Peltola et al. (2016) business model innovation occurs through the alignment of activities or the alignment between the value structure and ecosystems materials flow. The role of alignment in business model innovation is highlighted and is different from that described by Adner. Adner (2017) considers that the members of an ecosystem need to have their activities, actors, actor roles, and links among actors to be aligned to achieve value. Based on the business ecosystem literature, Peltola et al. (2016) discuss another type of alignment. They show that in the waste business ecosystem the value structure is aligned with the materials flow. Value trajectories adopted by ecosystem members help identify how and through which activities value is created and increased. The value trajectory depends on the knowledge and technological capacity of the waste business ecosystem and the current relevant regulations. Regulators are key actors that can facilitate the value trajectories related to a sustainable business ecosystem. Lynch et al. (2017) contribute by highlighting several constraints and challenges faced by ecosystem actors in the energy sector: privacy issues concerning data ownership between ecosystem members, network effect creation, and innovative business strategies to recruit as many adopters as possible at an early stage.

The role of alignment is important in the circular economy literature. A circular economy is a closed-loop system that is, a resource-product-waste new-resource-based system which contrasts with traditional linear resource-product-waste based systems (Goyal et al., 2018). The circular economy is a reconfigured system model to create a resilient ecosystem where waste is free owing to the adoption of reduce, reuse, and recycle paradigms (Goyal et al., 2018, p. 731). It depends on careful alignment and management of resource flows along the value chain based on integrating reverse logistics, design innovation, collaborative ecosystems, and business model innovation. “This circular economy ecosystem is driven by multiple factors like creative individuals; forward thinking entrepreneurs; emerging technologies; and supportive ecosystem setup at institutional, regional, and country levels” (Goyal et al., 2018, p. 738).

Hellström et al. (2015) highlight the need to identify the value drivers in each individual ecosystem member’s business since ecosystem value is created through the transactions and non-transactional links among companies. Alignment appeared as one value driver in addition to others that are initial context, uncertainty, and collaboration mechanisms. Alignment is required between the focal firm and other ecosystem members. It is déjà vu on the

complementarity of the products, services, or side-streams of the companies in the ecosystem. Concretely, “alignment of the companies’ activities is reflected in the value creation and capture systems through the division of responsibilities, risks, and benefits” (Hellström et al. 2015, p. 231). The initial context reflects the current situation and the need for business ecosystem change. Uncertainty refers to who makes the first investment. Collaboration mechanisms affect value creation, the firm’s role or function in the ecosystem, and firms’ value capture. All these drivers are identified as helpful to achieve ecosystem transition.

2.5 Conclusions, further research, and limitations

The goal of this study is to systematize discussion on the joint mobilization of business models and ecosystems in the management literature to understand why and how scholars are interested in their joint application. We find that the changing landscape, linked to new technologies (e.g. digital economy, Industry 4.0) and new social agendas (e.g. circular economy, sustainability), are the main motivation for scholarly interest. These changes are blurring industry boundaries and giving rise to new ecosystems involving interdependencies among firms. Those interdependencies are linked to the value creation and value capture process, two key elements of business models.

We followed Gomes et al. (2018) and conducted a systematic literature review and a hybrid methodology including descriptive, bibliometric, and content analysis over the period 2007 to 2020. Keyword analysis showed that business model is the most frequent term followed by innovation, business ecosystems, and ecosystems. The emphasis on business models is due to the business model idea as among the most promising approaches in the literature on innovation, strategic management, and entrepreneurship. However, it is changing from an intra-firm to an inter-firm perspective.

Our BCA illustrates research trends in the period 2016-2020. Six main trends emerged: (i) the role of territorial ecosystems, (ii) innovation strategy / digital innovation, new challenges both in strategic management and information, (iii) IoT, Industry 4.0, (iv) entrepreneurial ecosystems, (v) business model innovation in the new era, and (vi) servitization. Research trends are a powerful indication of future research. Our results demonstrated that there is a clear interest in how the firm can outdo the competition within a sustainable “battle”. This is an interesting finding and indicates the shift from a “profit for profit” agenda to a more socially responsible agenda.

Our co-citation analysis based on a sample of 41 articles, showed that scholars seeking to mobilize business models and ecosystem constructs jointly are drawing on the traditional business models (e.g., Zott & Amit, 2007, 2010), ecosystems (e.g., Iansiti & Levien, 2004; Moore, 1993), and servitization (e.g., Oliva & Kallenberg, 2003; Tukker, 2004; Ulaga & Eggert, 2006; Vandermerwe & Rada, 1988). This is to be expected as the joint adoption of ecosystems and business models is a new research agenda with a limited number of publications and inevitably builds on the contemporary literature addressing each concept individually. The results of our content analysis were more unexpected. It shows that although business models and ecosystems have been at the center of discussions on strategic and innovation management for more than 20 years, two strong research groups in marketing and industry ecology are emerging.

We highlighted also that although these groups are adopting the two concepts to explain a contemporary phenomenon, they differ in how they do this and for what purpose. The strategic management stream adopts both concepts in order to build new theory, and therefore the focus is more conceptual. The marketing stream adopts both concepts but adopts a more practical view aimed at : (i) responding to consumer behavior, and (ii) applying a service-oriented logic. In both cases, this is achieved by elevating business model thinking from the intra-firm to the ecosystem level. The entrepreneurial research seeks to distinguish entrepreneurial ecosystems from other types of ecosystems using a business model framework and considering innovation as promoting ecosystem emergence. Finally, the industry ecology research examines the complementarities between business models and ecosystems to promote a circular economy and sustainable business by focusing on new forms of alignment structure.

We have identified why and how business models and ecosystems are correlated in the strategic management literature. However, our results show that this work is spread across different research groups/ domains, and to our knowledge, there have been no efforts made to organize this literature to form a new body of research. Based on our findings, we propose four directions for future research.

The new normal: digital economy, sustainability, and business model innovation within emergent ecosystems: one of the reasons for the joint employment of business models and ecosystems is the effect of the digital economy. Traditional management formulas are no longer applicable in a complex digital economy (e.g. Adner, 2017; Teece, 2018). Digital ecosystems are complex systems involving collaboration and increased levels of interdependencies. Thus, scholars interested in these aspects are using business models and ecosystems to try to explain

how traditional management concepts might be adapted to this new context (e.g. dynamic capabilities). However, these efforts are recent and leave many unanswered questions. In particular, to understand how firms manage change in a digital context requires further investigation of two aspects: (i) how incumbent ecosystem leaders manage the transition to a digital context without losing their leadership positions, and (ii) how old ecosystems are being renewed. Sustainability and circular economy research could also benefit from a better understanding of how ecosystems emerge or renew themselves through business model redesign. Some efforts in that direction (Goyal et al., 2018; Roundy et al., 2017; Shaw & Allen, 2018) have begun but as already mentioned they leave many questions about leadership and different ecosystem life cycles unanswered.

Business model innovation and ecosystem dynamics: Scholars that explore business model innovation have to explain ecosystem dynamics that arise because some forms of business model innovation (e.g., servitization) imply changes not just at the firm level but also at the ecosystem level. Work in this stream explores issues such as tensions among partners (Jamie et al., 2016), and firm flexibility (Wei et al., 2017). However, we need to consider also how ecosystem roles change with new dynamics. In this stream, we identified two opportunities for further research: (i) understanding ecosystem dynamics based on the business model innovation process, and (ii) new strategic tools for ecosystem business models (in line with Viswanadham, 2018).

Territory and role of public actors in ecosystems: territorial ecosystems involve a particular actor type - the public actor (e.g. Brennan & Tennant, 2018; Ma et al., 2018; Peltola et al., 2016; Radziwon et al., 2017). Most of the literature on ecosystems and business models addresses and analyzes private companies and issues related to competition. However, the presence of a public actor changes the construction of the ecosystem or business model. Learning more about how the territorial ecosystem (positively or negatively) affects sustainable business models is important. We identified some opportunities for further research in this area: (i) how ecosystem leadership is managed when the public actor is the imposed leader, (ii) what are the problems related to business model innovation in highly regulated territorial ecosystems, (iii) how to manage tensions amongst public, private, and entrepreneurial firms when building ecosystem business models in territorial ecosystem, and (iv) how business models and the business ecosystems literature are affected if a public actor is in a key role.

Ecosystem business models or business model ecosystems: the need for theory building: finally, critical to the joint adoption of business models and ecosystems is the lack of theoretical

concepts to guide scholars. Efforts in the literature are scattered and include different methods. This can be considered positive since it demonstrates the malleability of the concepts, and how much they are gaining ground. However, it makes it difficult to compare studies and leads to scattered efforts rather than the consolidation of knowledge. Theoretical explorations and proposals for frameworks to achieve research goals would represent advances in this area.

To conclude, our study has some limitations which in some cases represent opportunities for further research. Although bibliometrics is a robust, transparent, and replicable method, choices need to be made about sampling and cut-off points especially BCA and CCA which might constrain the boundaries of the analysis and result in outliers. We tried to address this by including some additional articles in the content analysis. Another limitation is that in general, content analyses are subjected to researcher interpretation. We tried to account for this by continuing our rounds of discussion until both authors reached an agreement. However, it is possible that some interpretations were overlooked. This provides opportunities for future research on the topic. Finally, we hope that our review and recommendations for future research will encourage scholars to continue investigation of this topic and further develop our conceptual framework.

2.6 Contributions to thesis: manuscripts 2 and 3

Manuscript 1 has a very important role in this work. Its role goes beyond being a literature review to be (i) a study that tests the hypothesis that scholars in management are jointly adopting business models and ecosystems to tackle contemporary phenomena; (ii) why scholars are doing so and how; and (iii) it laid the ground for new research agendas, which some were used as the cornerstone of this thesis, in other words, that supported and motivated Manuscripts 2 and 3. Figure 19 graphically depicts this conceptual process.

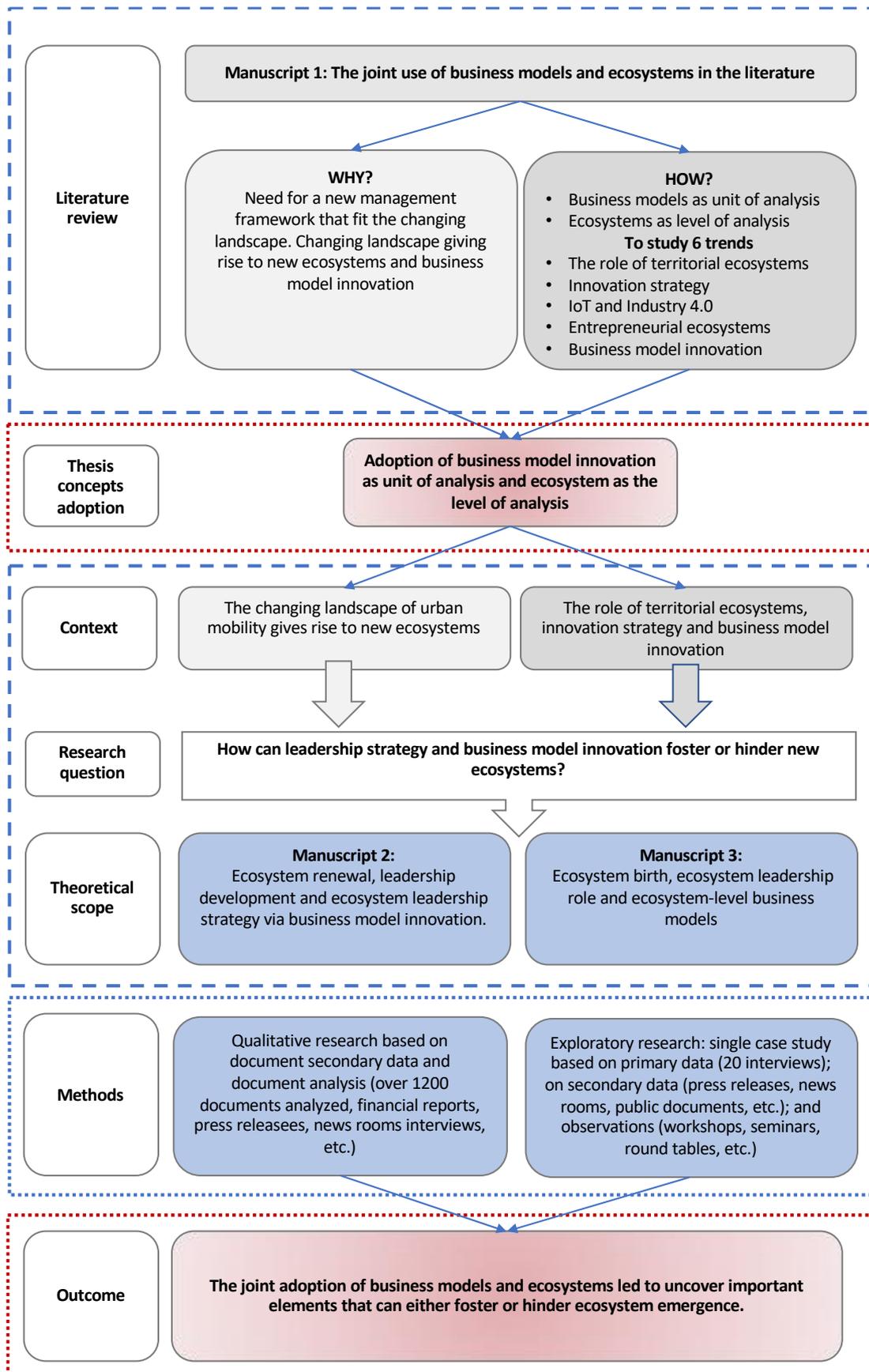
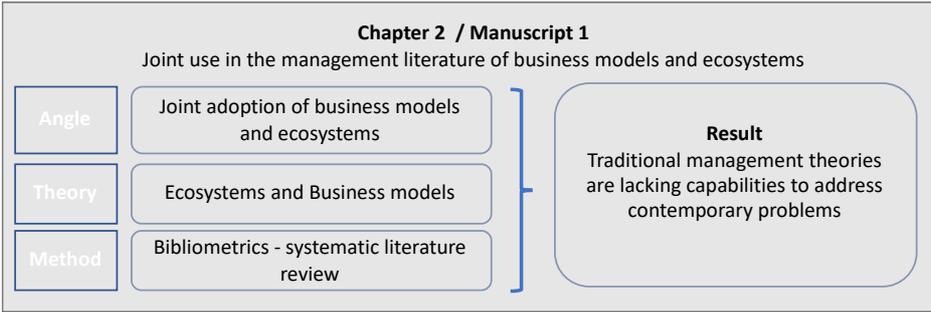
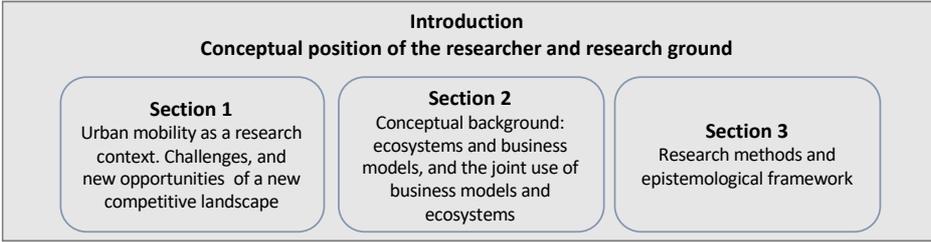


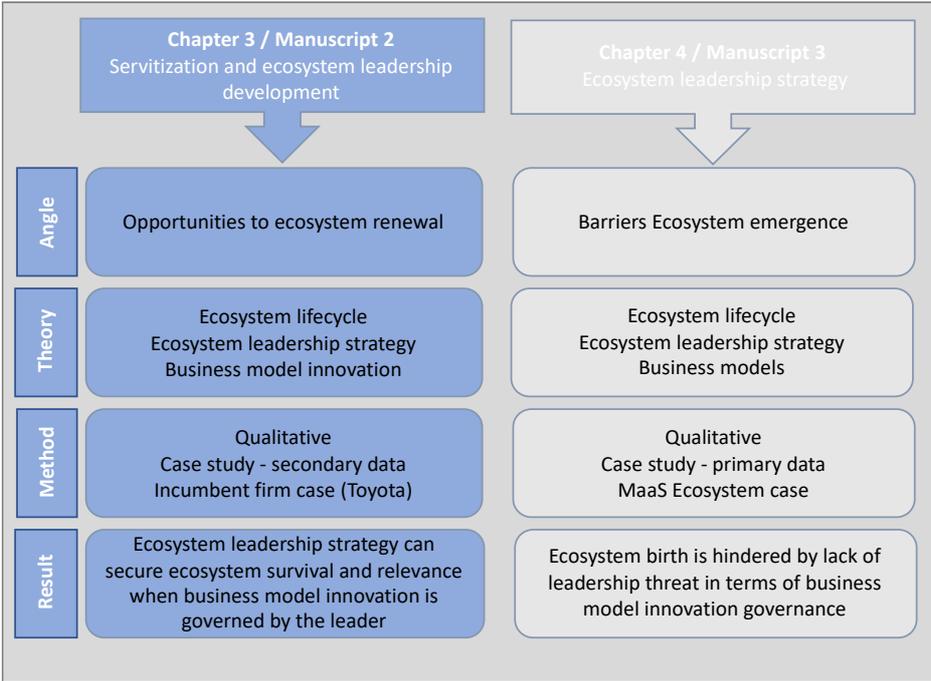
Figure 19: Contribution of manuscript 1 to manuscripts 2 and 3

Chapter three: Impacts of Servitization Strategies on Ecosystem Leadership Development

General phenomenon
Members of urban mobility ecosystems are facing several challenges in terms of business model innovation and leadership development



Research question
How can leadership strategy and business model innovation foster or hinder new ecosystems?



Chapter 5
General conclusion and discussion
Leadership strategy at the ecosystem level could be defined as business model innovation governance by a leader. This role is well assumed when there is a leadership co-evolution risk. It is however less well performed on the contrary case. Thus, business model innovation governance raises the chances of ecosystem birth and survival.

Impacts of Servitization Strategies on Ecosystem Leadership Development

3.1 Extended summary

This Manuscript is a solo authorship

3.1.1 Motivation

This second Manuscript aims to address some research opportunities previously identified in the first Manuscript on the joint adoption of ecosystems and business models, that are relevant to this thesis research question. More precisely the first Manuscript highlighted that one research trend in the intersection of ecosystems and business model innovation is servitization. Servitization implies business model innovation, but more than that it also suggests that by adopting a servitization strategy companies need to revisit the entire multi-actor “chain” of value creation, which in turn we can assume that it means either creating new ecosystems or renewing existing ones. Indeed, servitization changes the way the focal firm captures, creates, and delivers value to its consumers, and in so doing has an impact on the entire ecosystem.

Moreover, the servitization impact on ecosystems is a very interesting research ground to uncover how firms deal with ecosystem change, more precisely related to changes in ecosystems’ roles, ecosystem leadership strategy, and the renewal stage of ecosystems’ life cycle, which is fundamentally relevant to understand what foster ecosystem emergence.

3.1.2 Objectif

The main objective of this Manuscript is to study what fosters ecosystem emergence during the renewal stage of the ecosystem life cycle.

3.1.3 Implication for the doctoral thesis

This study suggests focusing more particularly on the renewal stage of the ecosystem life cycle. Indeed, by suggesting that the transition between leadership and renewal stage is delicate and that if renewal is not successful it might lead to ecosystem death, it seems relevant to focus more particularly on the renewal stage. By trying to provide a better understanding of ecosystem renewal, this study complements Moore’s (1993, 1996) work, by demonstrating that renewal

success is possible when accompanied by an ecosystem leadership strategy that is supported by business model innovation at the ecosystem level.

3.1.4 Valorization

3.1.4.1 *Conferences and workshops*

- Foerster. 2021: “Servitization implications in ecosystem literature”. Conference EURAM 2021
- Foerster. 2021: “Servitization implications in ecosystem literature”. PhD day Skema
- Foerster. 2021: “Servitization implications in ecosystem literature”. Seminar ESIA UCA / Gredeg- CNRS

3.1.4.2 *Submissions*

- 11/2020 “Servitization: an Ecosystem Theory Perspective and Implications” submitted to Strategic Management Journal.
- 02/2021 Decision: Rejected after the evaluation of two reviewers
- 09/2021 “Servitization strategies and impacts in ecosystem leadership development” submitted to R&D Management
- 02/2022 Decision: Rejected after the evaluation of two reviewers
- 02/2022 “Servitization strategies and impacts in ecosystem leadership development” submitted to Journal of Innovation Economics and Management (JIEM)
- 04/2022 Decision: request to major changes
- 05/2022 Re-submission of the new version
- 07/2022 Decision: request to minor changes
- 07/2022 Re-submission of the new version
- **08/2022 Decision: accepted for publication - Journal of Innovation Economics and Management (JIEM)**

Manuscript 2 - Impacts of Servitization Strategies on Ecosystem Leadership Development

Abstract

The surge of interest in servitization in the strategic management literature focuses mainly on intra-firm issues. This study complements work on servitization by positing that servitization represents a radical shift in how ecosystems are renewed and how ecosystem leadership is developed. Servitization changes the way the focal firm creates, delivers, and captures value for its consumers, consequently impacting the entire multi-actor “chain” of value creation. We argue that during the ecosystem renewal stage, adopting different types of servitization strategies has different effects on ecosystem leadership development. We develop a conceptual framework to analyze the impact that different servitization strategies have on ecosystem leadership development. We use a real-world case to illustrate and support our conceptual framework. We discuss different implications of our framework for ecosystem alignment, ecosystem business models, and collaborations. The study contributes to the growing research on the interplay between servitization and ecosystems.

Keywords: servitization; ecosystems; ecosystem alignment; ecosystem leadership.

3.2 Introduction

In business studies, the term ecosystem was borrowed from ecology and was coined by Tansley (1935). In 1993, Moore drew a parallel between the ecological system and employed it in the business field to argue the idea that firms should not be regarded as members of a single industry, but rather members of a business ecosystem. In business ecosystems, companies are composed of different members that are interdependent and which cooperate to materialize a new value proposition (Bogers et al., 2019; Moore, 1993).

The members of ecosystems include a focal company, suppliers, producers, competitors, and other stakeholders. According to Moore, (1996, p. 126), *“over time, they coevolve their capabilities and roles, and tend to align themselves with the direction set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions to align their investments, and to find mutually supportive roles.”*

Moore’s seminal works (1993, 1996) taught us that ecosystem leadership can be acquired; however, it might not last forever. That is because ecosystems go through four different stages: birth, expansion, leadership¹³, and self-renewal (or death). Thus, leading firms need to constantly be attentive to changes and respond to them accordingly to keep the ecosystem alive. The literature in strategic management has greatly contributed to our knowledge regarding expansion and the leadership stages (e.g. Adner, 2006; Adner & Kapoor, 2010; Gawer & Cusumano, 2008, 2002); less explored is the birth stage (e.g. Attour & Peruta, 2016; Hannah, 2015; Hannah & Eisenhardt, 2018), and barely explored is the renewal stage (e.g. Dedehayir et al., 2018; Moore, 1993, 1996). However, a leading firm’s ultimate challenge is the threat of obsolescence (Moore, 1993); thus the renewal of ecosystems is paramount for firms that seek long-term ecosystem success. But how can leading firms succeed in the renewal phase of ecosystems? What are the strategic choices they need to make to avoid new ecosystems emerging in their place? How can leading firms restructure themselves and their ecosystems to cope with the new reality? To answer these questions, we need a better way to understand the complex dynamics of ecosystem renewal and ecosystem leaders’ strategies.

¹³ The leadership stage, which is part of Moore’s ecosystem lifecycle typology, is not to be confused with ecosystem leadership. In the first case leadership is a label to define a stage in the lifecycle, in the second, leadership refers to a firm that holds the central role in the ecosystem.

In this paper, we introduce a framework for studying and understanding leadership continuity while thriving in the renewal stage. To do so we draw heavily from the servitization strategy literature. We propose that one way a firm can restructure itself, during the renewal stage, is through business model innovation (BMI). In the last few decades, industries have been facing many challenges due to innovation, radically changing the way companies are doing business with their customers as well as how products are developed, manufactured, and delivered (Gersch & Goeke, 2007; Teece, 2018b). BMI has become a commonly used strategy to battle competition and increase firms' performance (Baden-Fuller & Morgan, 2010; Christensen, Bartman, & Van Bever, 2016; Hacklin, Bjorkdahl, & Wallin, 2018). Research into strategy, operations management, and marketing has noted that a way that manufacturing firms adopt BMI is by embracing services alongside their product portfolios (Cusumano et al., 2015; Vandermerwe & Rada, 1988; Visnjic et al., 2018). The management literature describes this phenomenon as servitization.

Servitization, in this study, is defined as the transformative strategy employed by product-centered firms to include the offer of service solutions (Baines et al., 2017; Visnjic et al., 2018; Frank et al., 2019). Servitization implies a shift from pure product manufacture to a more service-oriented process which involves a change to the business model (BM) logic, that is, BMI (Cusumano et al., 2015; Kowalkowski & Ulaga, 2017; Martinez, Neely, Velu, Leinster-Evans, & Bisessar, 2017). BMI is considered to be activity systems that include new partners and activities configured in a novel way (Amit & Zott, 2012). Consequently, companies pursuing a servitization strategy need to determine their new value proposition (Ayala, Gerstlberger, & Frank, 2019). However, changing the value proposition is very challenging, as it shifts from unidirectional value delivery to value co-creation (Zhang & Banerji, 2017). Thus, our research question is "how a threatened incumbent firm may reassure ecosystem leadership through the adoption of servitization strategy".

To answer our research question, we first analyze the existing literature and broader conceptual reasoning about servitization strategies and ecosystems. Then we introduce a conceptual framework of ecosystem leadership and ecosystem renewal development from the servitization strategy perspective. We position them according to three dimensions: (i) ecosystem leadership development, (ii) ecosystem renewal success, and (iii) servitization strategy types, showing three ways a firm can offer product-service solutions. We use these three dimensions to classify different types of servitization strategies in product firms by considering changes in leadership development in the renewal phase of the ecosystem. Thus we

show that there are nine types of servitization strategy configuration in the combination of both ecosystem perspectives.

We use this framework to assess a real case scenario. We chose the case of Toyota and its partnership with Uber. This case is interesting because we can investigate how, in over six years, Toyota, a threatened incumbent leader, has been able to ensure its leadership in the ecosystem through the implementation of a sequence of servitization strategies. At first Toyota's leadership in the ecosystem was being threatened by Uber. However, over time, through the evolution of its servitization strategy, new alignments were formed, the ecosystem was renewed, and Toyota was able to reemerge as the ecosystem leader.

With such results, we provide a new perspective on servitization strategy in the context of ecosystem renewal, which can help managers position their company within a threatened ecosystem to maintain or gain leadership advantages and improve the performance of the ecosystem over time. Theoretically, our study contributes at the intersection of the servitization and ecosystem strategy. Our primary contribution is to clarify three servitization strategies by which firms successfully realign the ecosystem structure around a value proposition, and by doing so, it ensures ecosystem leadership in an ecosystem that needs to be renewed.

3.3 Theoretical Background

In this section we briefly review the literature on ecosystems and servitization, emphasizing the role of the leader. Then we review the literature that has addressed the connections between servitization and ecosystems.

3.3.1 Ecosystems and the role of the leader

The term ecosystem refers to a group of interacting firms which depend on each other's activities. *"In a business ecosystem, companies co-evolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations"* (Moore, 1993, p. 76). According to Moore (1993, 1996), every ecosystem goes through four distinct stages - birth, expansion, leadership, and renewal.

During the birth phase, members of the ecosystem must understand and collaborate toward a common value proposition. In this phase, the ecosystem leader emerges and assumes a central position by securing the cooperation of key organizations which will provide complementary

products and services that will collectively deliver value to the customer. In the second phase, the ecosystem expands into new territories of application. Expansion into new territories naturally requires the stimulation of market demand within the capacity of the ecosystem. It is therefore fundamental that the ecosystem leader is able to orchestrate all actors toward that expansion. The third stage of ecosystem evolution is a period of consolidation and control. This phase centers on ecosystem leadership and the establishment of control in the ecosystem's sub-systems and processes. Finally, the renewal phase is a response by the mature ecosystem to emerging threats, such as those arising from new technologies, disruptors, and industry changes, which create opportunities for new ecosystems to emerge. There are two possible reactions to these challenges: self-renewal or death.

Thus, every ecosystem goes through a renewal phase, where the ecosystem leader needs to maintain its position. But what is in fact the role of the ecosystem leader in the renewal phase? The literature around platform ecosystems has provided numerous contributions to ecosystem leadership (e.g Cusumano & Gawer, 2002; Gawer & Cusumano, 2002). They state that the role of the ecosystem leader is to drive industry-wide innovation for an evolving system of separately developed pieces of technology. However, this literature focuses on a particular type of ecosystem, that of digital platforms, which operate differently from other types of ecosystems¹⁴. In the business ecosystem literature, the role of the leader is that of the innovator, meaning that the leader needs to continually search for innovation to gain and maintain ecosystem performance (Iansiti & Levien, 2004a, 2004c; Moore, 1993, 1996); others highlight the fact that the actors in the ecosystem need to find a balance between cooperation and competition (Hannah, 2015; Hannah & Eisenhardt, 2018; Moore, 1993). Although these are important contributions, except for Moore (1993, 1996) we still know little about the role of the leader in the renewal stage of the ecosystem lifecycle.

Another important aspect highlighted in the ecosystem literature is the importance of the leader as the ecosystem's main contributor (Moore, 1993); he acts as a hub (Iansiti & Levien, 2004b) and orchestrator (Linde, Sjödin, Parida, & Wincent, 2021; Moore, 1993). Orchestrating diverse actors requires the proper alignment of diverse incentives among the ecosystem constellation (Sandulli, Ferraris, & Bresciani, 2016). While the leadership may shift over time,

¹⁴ For a comprehensive study on the different types of ecosystems refer to Jacobides *et al.* (2018)

the role of the leader is valued by the rest of the community. Thus, the role of the leader is extremely important in finding, orchestrating, and maintaining the proper alignment structure of the ecosystem. However, to the best of our knowledge, what the literature has not yet shown is the impact on ecosystem leadership when a leader decides to realign the structure of its ecosystem.

Lastly, an ecosystem that goes through the renewal stage necessarily needs to rethink its BM. That is because firms need to adapt their BM to evolving ecosystems (Zott & Amit, 2013). In this study, we focus particularly on the servitization BM.

3.3.2 Servitization strategies

Servitization is defined as a transformative strategy employed by product-centered firms to include the offer of service solutions (Neely, 2008; Baines *et al.*, 2017; Visnjic *et al.*, 2018; Frank *et al.*, 2019). Academic interest in servitization began in the 1980s. For example, Vandermerwe and Rada (1988) use the term to describe how firms added value to their core corporate offering through the parallel provision of services. Visnjic *et al.* (2018) point out that servitization emerged first as a trend among manufacturing firms seeking competitive advantage as products gradually became commoditized. Servitization emerged when the market changed from purely product-oriented production to service-oriented offers. This change required new strategies to create, deliver and capture value. Consequently, the adoption of servitization requires a transformation of the firm's BM (Ayala, Paslauski, Ghezzi, & Frank, 2017; Visnjic-Kastalli, Van Looy, & Neely, 2013).

Servitization is thus considered a particular form of BMI. As such, one of the main challenges of servitization is to determine the new value proposition (Alejandro G. Frank *et al.*, 2019). One of the reasons for that is because the types of services embedded in the value proposition can vary, meaning that there are different types of servitization strategies (Baines, Lightfoot, Benedettini, & Kay, 2009; Cusumano *et al.*, 2015; Martinez *et al.*, 2017). It is important to note that there is another concept closely related to servitization that also proposes the interconnected delivery of products and services. In the management literature, this concept is referred to as Product-Service Systems (PSS) (Baines *et al.*, 2009). However, while the latter has been more motivated by sustainability and the reduction of environmental impacts (Tukker, 2004; Tukker & Tischner, 2006), servitization studies have been more focused on the role of services in the competitive strategies of product firms. Therefore, the present study exploits the

service categorization in Cusumano *et al.* (2015), which provides an understanding of the special nature of the services offered by product firms. The authors propose the following typology: product “smoothing” services that maintain product functionality and are loosely coupled to the product allowing the service to be standardized and offered by the product maker or by an independent service provider; product “adapting” services that refer to customization of the product based on services. This expands product functionality and tends to be more tightly coupled to the product; and product “substituting” services that replace the entire product, with customers paying primarily for the usage. Both smoothing and adapting services complement the product while substituting services completely replace the product for the service.

3.3.3 Existing research on the connections between servitization and ecosystems

The works connecting servitization and ecosystems are relatively new and still scarce. Some scholars have acknowledged the importance of firms’ ecosystems for decisions about whether or not to outsource a service (Cusumano *et al.*, 2015), or whether the firm should open up its service BM (Visnjic *et al.*, 2018). Others have proposed conceptual frameworks for inter-firm capabilities (Gebauer, Paiola, & Saccani, 2013), while Frishammar and Parida (2019, p. 2) suggest that a change from a product orientation to a service orientation “*necessarily requires fundamental changes in business logic that often entails collaboration with both old and new actors in the firm’s ecosystem*”. However, despite the acknowledgment of the importance of ecosystems, the focus is mostly on service BM strategies or at the intra-firm level.

Autio and Thomas (2020) point out the importance of cross-fertilizing opportunities that arise through the building of bridges that connect strategic and service management when it comes to ecosystem theory. A recent special issue in the Journal of Business Research (2019), entitled “Servitization in ecosystems and inter-organizational networks” is one first step in that direction. In this issue, authors have focused on important topics such as the transition toward digital servitization and the role of the service ecosystems (Sklyar *et al.*, 2019). Their results indicate differences between digital service-led growth and associated ecosystem-related activities; the authors show the underlying processes of organizational change in the ecosystem and suggest that within-firm centralization and integration play a key role in the capacity to organize for digital servitization. Others have focused on the digital servitization of firms in the

context of ecosystems, they point out that digitalization not only affects individual firms' BMs but also requires the alignment of the BMs of other firms within the ecosystem (Kohtamäki et al., 2019). Lütjen, Schultz, Tietze, & Urmetzer (2019) provide interesting insights related to ecosystem-related capability for the success of service innovations. However, even though very relevant, ecosystems in these studies are seen as the context, and not the object of the analysis.

The emerging literature that connects servitization to ecosystems provides little, if any, support for understanding how servitization strategies may be used by firms to guarantee competitive and leadership advantage at the ecosystem level. This matters because servitization calls not only for company-level changes but also changes at the ecosystem level (Kohtamäki et al., 2019; Reim, Sjödin, & Parida, 2019). Thus, it can be assumed that to guarantee competitive and leadership advantage, firms will have to embrace significant change requiring interplay between different actors and the (re)configuration of new ecosystems. As firms progressively implement complex value propositions (Kapoor & Lee, 2013; Van der Borgh et al., 2012; Williamson et al., 2012), ecosystems become increasingly important as vehicles to create and capture value (Dattee, Alexy, & Autio, 2018). Thus ecosystems are critical for shaping firm success (Hannah & Eisenhardt, 2018).

We draw from the servitization literature, which provides a strong framework for understanding and analyzing the behavior of a threatened ecosystem, to explain the ecosystem dynamic of self-renewal. We use a real-world case to demonstrate how an incumbent firm that was being threatened by industry changes, new technologies, and disruptors was able to secure ecosystem leadership and succeed in the renewal of its ecosystem.

3.4 A Conceptual Framework for The Impact of Servitization Strategy in Ecosystem Leadership

To build our conceptual framework we used two theoretical perspectives (Figure 20). The first – ecosystem leadership – considers the levels of ecosystem leadership development from low to high. It assumes that ecosystem leadership can move from a threatened position to one of control. The way ecosystem leadership can move from one level to the next is through the adoption, adaptation, and adherence to new strategies and BMI. The second – ecosystem renewal – considers that ecosystem renewal success depends on leadership development. If ecosystem leadership manages to adopt, adapt, and adhere to its strategies and BMI, then the ecosystem can be renewed.

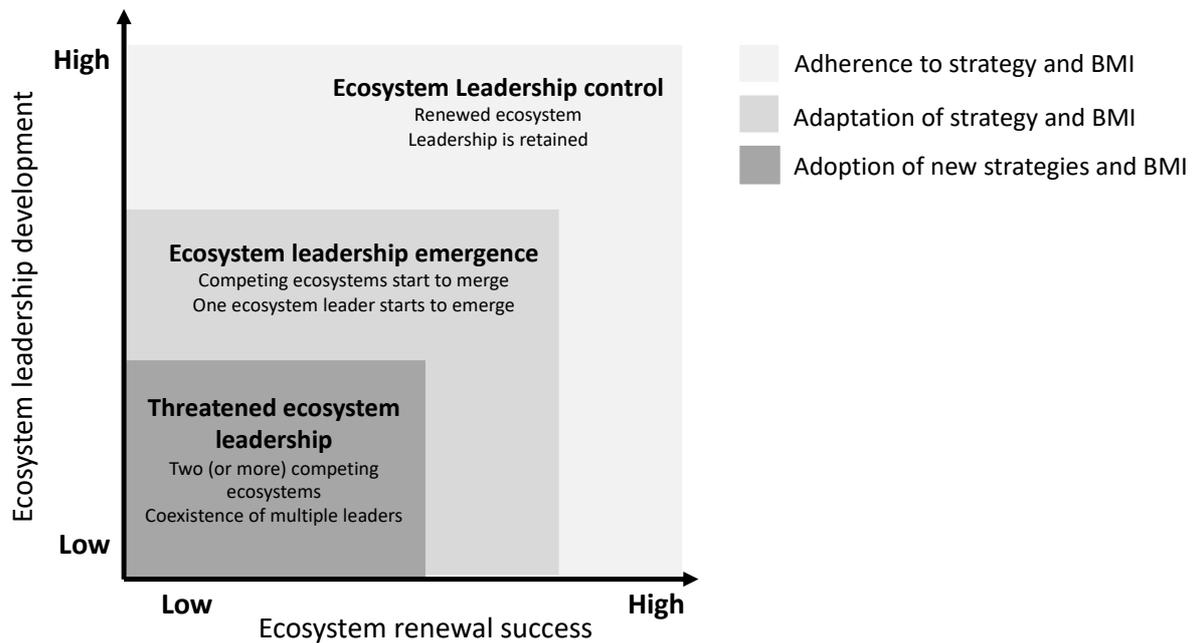


Figure 20: Ecosystem leadership development and ecosystem renewal success

Based on the theoretical perspective presented in Figure 20 we developed our conceptual framework (Figure 21). Three dimensions guided the development of the conceptual framework. The first two are leadership development and ecosystem renewal (vertical axes). We propose three main levels of leadership development and ecosystem renewal. The first level – *low* - considers threatened leadership and low levels of ecosystem renewal. During this phase, the threatened leadership will develop a new value proposition, and seek to nurture the existing community of actors, while seeking new partners and suppliers. The second level – *moderate* – considers the emergence of the ecosystem leader. During this phase a leader emerges, assumes the role of ecosystem orchestrator, and the value proposition is expanded to new territories of application. Finally, the third phase – *high* – considers leadership stability and control; this is when the ecosystem is renewed. During this phase, the leader defends ecosystem control, and the value proposition is stable. Each phase of ecosystem leadership development can be coupled with one of the three different types of servitization strategy (horizontal axis). We adopted the servitization strategies proposed by Cusumano *et al.* (2015), comprising of smoothing, adapting, and substituting services, and we follow Frank *et al.*'s (2019) assumption that each strategy represents different servitization levels, and which is presented in the subsections below.

Servitization strategy

Ecosystem leadership development	High	Leadership control Stabilizing value-adding components Product related to standard services	Leadership control Stabilizing value-adding components Product related to customized services	Leadership control Stabilizing value-adding components Product substituted by services	High
	Moderate	Leadership emergence Value proposition extension Product related to standard services	Leadership emergence Value proposition extension Product related to customized services	Leadership emergence Value proposition extension Product substituted by services	Moderate
	Low	Threatened leadership Nurturing a community of partners and suppliers Product related to standard services	Threatened leadership Nurturing a community of partners and suppliers Product related to customized services	Threatened leadership Nurturing a community of partners and suppliers Product substituted by services	Low
					Renewal success

Figure 21: Conceptual framework for servitization strategy and ecosystem leadership development (inspired by the works of Cusumano et al., 2015 and Frank et al., 2019)

3.4.1 Framework configuration for Smoothing strategy

Smoothing services require simple, clear exchanges between the producing firm and consumers regarding the product technology and its uses, and can increase acquisition and retention as uncertainty declines (Cusumano *et al.*, 2015). When firms experiment with new technology and BMI, this can increase the resistance of some consumers to acquiring the new product due to uncertainty about its use (Anderson & Tushman, 1990; Cusumano *et al.*, 2015). This might induce a smoothing strategy to ease the consumer into using a new product that includes some services. In this strategy, the focus is on the product with the service acting only to increase sales and retain users. For example, a customer may purchase a computer from Apple, and separately purchase the extended warranty or insurance.

Adopting a smoothing strategy when leadership development is high is relatively less risky and less complex. That is because the ecosystem is mature, the value-added components are stabilized, renewal success chances are higher, leadership is stable, and smoothing services implies a less complex change in strategy. More complex, but still less risky is the adoption of a smoothing strategy when leadership development is moderate. That is because, at this stage, the ecosystem value proposition is being extended to other territories of application and changing this value proposition could be risky. Finally, implementing a smoothing strategy when leadership development is low becomes riskier, as the ecosystem is still being threatened.

However, if the incumbent firm is being threatened by disruptors, and changes are needed, this strategic choice might be considered necessary. This is the case with residential intercom providers. For example, Cogelec, a French intercom manufacturer, provides surveillance services alongside their product under their Intratone brand.

3.4.2 Framework configuration for adapting services

Adapting services refers to customization of the product based on services, major customizations which include new features aimed at individual consumers, training or consulting to introduce the consumer to new uses, and integration of the core product with other products (Cusumano *et al.*, 2015). The advantage of adapting services is that they enable experimentation which increases product functionality; in this sense, it is a win-win situation for both consumers and firms. Consumers have opportunities to request modifications to the product to fit their needs (von Hippel, 1994) while firms are able to improve the product based on feedback from consumers.

A firm following an adapting strategy when leadership development is high might consider low levels of risk; at this mature phase of the ecosystem firms know their customers well and are well positioned to offer services that will ease customers into novelty. When leadership development is moderate, firms need to consider a medium level of risk; that is because introducing novelty in an ecosystem where leadership is still being shaped might be too premature. Most probably firms following this path will need to rely heavily on strategic partnerships to help in the development of the new adapting services. Sometimes, however, these partnerships fail. This was the case with Thyssen Krupp Industrial Services. The company was created to reduce the parent company's exposure to the cyclical nature of steel production and sales. However, the expected synergies with the company's other core businesses did not fulfill the financial expectations. Thus, Thyssen Krupp decided to terminate its involvement in the services business by selling it off (Kowalkowski, Gebauer, Kamp, & Parry, 2017). Finally, when leadership development is low, following an adapting servitization strategy might be very risky. That is because the ecosystem leadership and value proposition are not mature, and the relationship with partners and suppliers is still being forged. Making changes in this phase will generate confusion, as it will not be clear, to consumers, partners, and suppliers, what the value proposition really is.

3.4.3 Framework configuration for substituting strategy

Substituting strategy challenges the assumption that services in product industries are primarily complements of products (Cusumano *et al.*, 2015). In this case, products are replaced by services. Instead of buying and owning things, consumers want access to goods and prefer to pay for temporary access to them (Bardhi & Eckhardt, 2012). There are numerous consumption models where access is enabled by sharing or pooling resources, products, and services refinement based on technology and a peer community (Belk, 2010; Gansky, 2010; Giesler, 2006). Examples vary from data processing services, software as a service, and car- or bike-sharing.

Firms adopting the substituting strategy might do so in any of the three phases of leadership development with little risk. That is because the change is mostly in the BM, meaning that the product remains unaltered; what changes is how customers will have access to the product. Instead of owning it, they will use it as a service. Rolls-Royce manufactures engines and for some years has offered a service package whereby customers pay by the hour according to the amount of time an engine is in flight. The engine itself is still the same, the way it is consumed is what has changed.

3.5 Research Method

Similar to Snihur, Thomas, & Burgelman (2018), this study follows the longitudinal theorizing method (Burgelman, 2011) by choosing an exemplary case (e.g. Burgelman, 1991; Danneels, 2011; Snihur, Thomas, & Burgelman, 2018) that illustrates the phenomenon of interest and enables theory generation and elaboration rather than theory testing (Siggelkow, 2007). The design was based on one in-depth case of an incumbent automotive firm and different levels of analysis (incumbent-level challenges and ecosystem-level responses). The case follows the effects of industry and technological changes on a firm, and the response of the focal firm to such changes.

To study the development of leadership over time we used a longitudinal design based on one case, Toyota, documented in the archival data. Following research on servitization types (Baines *et al.*, 2017; Cusumano *et al.*, 2015; Tukker, 2004), ecosystem phases (Moore, 1993, 1996, 2006), and the interplay between value creation and ecosystems (Autio & Thomas, 2020), we examine the disruption in the automotive industry caused by technological changes (e.g.

connected, autonomous, shared, and electric vehicles) to Toyota, an incumbent OEM firm. Toyota is a particularly attractive case for a longitudinal case study because in the last six years the firm has undergone innumerable changes to keep its ecosystem leadership, including a partnership with Uber, one of the automotive industry's main disruptors. We take the example of Toyota and Uber to exemplify how the shift in the transportation landscape has driven traditional automaker companies to embark on new servitization strategies to maintain their leadership status.

3.5.1 Data collection

We collected archival data covering Toyota and Uber partnerships between 2016 and 2021. 2016 was chosen as the start year as this was the year that Toyota and Uber started their cooperation. We searched Factiva for general media coverage¹⁵ and archival data including annual reports, press releases, specialist media¹⁶ reports, and newsroom interviews during the period 2016-2021. Data from Toyota's and Uber's press releases were also analyzed. Documents that did not address the partnership between Toyota and Uber, its evolution over time, and documents that did not show evidence of ecosystem leadership development were excluded from the sample. The data sources are detailed in Table 11. Archival data are appropriate to study our research question as this is free from bias (Snihur *et al.*, 2018). The large number of documents provided detailed insights into the evolution of an incumbent firm servitization strategy, and its repositioning as the ecosystem leader.

Table 11: Data sources, 2016-2021

Data source	Total number of documents (1240)	Number of documents relevant to the research topic (168)
<i>Internal</i>		
Press releases	242	9
Annual reports	7	4
Company's newsroom interviews	2	2
<i>External</i>		
General media	959	123
Specialist media	30	30

¹⁵ General media coverage included: Dow Jones, Reuters, Forbes, Financial Times.

¹⁶ Specialist media coverage included: Contify Automotive News, Just-Auto, Auto Business Daily.

3.5.2 Data Analysis

We followed an interactive process of moving back and forth between theory and data; this approach is appropriate for theory elaboration using case data (Merriam, 2002). We based the analysis on publicly available archival information, such as press releases, executive interviews in the media, and media coverage. We used archival data to generate a chronology of events on the evolution of Toyota’s servitization strategy through a partnership with Uber (summarized in Table 12). We then synthesized these data into a case narrative that reconstructs from 2016 until 2021 the evolution of that partnership. Next, we analyzed how Toyota’s choice of partnership resulted in new ecosystem alignments, and how those alignments changed over time because of new servitization strategies.

Table 12: Chronology of events between Toyota and Uber partnership

<i>Year</i>	<i>Description</i>
<i>May 2016</i>	<ul style="list-style-type: none"> • <i>Toyota and Uber explore ridesharing collaboration</i>
<i>January 2018</i>	<ul style="list-style-type: none"> • <i>Toyota launched new mobility ecosystem and concept vehicle at the 2018 CES. Uber will also join as a technology partner</i>
<i>August 2018</i>	<ul style="list-style-type: none"> • <i>Toyota’s president announces Toyota’s transition from an automobile company to a mobility company</i>
<i>April 2019</i>	<ul style="list-style-type: none"> • <i>Toyota and Uber extend collaboration to automated vehicle technologies</i> • <i>Toyota, Denso, and SoftBank Vision Fund to invest \$ 1 billion in Uber’s Advanced Technologies Group</i>
<i>December 2020</i>	<ul style="list-style-type: none"> • <i>Aurora acquires Uber’s self-driving unit, Advanced Technologies Group (ATG), accelerating the development of the Aurora Driver</i>
<i>February 2021</i>	<ul style="list-style-type: none"> • <i>Aurora Partners with Toyota and Denso to build and globally deploy self-driving cars</i>

3.6 Toyota’s Leadership Evolution Through Servitization Strategies

Toyota was founded in 1896 by Sakichi Toyoda as a weaving looms manufacturer. In 1933 the son of Toyota’s founder, Kiichiro Toyoda, challenged the company to do what many believed to be impossible, which was to go from building looms to building cars. Today his grandson, Akio Toyoda, is leading Toyota through another transition - from an automobile company to a mobility service company. This shift comes as a response to threats from disrupters. Cars are being increasingly electrified, and chips are taking over more functions which were formerly undertaken by mechanical parts, setting the stage for massive disruption across automotive ecosystems that have been in place for decades. Leading incumbent firms, such as Toyota, are focusing on new strategies to renew their ecosystem and maintain control over it. In this study, we examine one of Toyota’s strategies toward mobility services. In a period

of six years, Toyota adopted a servitization strategy that evolved and changed; and over time, Toyota's ecosystem leadership presence grew stronger in the renewed ecosystem.

3.6.1 Phase one: The first steps towards servitization

In 2016 the Toyota Motor Corporation (TMC) announced a partnership with Uber to lease vehicles to Uber drivers. As part of the agreement, Uber drivers can lease vehicles from Toyota Financial Services (TFS) and make payments from their Uber earnings. The leasing period is flexible and based on driver needs. The two companies also agreed to conduct ridesharing trials in countries that have yet to establish the practice. Furthermore, because Toyota and Uber have a shared purpose and a shared value proposition, that is to advance in-car technology, the agreement also included collaboration in R&D in other areas such as developing in-car apps that support Uber drivers, sharing knowledge, and accelerating their respective research efforts. These two actions can be viewed as a smoothing strategy, as car ownership is still the focus, and either the leasing service or the car apps service are means to attract Uber drivers to increase car purchases.

Ridesharing companies, such as Uber, are viewed as complementor disruptors to automakers, as they could impact car ownership, and consequently threaten the position of automakers (Adner & Lieberman, 2021). That is because ridesharing may decrease private car sales by enticing users to opt for alternative modes of transport instead of buying new cars. However, Toyota counterbalances this threat by adopting a smoothing servitization strategy. Furthermore, this strategy entailed a structural change in the alignment of Toyota's existing ecosystem. To collaborate with Uber, TFS adopted a new BM. Adopting new BMs that are beneficial for both parties is an important process when starting new partnerships (Spieth, Laudien, & Meissner, 2020), and even though leasing is an existing practice in the automotive industry, the proposed solution presents fundamental changes in BM components, such as revenue streams, client segment, and value proposition. Moreover, both companies agreed to share research and development efforts to achieve beneficial improvements to in-car technologies that would benefit Uber drivers.

The partnership between Toyota and Uber represents an important milestone in Toyota's strategy, as collaborative partnerships have positive effects on product-service innovation (Bustinza, Gomes, Vendrell-Herrero, & Baines, 2019). The company, which was conceived as an automotive firm, publicly declared it wanted to transition to a mobility firm. Shigeki

Tomoyama¹⁷, Executive Vice President, TMC, and President, Toyota Connected Company, stated: “As a mobility service platform provider, by collaborating with various companies and services, we would like to help create a new mobility society in order to offer safer and more convenient mobility to our customers”. Partnering with Uber is one of the first steps toward that goal. However, this new strategy implies changes that go beyond the firm’s boundaries. The partnership entailed changes in the alignment structure of Toyota’s ecosystem (Figure 22). It also came at a price. In this context, Uber appears as the ecosystem leader, as the services proposed by the new partnership serve Uber drivers and clients, which corroborates the assumption that disruptors can eventually reduce the influence and control of automakers (Adner & Lieberman, 2021). This was the case until 2018, when both companies announced the expansion of their collaboration.

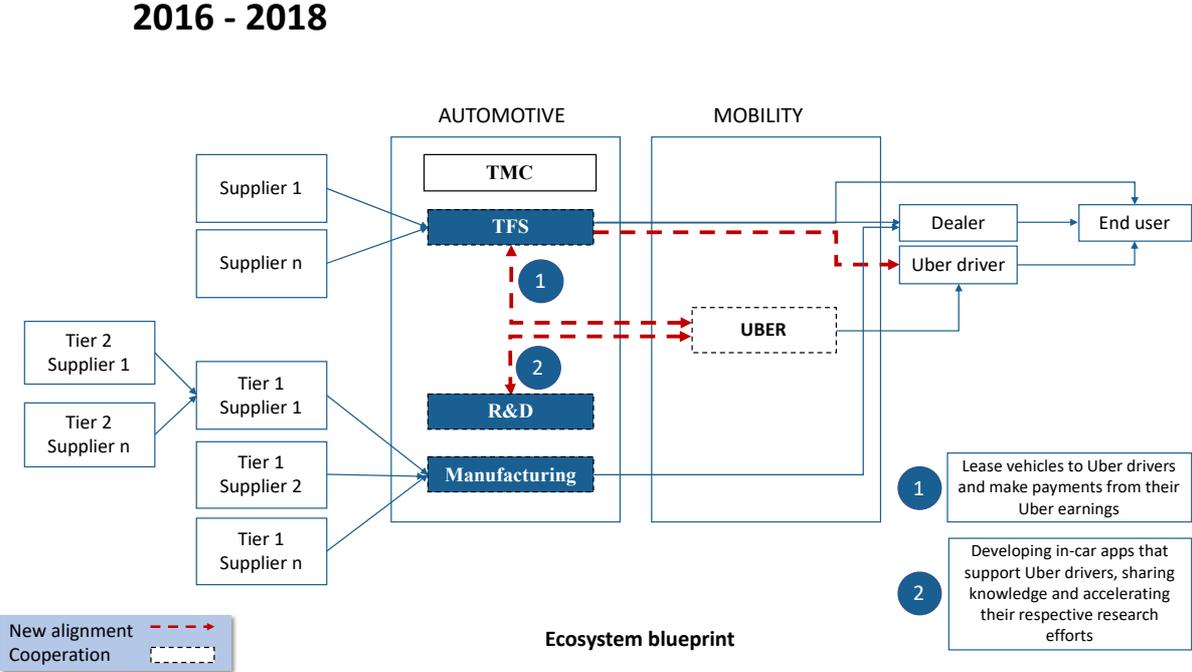


Figure 22: Toyota ecosystem blueprint in 2016 after collaboration with UBER

3.6.2 Phase two: The shift from automotive to mobility

In August 2018 Toyota and Uber announced that they had agreed to expand their collaboration to advance and bring to market autonomous ridesharing as a mobility service at

¹⁷ Toyota newsroom in October 2016. Last accessed August 9, 2021, at: <https://global.toyota/en/detail/14097157>

scale. "The deal is the first of its kind for Uber and signals our commitment to bringing world-class technologies to the Uber network," said Dara Khosrowshahi, Uber's CEO¹⁸. To accomplish this, technologies from each company are to be integrated into purpose-built Toyota vehicles to be deployed on Uber's ridesharing network. According to Shigeki Tomoyama¹⁹, executive vice president of TMC, the agreement and investment are part of Toyota's transformation strategy to becoming a mobility company, of which the aim is to provide a path for the safe and secure expansion of mobility services like ridesharing, including Toyota's Guardian technology, which offers some automated safety features such as lane-keeping, but which does not enable a vehicle to be entirely self-driven. Under this deal, the companies agreed to integrate Uber's Advanced Technologies Group (ATG) self-driving technology into the Sienna minivans for use in Uber's ride-hailing network. The vehicles could later be owned and operated by third-party fleet managers.

This new collaboration shifts the servitization strategy from smoothing to adapting, as it significantly expands the product functionality and helps the driver to develop new uses for the product or adapt it to novel conditions (Cusumano *et al.*, 2015). This time the product (Sienna minivans) is going to be modified to incorporate new technologies that will later be commercialized for ridesharing drivers. The final client, in this case, is the Uber driver (or other ridesharing companies) and, later, third-party fleet managers. This is a major shift in Toyota's BM and in Toyota's identity; from this point on, the company no longer wants to be seen as an automotive company, but as a mobility company. Uber ATG is now one of Toyota's Tier 1 suppliers and a partner to Toyota's Research Institute (TRI). This new agreement places Toyota as the ecosystem leader in all aspects related to research and development, product design, and strategy. In contrast to the previous case, in this relationship it appears that Toyota is the ecosystem disruptor as it switches from an automaker to a mobility company, hence threatening Uber's influence and control. Figure 23 depicts the alignment changes and new cooperation that emerged from this new deal and that lasted until 2020 when Uber ATG was acquired by Aurora.

¹⁸ Toyota news release, 2018. Last accessed July 15 2022 at: <https://global.toyota/en/newsroom/corporate/24330817.html>

¹⁹ Toyota news release, 2018. Last accessed August 21 2020, at: <https://global.toyota/en/newsroom/corporate/24330817.html>

The alignment changes also indicate that the partnership is ready to enlarge the critical mass of members of the ecosystem.

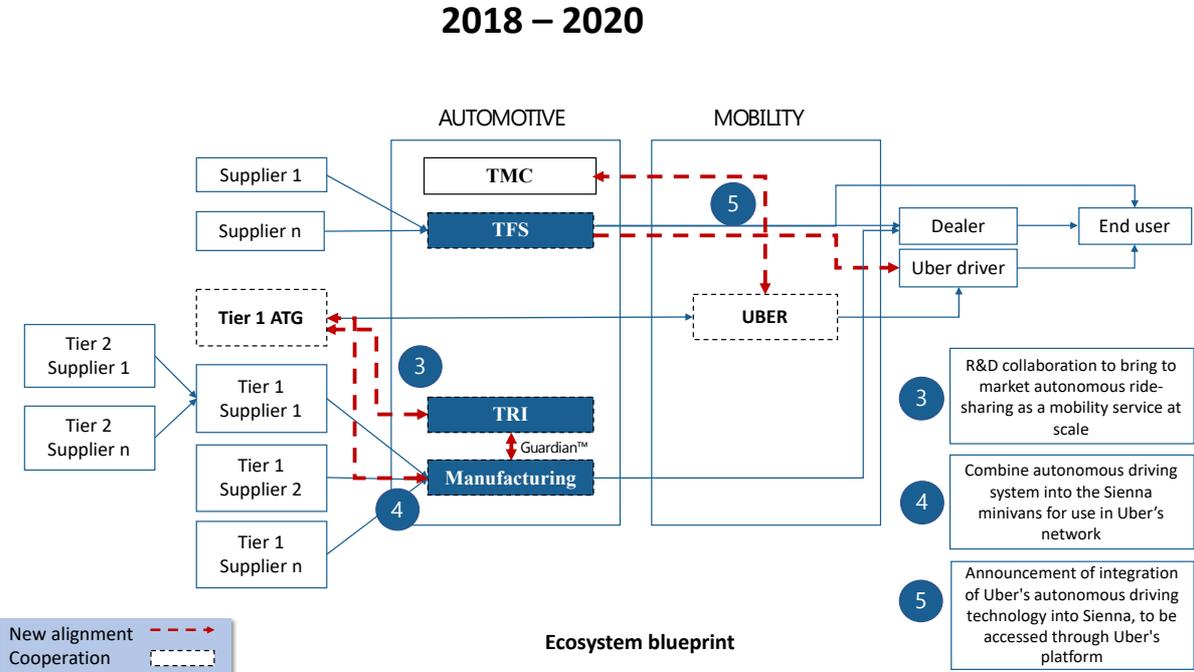


Figure 23: Toyota ecosystem blueprint in 2018 after new collaboration with UBER

3.6.3 Phase three: The consolidation of leadership

In 2020 ATG was acquired by Aurora, an autonomous driving startup. In 2021 Toyota and Aurora reached a deal to build self-driving taxis based on the Toyota Sienna minivan. In this new deal Toyota shifted its position within the ecosystem as a recognized leader as stated by Chris Urmson, the Aurora CEO: “Toyota has an unparalleled legacy, engineering expertise, leadership, and ability to deliver high-quality, affordable, and reliable vehicles. They’re also the preferred vehicle brand for transporting riders on ride-hailing networks²⁰. Denso, a major Japanese auto parts manufacturer, will also contribute to the project. Aurora and Toyota will work together to design and build the self-driving Sienna minivans with an aim to start testing

²⁰ Aurora news release. Last accessed July 15, 2022. <https://aurora.tech/blog/mobility-for-all-launching-the-aurora-driver-on-ride-hailing>

a fleet by the end of 2021. The joint development work in 2021 will lay the groundwork for the mass production and launch of these vehicles with Toyota on ride-hailing networks, including that of Uber. The partners also aim to explore the mass production of autonomous driving components with Denso and the creation of a services platform with Toyota that could manage financing, insurance, and maintenance of the self-driving vehicles. In these examples, *“leasing or rental arrangements leave the responsibility for repair or maintenance of the product with the manufacturer or leasing company, with the customer paying primarily for the usage of the product, as is the case in substituting service strategy”* (Cusumano *et al.*, 2015, p. 563). Even though it is too early to assess if the venture will be successful or not, a renewed ecosystem has emerged where Toyota succeeded in maintaining its leadership. It is now clear that Toyota is the leader and orchestrator of the new ecosystem.

This last step (Figure 24) indicates another shift in Toyota’s servitization strategy, resulting in a new ecosystem alignment. To satisfy permanent improvement, which is an important step toward ecosystem renewal, Toyota took some risks, such as accepting a fragile position during the early stage of ecosystem renewal. Through a chain of changes in servitization strategies, Toyota was able to smoothly transit from a fragile position to occupy the role of the ecosystem leader. Given that the new alignment between Aurora, Denso, Uber, and Toyota is not bilateral, and that these firms are interacting closely to continuously enhance the autonomous vehicle system, the challenge is, then, the coordination of these interactions to achieve system optimum. The success of their coordination will be a critical factor for autonomous vehicle performance (Adner & Lieberman, 2021).

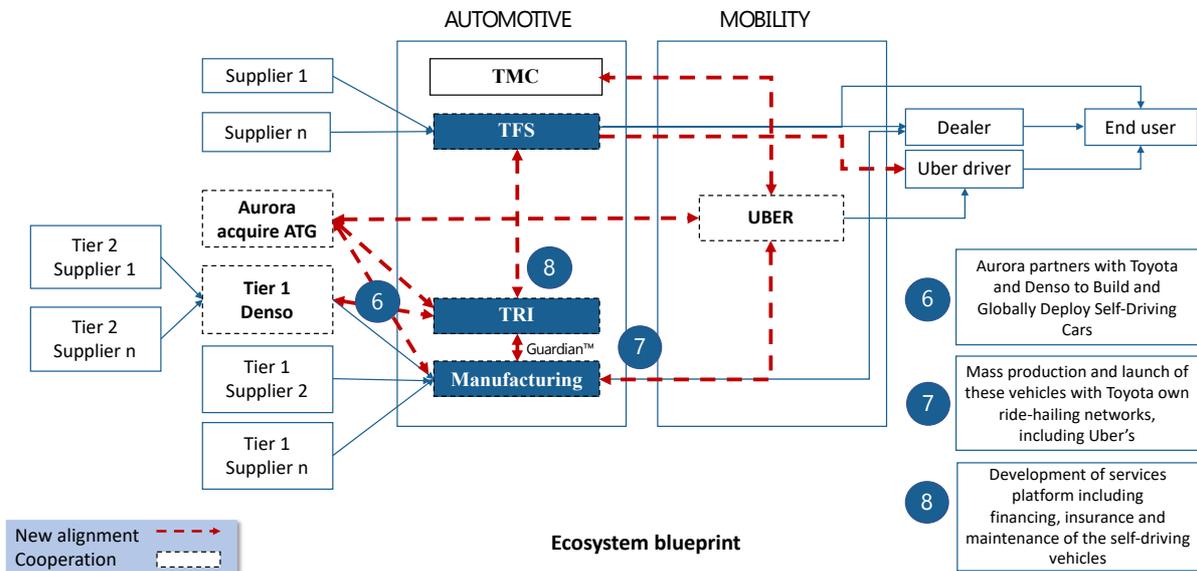


Figure 24: Toyota ecosystem blueprint in 2021 after agreement with Aurora and UBER

3.7 Discussion: Impact of The Proposed Conceptual Framework

Our research poses the question: “how may a threatened incumbent firm reassure ecosystem leadership through the adoption of servitization strategies?”. Our real-world example suggests that during the renewal stage, the incumbent firm adopts a sequence of three servitization strategies to stabilize its leadership position. During this process, the incumbent firm transitioned from a threatened position to one of control and leadership.

Based on our conceptual framework, Figure 25 graphically illustrates Toyota’s servitization trajectory. The framework indicates how threatened ecosystems can be renewed. Toyota, an incumbent firm, which was being threatened by new technologies and disruptors, managed to smoothly transition from a product-oriented strategy to a service-oriented one, and by doing so, it became the new ecosystem leader. By crafting the strategy, Toyota got the actors into place by agreeing to act in accordance with their strategic plan.

Toyota Servitization strategies evolution

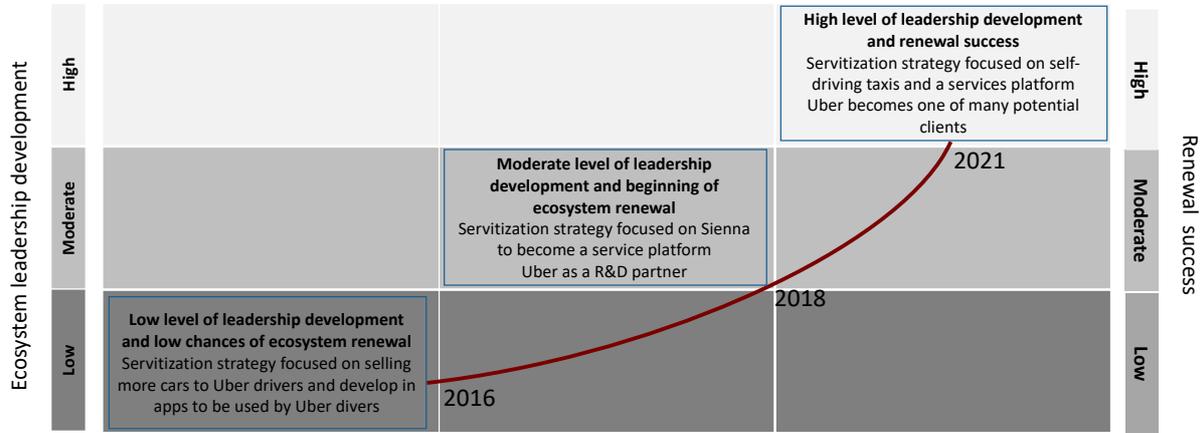


Figure 25: Toyota servitization evolution from 2016 to 2021

Our key insight concerns uncovering the interplay between servitization strategies and ecosystems. Our proposed conceptual framework offers a new and complementary perspective to the extant research on servitization and ecosystems. Our study reveals that product firms adopting a servitization strategy, in addition to affecting their competitive positioning, may have an impact on their leadership development. In other words, the decision to adopt a servitization strategy may help to determine how an incumbent firm could maintain its leadership within an ecosystem that needs to be renewed. However, when product-oriented firms change their value proposition to services, challenges arise (Zhang & Banerji, 2017). Thus, analyzing these challenges through an ecosystem logic lens, more precisely through the impacts on ecosystem alignment and related issues such as ecosystem orchestration, BMs, and ecosystem collaborations can be helpful. The design of the alignment structure is particularly crucial since all partners involved in an ecosystem pursue their individual agendas, which requires joint decision-making by all partners involved (Jacobides et al., 2018).

3.7.1 Challenges of orchestrating actors through ecosystem alignment

When new coordination issues arise, ecosystems provide the necessary setting to resolve them through alignment (Adner, 2017; Jacobides *et al.*, 2018). Thus, alignment is only part of an ecosystem logic when normal conditions change, and the alignment of actors becomes an issue (Adner, 2017). Firms across industries are witnessing continual waves of innovation and change. To cope with this context, firms need to find a stable structure of ecosystem leadership.

However, orchestrating innovation by leading actors in an ecosystem inherits several challenges (Linde *et al.*, 2021). To convince and implicate different ecosystem actors, Toyota was challenged to find the right incentives over the timing of investments, and who captures the greatest value at different phases of service generations. At first, it did so at the risk of losing its leadership status to Uber. That is because orchestrating diverse actors requires the proper alignment of diverse incentives among these new types of actors (Sandulli, Ferraris, & Bresciani, 2016; Visnjic, Neely, Cennamo, & Visnjic, 2016).

Moreover, shifting from product-oriented to service solutions represents a big challenge for firms and their associated ecosystem. The new value proposition is created, delivered, and captured differently, and it requires the alignment of activities among a diverse set of partners (Jovanovic, Sjödin, & Parida, 2021; Vinit Parida, Sjödin, & Reim, 2019). Ecosystem actors are dependent on each other's core competencies to create and deliver new value propositions, which implies a change of mindset in the supply chain of partners, as supplying physical goods and servitized offerings are different (Oliva & Kallenberg, 2003). The leading actor must take into consideration the perennality of the ecosystem, thus the leader needs skills and capabilities to orchestrate the ecosystem and guide all actors toward the delivery of the value proposition (Linde *et al.*, 2021).

3.7.2 Business models as a catalyst for ecosystem alignment

BMs are essential for ecosystem alignment. Demil *et al.* (2018) and Teece (2018) suggest that BMs and the ecosystem are neither independent nor static but co-evolve. Firms are increasingly required to adapt or design new BMs to maintain a competitive advantage in highly networked, dynamic environments (Weiller & Neely, 2013). Moreover, firms need to quickly understand the type of BM configuration that is possible within the industry and whether firms can switch between models (McNamara, Peck, & Sasson, 2013).

This matters, especially in servitization strategy. Some authors consider that servitization is more than a BM transformation, and is a catalyst for the transformation of the product firm (Ayala *et al.*, 2017; Kastalli & Van Looy, 2013). In this case, the ecosystem plays a pivotal role in helping to underpin how and under what conditions this transformation takes place. As can be seen from the Toyota case, BMI is part of every servitization strategy but differs in its levels of innovation and openness. Firms adopting a smoothing strategy will be more likely to adapt an already existing BM, as seen by Toyota's first strategy to create a new BM tailored for Uber

drivers. Adapting services tend to require BMI since some of the services provided did not exist previously. Finally, substituting services involves a high level of BMI or an open BM.

3.7.3 Leading collaborations in ecosystems

Ecosystems are guided by non-hierarchical governance which requires a certain level of collaboration amongst the actors while still allowing for products and services to be produced independently. To enable collaboration, it is assumed that the leader successfully manages to coordinate and engage all the actors. The process of collaboration in ecosystems should be mutually beneficial for all partners and generate added value for their direct and indirect stakeholders. This stems from the collaborative advantages that accrue to the individual organizations which collaborate to achieve an objective that would otherwise be infeasible (Huxham, 1993; Penin *et al.*, 2011). Through Toyota's leadership, Toyota, Uber, Aurora, and Denso are seeking to resolve a technological challenge (autonomous driving) by collaborating with each other.

Collaboration is important for ecosystem alignment. Innovative services can be offered either by the product firm (e.g., if they perceive it is difficult to codify and transfer localized knowledge) or made accessible in the ecosystem. To maintain competitiveness, firms might be more inclined to engage in open innovation activities to accelerate internal innovation (Joel West & Bogers, 2017; Zott *et al.*, 2011). Opening up the innovation process to collaboration with external partners is then, inevitable (Radziwon *et al.*, 2017).

3.8 Conclusions and Implications

The strategy The strategy management literature has largely addressed the problem of disruptors (e.g. Adner, 2002; Adner & Lieberman, 2021; Christensen, 1997; Danneels, 2004; Foster, 1986). These studies mostly focus on what defines disruptors, organizational factors impacting incumbent response, and the economic drivers of disruption. Most of them analyze product-oriented firms, where the fate of the incumbent is almost always fatal given the threat of the disruptors. Our novel contribution is to highlight the powerful impact of servitization strategy in ecosystem leadership, allowing latent ecosystems to battle disruption. We demonstrate that a leader was able to realign the ecosystem and convert an initially negative relationship into a positive one. New technologies pose challenges to old and new firms. Even though a disruptor might have the initial upper hand, by pursuing innovation incumbent firms

might choose to collaborate with rival disruptors to speed up the value creation process and profits from the new technology.

We have shown how actors with central roles in the ecosystem can adapt themselves to the system. In some of our examples, the adaptation process is unpretentious, where the role of the ecosystem leader is not evident. In other examples, the incumbent firm reclaims its ecosystem leadership role. In this latter situation, the focus is on the value proposition and on the optimum alignment where every actor accepts their role to achieve a common goal.

Beyond affecting ecosystem alignment, servitization strategies can alter the direction of ecosystem evolution. This process changes the research, innovation, and investment efforts of the actors, as well as the external environment that governs their access to resources. Ecosystem alignment through servitization also affects BMs and collaborations within ecosystems.

Understanding the alignment of power and the role of actors in ecosystems is becoming increasingly relevant given the rise of new technologies, in which servitization often prevails. The example we have provided is impacted by four new technologies (connected, autonomous, shared, and electric vehicles). In the automotive industry, these technologies are converting the transportation industry into a mobility industry. Established automotive firms, which have dominated their complex global supply chain for decades, now face challenges in dealing with new players as the industry moves towards mobility.

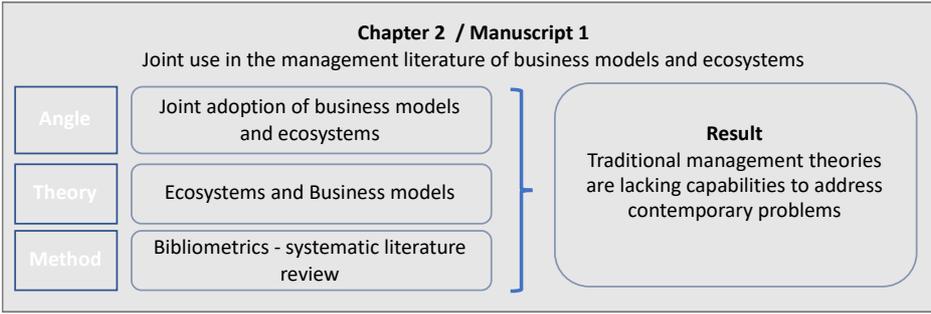
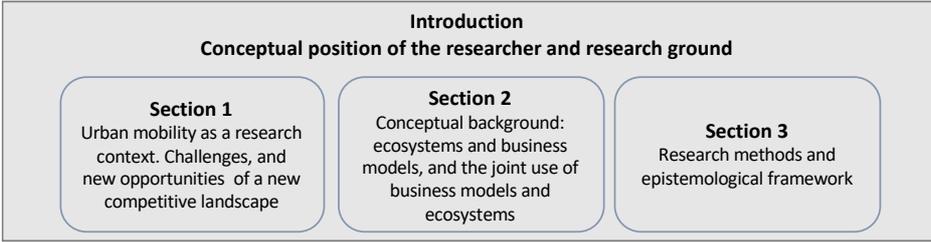
From a managerial perspective, our framework lays out a comprehensive road map of potential opportunities and actions for ecosystem players to consider. We highlight what some may have considered spontaneously, as many firms in the automotive industry have carried out servitization strategies. However, we hope that most managers will find it useful to learn the different paths available through the different types of servitization strategies, as well as the implications for their ecosystem alignment. Such awareness can provide insights for the formulation of an effective competitive strategy as well as for choosing the right alignment structure considering the targeted value proposition.

Our framework provides a unified view of two important management works of literature - servitization and ecosystems - and has provided empirical support for the existing model of Cusumano et al. (2015). The framework we propose has potential implications for research on strategic positions, ecosystem strategy, and servitization strategy. This study has some

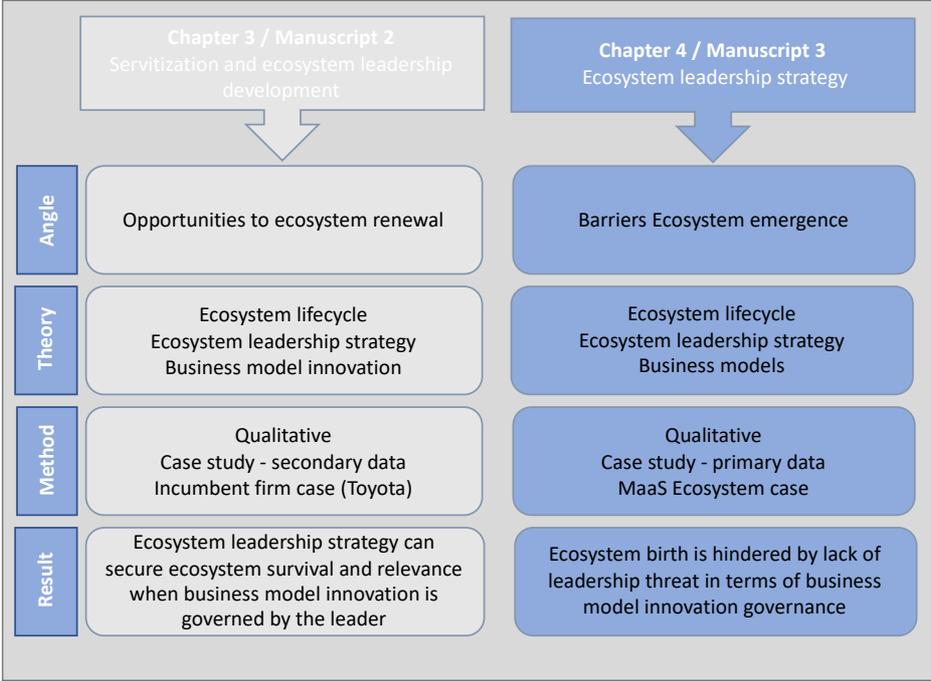
limitations which suggest directions for future research. The first limitation is that this is a conceptual study that is based on the current state of the art and a real-world example based on secondary data. Although the effort of gathering and systematizing real-world examples may be valuable, further empirical research is needed to validate elements of the framework and refine the framework analysis conditions. Qualitative case studies could provide more insights into the different elements proposed by our framework.

Chapter four: What factors hinder ecosystem emergence? The case of the Mobility-as-a-Service ecosystem in the South of France

General phenomenon
Members of urban mobility ecosystems are facing several challenges in terms of business model innovation and leadership development



Research question
How can leadership strategy and business model innovation foster or hinder new ecosystems?



Chapter 5
General conclusion and discussion
Leadership strategy at the ecosystem level could be defined as business model innovation governance by a leader. This role is well assumed when there is a leadership co-evolution risk. It is however less well performed on the contrary case. Thus, business model innovation governance raises the chances of ecosystem birth and survival.

What factors hinder ecosystem emergence? The case of the Mobility-as-a-Service ecosystem in the South of France

4.1 Extended Summary

This Manuscript was co-authored with Amel Attour and Annabelle Gawer

4.1.1 Motivation

Mobility as a Service (MaaS) is fundamentally changing the way urban transportation systems are seen by refocusing the service on customers and providing them with an end-to-end trip. Furthermore, is a driving factor in the mobility transformation to discover alternatives to car ownership, as well as a regional development, and a solution towards sustainable mobility.

MaaS value proposition is clear and simple: an app that connects users to all transport modes available to get them from point A to B. Due to the endless possibilities and opportunities, MaaS attracts multiple players willing to be part of the MaaS ecosystem. In the private sector, MaaS attracts companies such as transport operators, IT and telecommunication companies, energy providers, start-ups, and even giant players such as Google. In the public sphere, MaaS is seen by local authorities as a response to the need to provide attractive, inclusive, and sustainable mobility for all. The first MaaS ecosystem emerged in 2016 by Whim Global. Since then, several MaaS initiatives have emerged, but thus far, a successful MaaS ecosystem has not fully emerged.

Thus, why is the MaaS ecosystem failing to emerge if we have all the elements to form the MaaS ecosystem, such as a clear value proposition, willing players, resources, and technology? The literature on ecosystem emergence, explore many success cases, but the reasons why ecosystems fail to emerge are much less regarded. While the literature has so far dealt with successful cases, it seemed to us that, understanding ecosystem failure to emerge, would make it possible to better understand what leads ecosystems to emerge in the first place. In addition, studies focusing on ecosystems are limited to the study of private actors, disregarding the importance of public actors to ecosystems in key areas, such as mobility. Public actors can be considered leaders in mobility ecosystems, such as MaaS, given their position of authority. Contrary to private actors, that need to conquer the leadership role, public actors are attributed to the role of leader. This particular case raises questions about the ecosystem leadership threat of substitution. In other words, how does leadership evolves in a context where threats to

replace the leader are considered low? And how the public leader deals with the challenges of integrating the different mobility services business models (private and public) into a single platform (MaaS)?

4.1.2 Objectif

The main objective of this Manuscript is to study what hinders ecosystem emergence.

4.1.3 Implication for the doctoral thesis

This third Manuscript is based on theoretical elements as well as on exploratory empirical returns, it, therefore, marks the end of the thesis. In line with the results of the previous Manuscripts, this Manuscript focuses more precisely on the barriers to ecosystem emergence. This Manuscript attempts to understand the birth stage of the ecosystem life cycle, and the role of the leader in ecosystem emergence. This research considers business models at the ecosystem level and how leadership can or should contribute to the design of such models. Thus, concluding the inquiry led by this thesis to understand how ecosystem leadership and business model innovation can foster or hinder new ecosystems.

4.1.4 Valorization

4.1.4.1 Conferences

- Foerster, Attour, Gawer. 2021. “What factors hinders ecosystem emergence? The case of the Mobility as a Service ecosystem in France”. Conference R&D management 2021

4.1.4.2 Awards

- Best Paper in Track: Design of New and Industrial Ecosystems. R&D Management Conference 2021

Manuscript 3: What Factors do Hinder Public-Private Ecosystems' Birth? The Case of Nice Metropolis' Mobility-as-a-Service Ecosystem”

Abstract

The What are the main factors that hinder ecosystems' birth in the case of public-private ecosystems? The ecosystem literature addressing the birth stage of ecosystems has so far mainly focused on how privately governed businesses build and manage their ecosystems. However, a clear understanding of the key factors that disrupt the birth of public-private ecosystems is largely absent in the ecosystem literature. To investigate this question, we conducted from 2020 to 2022 an empirical qualitative study on the Mobility-as-a-Service (MaaS) ecosystem in the Nice metropolis in Southern France.

We find that ecosystem birth is hindered by three factors: the leading public actor's absence of ecosystem leadership strategy, leadership implementation failure, and the absence of an ecosystem-level business model. More precisely, these factors hinder the materialization of the ecosystem value proposition. This is important because understanding the factors that hinder ecosystem birth can enable public and private actors driving new ecosystem initiatives to identify potential risks and find solutions that could help avoid ecosystem failure.

Keywords: ecosystem leadership strategy, ecosystem birth, ecosystem leadership, ecosystem business models, MaaS ecosystem.

4.2 Introduction

This This paper examines the causes leading to ecosystems' failure at the birth stage of ecosystems' life cycle. The ecosystem literature that addresses the birth stage of ecosystems has mainly focused on how existing privately governed businesses build and manage their ecosystems (e.g., Adner, 2006, 2017; Adner & Kapoor, 2010, 2016; Gawer & Cusumano, 2002; Hannah & Eisenhardt, 2018; Iansiti & Levien, 2004c; Moore, 1993, 1996). They conclude that two elements are central to ecosystem birth, the first being the existence of a leader, and the second is a clear value proposition offered by the ecosystem to end-users. Nevertheless, an understanding of the critical factors that hinder ecosystem birth is notably lacking in the ecosystem literature.

The ecosystem literature suggests that successful ecosystem birth depends on the existence of a leading organization that guides actors towards a new value proposition (e.g., Adner, 2017; Adner & Kapoor, 2010; Gawer, 2014; Iansiti & Levien, 2004c; Moore, 1993, 1996). However, less is known about the factors that prevent ecosystem leaders to exert their role successfully at the birth stage. Furthermore, studies in ecosystem birth have mainly focused on ecosystems dominated by private actors (e.g., Adner, 2017; Gawer & Cusumano, 2002; Hannah, 2015; Hannah & Eisenhardt, 2018; Pushpanathan & Elmquist, 2022). Ecosystems that are led by public actors have received far less attention in the management literature, yet such public actors play a key role in a number of sectors including healthcare, mobility, and education. Such public actors face challenges of a systemic nature especially when they aim to provide interconnected digital services, as for example in the NFC (Near-Field Communication) ecosystems in the French cities of Nice, Strasbourg, and Bordeaux (Attour & Rallet, 2014). Furthermore, public actors are subjected to specific constraints compared to private actors, including politically-determined budgetary pressure, and rising citizen expectations, in addition to challenges faced by all actors such as legacy technology systems, and the fast pace of technology evolution (Naranjo-Gil, 2009; Simmonds, Gazley, Kaartemo, Renton, & Hooper, 2021).

To investigate what causes ecosystem birth failure, we conducted an empirical qualitative study from 2020 and 2022 focusing on the Mobility-as-a-Service (MaaS) ecosystem in the metropolis of Nice in Southern France. Nice metropolis consists of 49 municipalities and 550 000 inhabitants. Nice is also embedded into three contiguous agglomerations, including Cannes

Pays de Lérins, Communauté d'Agglomération Sophia Antipolis, and Monaco. Combined, these territories represent more than 70% of the daily passenger flow of Nice (INSEE²¹).

MaaS is a recent mobility service concept that aims to bridge the gap between public and private transport operators on a city, intercity, and national level (Kamargianni & Matyas, 2017). Over the last ten years, there have been hundreds of attempts to develop and deploy MaaS ecosystems in most countries in the world (Capgemini invent & Autonomy, 2020). The objective of most MaaS initiatives around the world has been to successfully integrate hitherto fragmented modes of transportation and transport services (such as planning, booking, access to real-time information, payment, and ticketing) that travelers need to use to conduct a trip.

Despite well-funded initiatives toward sustainable mobility, supported by political programs both at the national level and by the city of Nice, the Nice metropolis' MaaS ecosystem has been diagnosed as failing to birth (CEREMA²²). These assessments evaluate access to real-time information, payment, ticket validation, booking, and user profile account.

This context is especially fruitful to study the factors that may hinder ecosystem birth, because the MaaS ecosystem in the Nice metropolis (launched in 2016 as part of the open data project), despite apparently strong political support, financial endowment, and well-publicized program, has still not evolved beyond the birth stage and has been failing to successfully emerge.

The remainder of the paper is structured as follows: Subsection 4.3 offers the conceptual background summarizing the current literature on the ecosystem life cycle, ecosystem construct, and ecosystem leadership strategy, motivating the research question. Subsection 4.4 describes the empirical context. Subsection 4.5 the case, and 4.6. research methodology. Finally, we present the results (Subsection 4.6), and we conclude with a discussion and avenues for future research (Subsection 4.7).

²¹ <https://www.insee.fr/fr/statistiques/4652889?sommaire=4763049> retrieved 01/05/2022.

²² See for example the assessment performed in 2021 by CEREMA (Centre for Studies and Expertise on Risks, the Environment, Mobility, and Urban Planning). CEREMA is the major French public agency for developing public expertise in the fields of urban planning, regional cohesion and ecological and energy transition for resilient and climate-neutral cities and regions. All assessments are available at: <https://smart-city.cerema.fr/maas/lignes-dazur>; <https://smart-city.cerema.fr/maas/palm-bus>; <https://smart-city.cerema.fr/maas/zou>.

4.3 Conceptual background

Ecosystems are complex systems, as such, they are not easy to build and sustain (Reeves, Lotan, Legrand, & Jacobides, 2019). Hence, a lot of attention has been given to how successfully build healthy ecosystems (e.g., Adner & Kapoor, 2016b; Cusumano & Gawer, 2002; Iansiti & Levien, 2004b; Moore, 1996). The focus on how to build successful ecosystems has created a blind spot obscuring the fact that a much larger number of ecosystems fail at different stages of the ecosystem life cycle. In fact, in a recent study Reeves et al. (2019) find that out of 57 ecosystems they studied in 11 different sectors, only fewer than 15% of ecosystems were sustainable in the long run. However, except for this study, little is known about ecosystem failure. Moreover, what are the factors that hinder ecosystems at the birth stage of the ecosystem life cycle.

Furthermore, given the ecosystem concept origins (Moore, 1993, 1996)²³, most ecosystem studies have focused on private ecosystems. However recently, with the rise of new digital services in public governed sectors, such as mobility, healthcare, communication, and public higher education, scholars have started to investigate public-private ecosystems (e.g., Basole, 2009; Hofmann, Sæbø, Braccini, & Za, 2019; Smith, Sochor, & Karlsson, 2019). As in the case of studies focused on private ecosystems, these studies do not focus on factors that hinder ecosystem birth.

Therefore, the answer to the question “what are the factors that hinder the successful birth of public-private ecosystems?” remains unclear. To answer this question and given the scarcity of literature addressing factors that hinder public-private ecosystem birth. We build our conceptual background on three ecosystem frameworks: ecosystem life cycle, ecosystem formation, and ecosystem leadership strategy.

4.3.1 Ecosystem life cycle

The ecosystem life cycle has been studied by different ecosystem scholars (e.g., Moore, 1993, 1996; Reeves et al., 2019; Rong & Shi, 2015). According to Moore (1993; 1996),

²³ Moore (1993,1996) coined the term “business ecosystems”. He defines business ecosystems as companies that are members of not a single industry, but as part of an ecosystem. In business ecosystems companies co-evolve capabilities around a new innovation.

ecosystems evolve through four distinct stages: birth, expansion, leadership, and self-renewal (or death).

4.3.1.1 Birth

The birth phase is marked by the conceptualization of a value proposition, it is a stage of idealization of new technologies or concepts. Even though the ecosystem is still immature, it can at least fulfill the needs of initial customers and challenge the status quo (Moore, 1996: 70). During this stage an ecosystem leader will emerge, the leader is the one that mobilizes others to follow in the new venture (Moore, 1993: 79). What is unclear is how the leader emerges, how the leading firm develops the value proposition, and how they develop the value capture mechanisms to create incentives to attract others to join the ecosystems that will enable the ecosystem to successfully birth and move to stage two.

4.3.1.2 Expansion

The second stage – expansion - starts with a core set of synergetic relationships and investment in increasing scale. In stage two competition raises, as other ecosystems might emerge delivering a similar value proposition. Therefore, the focus here is to build a strong and vast base of allies, be they customers, suppliers, or partners, and establish a critical mass within the market that is being exploited. The measure of success during this stage is the capacity to enlist the necessary support, which will enable business expansion.

4.3.1.3 Leadership

The third stage – leadership - is marked by competition within and outside the ecosystem. New entrants may threaten the mature ecosystem while existing members quarrel over the conquered success. In this stage the leader might be questioned and even blind-sided by other ecosystem members (Moore, 1996: 77). Since in stage three competition is fierce it is important that members keep their bargaining power over other members. The leader must also seek control over the ecosystem's future. One of the biggest challenges of this stage is how to balance control and authority without losing the capacity to innovate, failing to do so might lead to the death of the ecosystem.

4.3.1.4 *Renewal*

Lastly, the fourth stage – renewal - occurs when mature ecosystems are threatened by rising new ecosystems and innovations, so ecosystems need to find a way out of obsolescence. Renewing ecosystems demands finding new ways to innovate. Incumbent ecosystems might fall into the trap of convenience, and try to delay change, however, this risky move might lead to the extinction of the ecosystem (Moore, 1996: 81).

Moore (1993, 1996) identifies the existence of a clear ecosystem leader to be paramount to a successful ecosystem birth. This is because the leader is the one who initiates the process of rapid, ongoing improvement that draws the entire community toward a successful future. In other words, there are two main criteria for ecosystem success, the figure of the leader and clear a value proposition. Thus, even though Moore (1993, 1996) does not mention ecosystem failure, we can assume that if a leader does not emerge and the value proposition is not clear, then ecosystems will fail.

4.3.2 Ecosystem formation

The strategic management literature offers two complementary approaches to understanding what forms ecosystems, that of: “ecosystem-as-affiliation”, which sees ecosystems as communities of associated actors defined by their networks and platform affiliations; and that of “ecosystem-as-structure”, which views ecosystems as configurations of activity defined by a value proposition (Adner, 2017: 40). We use these two perspectives to ecosystem formation to understand how ecosystems are formed. By understanding how they are formed, we can then analyze the missing factors that could hinder ecosystem birth.

4.3.2.1 *Ecosystems-as-affiliation*

Ecosystems-as-affiliation as described by Adner (2017) refers to the stream of management literature that sees ecosystems as communities of associated actors defined by their networks and platform affiliations. The emphasis lies on the breakdown of industry boundaries, interdependencies, and symbiotic relationships in productive systems. Ecosystem-as-affiliation offers a macro-level analysis and focuses on general governance and community enhancements, hence paying less attention to the specific mechanisms of value creation. Within this research stream, research focusing on ecosystem birth includes the works of Moore (1996), Gawer & Cusumano, (2002), Iansiti & Levien, (2004c), Jacobides, Knudsen, & Augier, (2006), and Autio

& Thomas (2014). All these authors mainly focus on members' positions and roles in the ecosystem. We can group the members into two main categories, the leaders and the niche players (Iansiti & Levien, 2004c). Questions of interest in this stream relate to exploring network density, the role of actors within the ecosystem, and power relations.

In the ecosystem-as-affiliation perspective, the leader has a pivotal role in ecosystem birth. Iansiti & Levien (2004c) emphasize that the leader can influence the health of their ecosystems. An important aspect of leadership is the ability of a leader to attract followers, one of the reasons is that by attracting important followers, company leaders may stop them from helping other emerging ecosystems (Gawer, 2014; Moore, 1993).

4.3.2.2 Ecosystems-as-structure

Adner, (2017) defines ecosystem-as-structure as a complementary approach to ecosystem-as-affiliation. In this view, ecosystems start with a value proposition, and then it seeks to identify the set of actors that need to interact for the value proposition to materialize. Given this premise, this perspective aims to investigate ecosystems' birth. For ecosystem birth, the author proposes four basic elements: activities, which specify the discrete action to be undertaken; actors, which are the entities that undertake the activities; positions, which specify wherein the flow of activities actors are located; and links, which specify transfer across actors. This logic extends the strategic view to encompass indirect activities and actors that the focal firm might not have control over, therefore being a more comprehensive perspective of ecosystems.

In the ecosystem-as-structure perspective, the materialization of the value proposition has a pivotal role in ecosystem birth. According to Adner (2017) without a clear value proposition, the ecosystem will fail to birth. For a value proposition to materialize the author suggest that three key components need to be considered: alignment structure, which refers to the mutual agreement among the members regarding their positions in the ecosystem; multilaterality, which refers to relationships that are more than bilateral interactions; and partners, which refers to the members whose combined efforts lead to the materialization of the value proposition.

Although distinct, these views have commonalities: in both views, scholars have examined how ecosystems are purposefully built by leading firms with a clear value proposition in mind, in other words, successful ecosystems. Even though these perspectives do not directly teach us about ecosystem birth failure, they help us understand what elements are necessary to

ecosystem birth, more precisely about the alignment structure that will allow members of the ecosystem to coordinate around the materialization of the value proposition. However, to do so, ecosystem leaders need to design and implement an ecosystem strategy approach.

4.3.2.3 Ecosystem leadership strategy

An ecosystem leader is a firm whose vision others defer to, successful leadership is thus contingent on willing followership (Adner, 2017; Gawer & Cusumano, 2002; Iansiti & Levien, 2004a; Moore, 1993). The leader sets out the ecosystem strategy. An ecosystem strategy departs from the traditional view where the locus of attention is on the innovation itself, to think about innovation as an interdependent process (Adner & Euchner, 2014). This effort demands a change in mindset. When following an ecosystem logic, leading firms need to develop the capacity to share information to co-innovate. That is why making the set of dependencies as explicit as possible as early as possible is key to avoiding ecosystem birth failure.

4.3.2.4 Public and Private ecosystems

Thus far we have presented what the management literature offers in terms of the ecosystem life cycle, ecosystem formation, and ecosystem leadership strategy. However, these perspectives were elaborated to address private ecosystems, in other words, ecosystems formed by private actors. Little is known if those formulas also apply to public-private ecosystems.

The literature indicates that in public-private ecosystems, ideally, private actors could play a larger role in bringing innovation to public offers (i.e., mobility services such as MaaS platforms); while public actors could facilitate external innovation through outflows of their offerings to other actors (Smith et al., 2019). However, it is up to the public actor to decide if it will absorb new roles or accepts external actors to take on new roles (Smith et al., 2019). This perspective demonstrates, that contrary to private ecosystems, where the leader position is vulnerable and can be challenged at any time, in public-private ecosystems, the public actor has more power.

Therefore innovation in public-private ecosystems often involves changes in values and value systems (Bannister & Connolly, 2014). That is because, while the focus on private values suggests private organizations should carry out practices to gain market and obtain profit, the focus on public values should carry out practices to establish fair, equal, and just societies

(Cordella & Bonina, 2012). Thus, the challenge lies in finding the balance between these values, otherwise, the private-public ecosystem may fail to birth.

4.4 Empirical context: Mobility-as-a-service (MaaS)

The business environment has changed dramatically in the last 25 years as a result of the servitization process (Genzlinger et al., 2020). The literature on business, sustainability, and transport systems often argues the need to shift the focus of transport planning and policy from the physical infrastructure to mobility and accessibility (e.g., Genzlinger et al., 2020; Hull, 2008). MaaS is one initiative in that direction. The development of MaaS initiatives has occurred in many countries in Europe (such as France, Finland, Germany, and Austria) over the past four years. One, if not the first example is Whim which was proposed by the private Finnish start-up MaaS Global to the public in the summer of 2017 (Audouin & Finger, 2019). Whim is also considered the most advanced MaaS solution currently available. Other examples include WienMobil (Vienna, Austria) and Mobilitätsshop (Hannover, Germany), which have lower levels of integration compared to Whim (Cerema, 2019).

4.4.1 MaaS value proposition

Most characterizations of MaaS share the view that MaaS's objective is to offer door-to-door mobility services and to be an alternative to owning and using a private car (Butler, Yigitcanlar, & Paz, 2021; Lyons, Hammond, & Mackay, 2019). MaaS is therefore associated with a clear value proposition - to offer every public and private transport option in a single app, in which both payment and booking are handled while providing the users with dynamic route-planning information at the same time. However, not every MaaS presents the same level of successful integration. Studies conducted in Europe show that the current status of integration across MaaS initiatives is heterogeneous and can vary from level 0 to level 4, not necessarily in a linear way (Capgemini invent & Autonomy, 2020; Lyons et al., 2019; Sochor, Arby, Karlsson, & Sarasini, 2018). Level 0 represents no operational, information, or transaction integration across modes. Level 4 is the ultimate MaaS goal with total integration of operational information and transactional integration across modes for all journeys. According to these studies, no MaaS solution has achieved level 4 yet, the highest level achieved is level 3, and only very few platforms were able to do so (e.g., Whim, Moovizy, UbiGo). Level 2 has some but not all available modal combinations to achieve the integrated experience. Level one has some low modes of integration such as travel planning, and finally, level 0 has no integration,

they represent single mobility services (Capgemini invent & Autonomy, 2020; Sochor et al., 2018). Figure 26 graphically describes the 4 levels of MaaS integration.

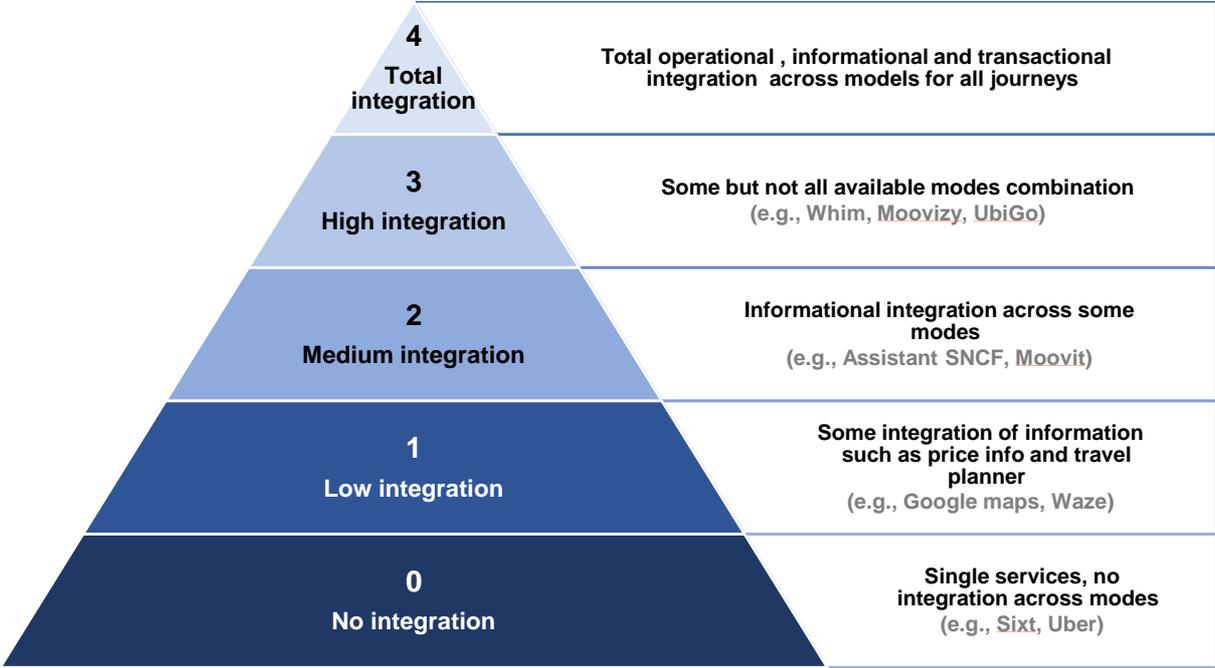


Figure 26: Maas levels of integration (based on the work of Sochor et al., 2018)

4.4.2 MaaS ecosystems

MaaS initiatives tend to create interactions across a constellation of various types of actors, including public actors be they municipal or regional, private firms such as mobility and transportation operators, manufacturers, and start-ups such as mobility, payment, and ticketing platforms. These constitute an alignment structure of the multilateral set of partners that need to interact for a focal value proposition to materialize directed toward delivering one value proposition or solution to users, and as such qualify as ecosystems (Adner, 2017).

4.4.3 MaaS ecosystem leadership

In most countries, MaaS ecosystems have the particularity of being led by public actors. By default, in most countries, mobility is organized by the public actor as a service to citizens. For this reason, the leadership and organization of this ecosystem are often attributed by the national government to local governments or agencies. The leader is defined by law and recognized by the ecosystem (Butler et al., 2021; Jittrapirom et al., 2018). That is not to say that the private actors have no influence on the matter. It is in fact the opposite. The arrival of new private

players in the mobility sector is reshaping the regional mobility offer (Hofmann et al., 2019). MaaS platforms are changing the role of public players and the Public Transport Authorities by creating a demand for innovative mobility services (Capgemini invent & Autonomy, 2020). Therefore, even though the current leadership belongs to the public actor due to regulatory constraints, the power balance between private and public might shift in the near future.

4.5 Case study: The development of MaaS in the Nice Metropolis

To explore the difficulties that are plaguing the birth of MaaS ecosystems, we chose the case of the MaaS ecosystem in the Metropolis of Nice – France. Nice is among the top 100 smart cities in the world (IESE Cities in Motion Index, 2020²⁴), and has deployed numerous mobility projects in the last years. Some examples include the flagship project Nice-Saint Augustin multimodal transport hub. This new major infrastructure will offer a strong intermodality offer between the SNCF²⁵ network, the tram lines as well as all the urban and interurban buses of the Nice Metropolis and the region coming from the west of Nice and the North. In 2022, the site will host the temporary TER station and TGV (High-speed train) station, complete with a car park relay with 280 places, and in 2023, a new bus station with 20 bus platforms. Another important project is the final station - named Nice airport station - and built as part of the New Provence Côte d'Azur Line (LNP- CA). The project should receive the first TGV trains by 2028. To all this, there is also the creation of “a bicycle park” to develop soft modes of transport. The cost of these projects, which advocates a sustainable construction policy, is estimated at 180 million euros. Another major project currently taking shape is the future multimodal hub of the neighboring city of Cagnes-sur-Mer which will provide a direct link between the new Nice station, tram lines, and buses.

Currently, in place, we can cite other local initiatives that aim to develop an integrated mobility solution such as La navette maritime Nice-Monaco; the tramway extension; and the ZOU pass in the South Region of France. However, the overall assessment from CEREMA²⁶ is

²⁴ IESE Business School - IESE Cities in Motion Index 2020 / ST-542-E p. 2. Last consulted May 9th 2022: <https://media.iese.edu/research/pdfs/ST-0542-E.pdf>

²⁵ SNCF (Société Nationale des Chemins de Fer) is France's national state-owned railway company. Founded in 1938, it operates the country's national rail traffic along with Monaco, including the high-speed rail TGV (Train à Grande Vitesse).

²⁶ Assessments available at: <https://smart-city.cerema.fr/maas/lignes-dazur>; <https://smart-city.cerema.fr/maas/palm-bus>; <https://smart-city.cerema.fr/maas/zou>.

that those initiatives have not yet achieved their full MaaS ambition. The partial integration nature of these projects places them on level 2 of MaaS integration, where travelers can only have access to some integrated journeys and some transport modals.

Just like in other European cities. In Nice, the mobility system is managed by local authorities. A recent law in France called LOM “Loi d'orientation des mobilités” (mobility orientation law) created the figure of the AOM “Autorité organisatrice de la mobilité” (mobility organizing authority). This new law boosts public action powers in the mobility sector at three levels - city, agglomeration communities, and metropolitan levels. The public actor is then, responsible for regulating all decisions related to all means of mobility, including traditional (e.g., train, bus, tramways) and new ones (e.g., carsharing, carpooling, self-service vehicles, etc.). They are also responsible for a range of complementary services (e.g., sharing mobility, micro-mobility, ridesharing, transport on demand, school transport, active transport, shared transport, and social transport), urban logistics, and large flow generators (e.g., hospitals and shopping centers). In addition to this increased scope, mobility infrastructures such as mobility hubs, parking lots, and cycling paths complete the scope of action of AOMs. This change in the scope of action imposes AOMs as leaders in the mobility ecosystem.

As the ecosystem leader, the AOM in Nice has the duty to develop the mobility plan, “Plan de Mobilité” (PDM). Likewise, there is an obligation to establish a committee of partners, associating at least representatives of users/inhabitants and representatives of employers, in order to involve them in the mobility policy carried out in the territory. This tangle of laws and responsibilities is intended to define roles and the structure of the mobility ecosystem. However, even though Nice Metropolis is a territory of innovation, and it plays a central role in the development of mobility solutions, it has not yet been able to provide a viable MaaS solution to its inhabitants. As defined by Kamargianni & Matyas, (2017:3) “*MaaS is a user-centric, intelligent mobility distribution model in which all mobility service providers' offerings are aggregated by a sole mobility operator and supplied to users through a single digital platform*”. To this date, despite the mobility efforts by the implicated actors in the ecosystem, the birth of the MaaS ecosystem has still not occurred. Hence, the MaaS ecosystem in Nice is confined to the early stage of the ecosystem life cycle with uncertainties surrounding its successful birth. It, therefore, offers an interesting example of how a city deals with challenges faced by the birth of MaaS ecosystems.

4.6 Method

To address our research question, what are the factors that hinder the successful birth of public-private ecosystems, we conducted a qualitative study in Nice Metropolis - France.

This context is especially fruitful to study the factors that may hinder ecosystem birth, because the MaaS ecosystem in the Nice metropolis, launched in 2016 as part of the open data project, despite apparently strong political support, financial endowment, and well-publicized program, has still not evolved beyond the birth stage and has been failing to successfully emerge.

The research design is an in-depth case study, using an embedded design to collect data at the inter-organizational level. We follow Aguinis and Solarino's (2019) 12 transparency criteria for qualitative research.

4.6.1 Data collection

Our research design is an in-depth case study, using an embedded design to collect data at the inter-organizational levels. Because the input provided by elite informants is critical for building and testing theories in the strategic management research (Basu and Palazzo 2008), the empirical analysis draws on a sequence of 20 in-depth interviews conducted with local authorities and elite informants from the mobility sector in Nice and related cities in the South Region of France and local authorities. These experts were active participants in our case as active members of the mobility sector in Nice for several years; they all hold decision-making positions, and they are at the forefront of the ongoing changes in the mobility sector (cf. Table 13). We interviewed members from local mobility authorities, as well as large mobility manufacturing and service companies operating in the region for several years, and mobility start-ups.

Interviews were exploratory, semi-structured, and lasted about an hour. They were all recorded, and later transcribed with the assistance of NVivo. Data were collected until no new codes were added to the data structure, suggesting we had reached theoretical saturation (Locke, 2001).

Table 13: Classification of participants

Interviewer	Organization Focus	Public/Private	Organization Size	Organization Coverage	Position Level	Job Function	Job Title
Pri1	Transport Manufacturer	Private	Large	Global	Director	Marketing	Marketing, Strategy, and Digital Services Solutions Director
Pri2	Transport Manufacturer	Private	Large	Global	Director	Project Management	Project Director
Pri3	Automotive Manufacturer	Private	Large	Global	Management	IT	Technical Solutions Architect
Pri4	Automotive Manufacturer	Private	Large	Global	Management	IT	Research Engineer
Pri5	Mobility Services	Private	Medium	France	Management	Business development	Community Development Manager
Pri6	Mobility Services	Private	Small	France	Founder	Business development	CEO
Pri7	Mobility Services	Private	Small	Metropole Nice Côte d'Azur (MNCA)	Founder	Operations	Transport Planning and Modeling Specialist
Pri8	Mobility Services	Private	Small	Metropole Nice Côte d'Azur (MNCA)	Founder	Operations	Transport Planning and Modeling Specialist
Pri9	Tourism Services	Private	Small	Regional	Founder	IT	CEO
Pri10	Mobility Services	Private	Small	France	Founder	Operations	CEO
PP1	Transport Operator	Private Public	Large	Global	Director	Business development	Director of "New Mobility" Activities of the Côte d'Azur
PP2	Energy Provider	Private Public	Large	Global	Management	Project Management	Project Manager - Key Accounts – French Departments
Pub1	Public Administration (AOM)	Public	Medium	Region CASA	Director	Public Management	Mobility, Transport, and Travel Director of the CASA Region
Pub2	Public Administration	Public	Medium	Metropole Nice Côte d'Azur (MNCA)	Director	Public Management	Director of the MNCA tramway
Pub3	Public Administration	Public	Medium	Regional	Director	Communication	Communications and Brand Director
Pub4	Public Administration (AOM)	Public	Medium	Region CASA	Director	Public Management	Deputy Director Mobility Travel Transport
Pub5	Public Administration (AOM)	Public	Medium	Metropole Nice Côte d'Azur	Director	Public Management	Planning, Housing, and Mobility Director
Pub6	Public Administration (AOM)	Public	Medium	Region Pays de Grasse	Management	Public Management	Head of travel service - public transport
Pub7	Public Administration (AOM)	Public	Medium	Region Cannes Lérins	Management	Public Management	Mobility Manager
Pub8	Public Administration	Public	Medium	France	Management	Project Management	Energy and Prospects Engineer, Transports & Mobilities

4.6.2 Data analysis

Figure 27 presents our data structure, highlighting the categories and themes from which we developed our framework. We used open coding to identify relevant concepts in the data and grouped them into categories. In the first step of the analysis, interview transcripts were entered as text files in NVivo, and were coded based on “in vivo” words. These comprised phrases, terms, or descriptions offered by participants, address the difficulties that are plaguing

the birth of the MaaS ecosystem. Through this process, we identified first-order codes, or terms and language adequate at the level of meaning of the participants' (Maanen, 1979).

Next, our analysis of the interview narratives followed the accepted sequence of open, axial, and selective coding (Corbin & Strauss, 2008). The data was analyzed and interpreted by the authors separately to confront their interpretations. After several rounds of discussions, we identified an initial set of noticeable concepts.

We then proceeded by probing for the context conditions that gave rise to phenomena, exploring connections between emerging concepts. We only kept and recorded as findings those relationships that were validated by multiple informants and that were consistent with archival data. We concluded by validating core concepts and systematically relating them to each other to form our data structure (Gioia, Corley, and Hamilton 2013).

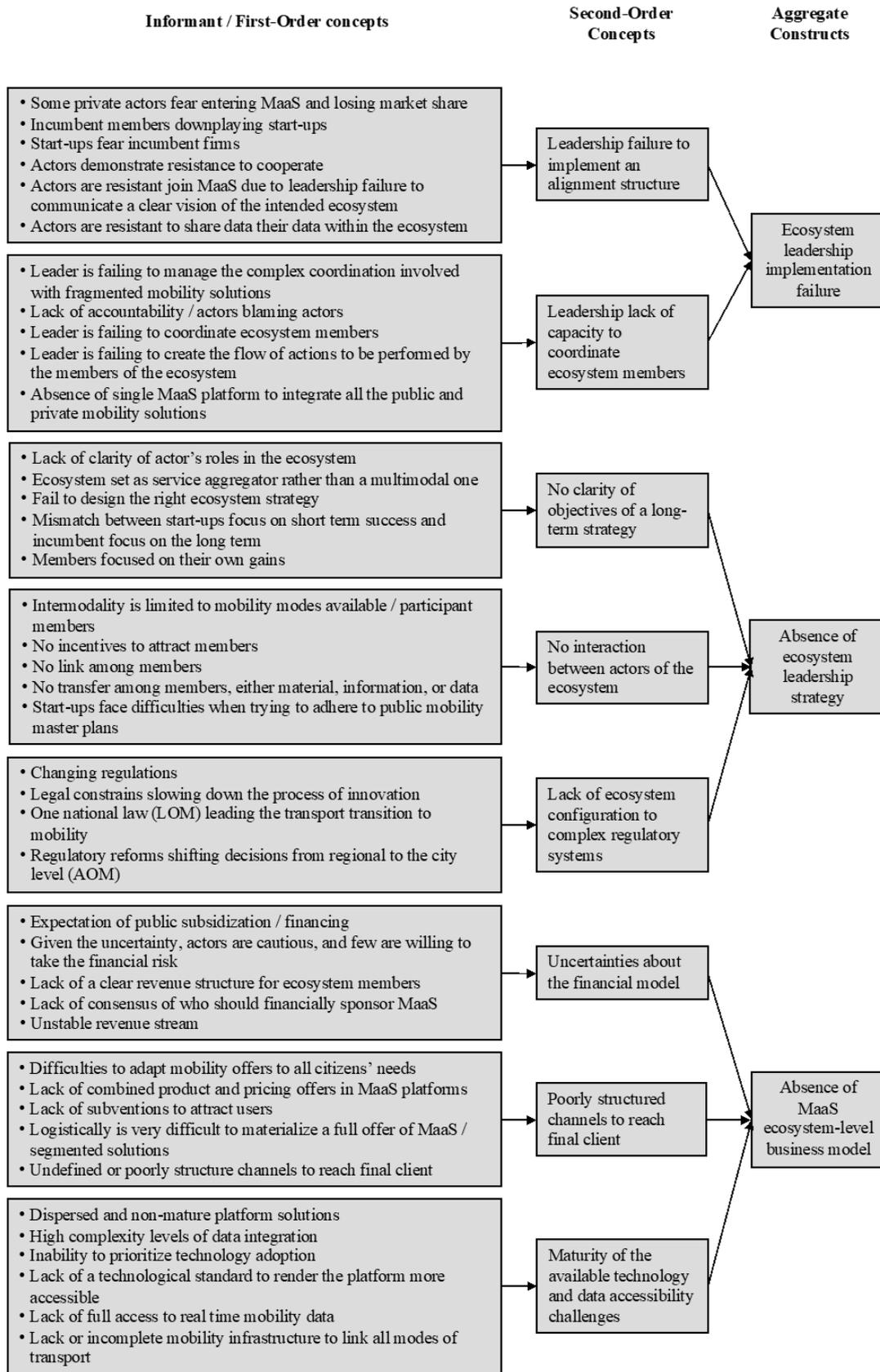


Figure 27: Data structure

4.7 Results

As a smart city, the Metropole of Nice has taken upon the challenge to develop a new mobility plan. This plan includes the ambitious vision of deploying MaaS as the main platform that aggregates all modes of transport available in one single application. This implies the new alignment of actors, which constitutes an ecosystem logic (Adner, 2017) and the birth of a new ecosystem (Moore, 1996). According to the literature, two elements are essential to ecosystem birth, a clear value proposition and the emergence of a leader (Adner, 2017; Moore, 1993, 1996). The MaaS ecosystem in Nice has both. However, the ecosystem is struggling to birth. Our results indicate that those elements alone are not enough for ecosystem success at the birth stage. That is because MaaS ecosystems are different from traditional ecosystems governed by a private actor whose aim is to secure a dominant position within a market or to solve a market failure. Public actors already have the dominant role, they aim to provide services to citizens and improve their quality of life.

Our results indicate three main factors to ecosystem birth failure. Notably, (i) ecosystem leadership implementation failure, (ii) absence of ecosystem leadership strategy, and (iii) lack of MaaS ecosystem-level business model. Each barrier hinders a structural element of both ecosystem birth and the ecosystem-level business model. Below we describe the main findings of our result.

4.7.1 Ecosystem Leadership Implementation Failure: hindering alignment and coordination amongst actors at the ecosystem level

Our results indicate that the leader is not fulfilling his role. Notably, due to (i) leadership failure to implement an alignment structure, and (ii) leadership's lack of capacity to coordinate ecosystem members.

4.7.1.1 *Leadership failure to implement an alignment structure*

Results show that niche players (which make up the bulk of ecosystems) are hesitant to join the MaaS ecosystem. Skepticism about MaaS, followed by resistance to working together stands out in the results of the analyses.

“Overall, MaaS is a comparison tool. Private mobility service providers do not necessarily want to be compared with each other, especially with other modes. If you are, for example, a

dominant scooter operator like Lime, you don't necessarily want to be compared, in the same application, with less developed operators like Tote. MaaS tends to level up the field. If you have a MaaS application, you will unlock scooter A or B in the same way. This is not necessarily the wish of operator A, who has invested a lot to be dominant. Moreover, mobility operators are in competition with each other, they don't want to live together. Then, there is another element, which is that private mobility operators, such as scooters, are not in the same space and time as the city. They don't know if they will live in 6 months. These are very aggressive investment models and market share models. As a result, private operators do not necessarily have the availability or the desire to open up their information systems and enter into IT projects. They have more urgent operational subjects than what the local authorities are proposing to them.” (Pri6)

The public/ private ecosystem coordinated by the public actor is failing to ensure and encourage a process of competition and equity between actors. The rigid process of public tender, known by the actors, tends to hinder the construction of a productive alignment and favors larger companies versus small businesses and start-ups.

“MaaS is a new concept, is a new service. Public markets today are not built to launch new things. There is a difficulty in writing calls for tenders, and in buying something that, today, is not established”. (Pri6)

“Our main difficulty, beyond the regulatory and legal difficulties, is that, here in France, the public domain is strongly regulated, we cannot contract just anyone and just anyhow. A private company cannot access a public place, without a contract, or convention, or a call for tender”. (Pub5)

As a consequence, smaller companies are resistant to joining the ecosystem for lack of support and fear of being diluted by larger companies. The lack of trust reflects the resistance to cooperating and sharing data.

“There are often small companies that do not want to get into MaaS because they are afraid of being eaten up by the big companies.” (Pri7)

4.7.1.2 Leadership lack of capacity to coordinate ecosystem members

Ecosystem coordination refers to how actors interact with each other, how they are linked, how roles are defined, and how the flow of actions is to be performed by each ecosystem member (Adner, 2017). However, in our case, this coordination is not reached because actors don't have a clear definition of their positions within the ecosystem. The MaaS ecosystem is extremely complex, and the failure to coordinate reflects this complexity. This lack of coordination and transfer amongst actors indicates that links are compromised and with that the structure of the ecosystem. The lack of coordination highlights leadership failure, as one of the roles of the leader is to be able to coordinate actors. This failed leadership makes it very challenging to establish the other actors' roles, hence the activities that need to be undertaken are left unclear. As a result, actors are in constant battle with each other, often one blaming the other for problems within the ecosystem.

“The big barrier, in fact, is that there are several organizations that are at war with each other. There is a lot of confrontation, so it's not always easy.” (Pri9)

Furthermore, MaaS is the platform that integrates the different modes of transport. Therefore, defining the governance to enable the integration of different actors within the platform emerges as a central point to MaaS. However, the diversity of actors makes the development of the platform a complex activity to be developed and coordinated. The lack of coordination obscures how and by whom this platform should be developed, owned, and operated. As a result, we witness technological fragmentation and a lack of definition of ecosystem members' roles.

“We are capable to create a platform, that will allow private companies to offer their services. But the question is, is it the role of the public administration to create its own platform, or should its creation be outsourced to third parties?” (Pub5)

This lack of clarity hinders the adoption of a model, and to this date, no actor has been able to coordinate all the fragment solutions in one single platform. This hinders the materialization of the value proposition. As a result, instead of working together towards a solution to solve the problem, many actors start developing their own solutions, which only adds to the complexity of the problem, as it pollutes the ecosystem with too many underutilized solutions. This focus on internal or short-term solutions emphasizes the role of a single firm and overlooks the

systemic participation of actors in the dynamic of cocreation that enables the value creation process. Instead of working in silos, firms within the ecosystem need to facilitate the broad integration process (Wieland, Hartmann, & Vargo, 2017). That is why the lack of coordination adds factors that hinder ecosystem birth, which in turn hinders the materialization of the value proposition.

4.7.2 Absence of ecosystem leadership strategy: hindering the cooperation process of the MaaS ecosystem

The leader's inability to coordinate indicates that the leader is struggling to find the proper alignment structure. Given that alignment is key to the ecosystem leadership strategy (Adner, 2017), this raises a very important question, is there an ecosystem leadership strategy in place? Our case results indicate that the ecosystem strategy is absent. More precisely our results indicate that there is: (i) no clarity of objectives and a long-term strategy plan, (ii) no interaction between actors of the ecosystem, and (iii) a lack of ecosystem configuration to the complex regulation system.

4.7.2.1 *No clarity of objectives and a long-term strategy*

Today members of the ecosystem are not sure what is on the agenda for the future of MaaS. Despite the clear value proposition proposed by MaaS, the inability of the leader to engage and coordinate prevents the definition of long-term goals. The absence of clear objectives gives rise to divergent positions and hidden agendas. Divergent positions and hidden agendas act as opposing forces, preventing the members of the ecosystem from moving in the same direction. There is clearly a lack of actor alignment exacerbated by the absence of coordination and common objectives. In this antagonistic context, the co-construction process becomes weak. The inclusion of new actors becomes a tortuous and discouraging path, preventing the construction of the cooperative environment necessary for ecosystem birth.

“The challenges of MaaS depend on who is addressing it. Everyone has different goals and different agendas... We don't really know what objectives are behind each of the actors, today it's quite fluid.” (Pri7)

No clarity regarding the long-term strategy and objectives disrupts the ecosystem, paralyzing actors. As a result, uncertainties arise regarding the leader's maturity to materialize the value proposition.

“It [MaaS] must be politically supported by the territory. However, the territory must be mature. Technologically the solution is ready. Now we must wait for the right guidance.” (PP1)

This context is disorientating, and actors, who despite sharing the same vision, become inert when faced with the lack of clarity regarding the long-term objectives. An inertia that prevents the design of the structure and implements a solid foundation to build the MaaS ecosystem of tomorrow. In the combination of these elements, a scenario of uncertainty is established, where individualism overcomes the ambition to cooperate, hindering ecosystem birth.

4.7.2.2 No interaction between actors of the ecosystem

The lack of a long-term ecosystem leadership strategy leads to skepticism regarding the MaaS. In this scenario, actors do not clearly see the incentives to join the MaaS ecosystem and cooperate. Hence, interactions amongst actors are extremely low. This lack of interaction translates into the limited exchange of data and information needed to build the MaaS.

“Today, the nerve of the war is real time[data]. We try to work mainly with real-time data. However, real-time data is jealously guarded by the transport operators precisely because they fear their re-use by third parties.” (Pri6)

Given that the MaaS solution is a platform that bundles all mobility services in one single app, this hesitation to cooperate and share data poses an important barrier to the birth of the MaaS ecosystem. In other words, the MaaS ecosystem faces difficulties at birth because the digital platform does not exist, while the complementary assets are ready. Furthermore, the lack of interaction also reveals the fragmentation in the flow of activities. This scenario creates zones of conflict of interests, causing an effect of repulsion between the actors, and intensifying the absence of interaction. While some actors try to push toward the MaaS, others tend to defend the status quo and avoid change.

“There are many reasons why MaaS has not fulfilled its promise. One of them is because different players have different agendas. At the end of the day, Maas is a tool for comparison. It is very hard to come to agreements, and many private operators are not motivated to do so.” (Pri10)

4.7.2.3 Lack of ecosystem configuration to complex regulatory systems

The regulatory system arising from the transformation of urban mobility, and the technological solutions adopted by the actors in the ecosystem are in the consolidation phase. The mismatch between the evolution of the legal framework and the adoption of new technologies slows down the innovation process.

“Maas is a new service, is a new concept. And public markets today are not made for launching new things. There is a difficulty in writing calls for tenders, and for the cities to buy something that is not yet in the system.” (Pri10)

An ecosystem leadership strategy is then necessary to cope with the consolidation of the new legal framework for mobility, as well as the regulation of new technologies. However, this process is still incipient, and it poses some challenges.

“Let’s look at the autonomous vehicle for example. If we could only have the authorization. Because today, the regulatory framework does not allow us to do what we would like with the autonomous vehicle. The regulatory framework needs to evolve a lot.” (Pub4)

Furthermore, the new regulatory framework for mobility has brought about profound structural changes. Actors in the transport ecosystem, accustomed to interlocutors at regional and departmental levels, began to have cities as interlocutors. This change frustrates traditional actors, that now must deal with several interlocutors.

“We are confronted with problems of territorial segmentation. Whenever we want to do something, we need to have the approval of each administration. This is very time consuming.” (Pri11)

It also makes the value architecture more complex. The set of direct and indirect laws reveals the legal complexity to which different actors are exposed to. The overlapping of new technologies, previously distant from the mobility ecosystem, is bringing actors closer to regulatory frameworks such as GDPR²⁷, and legislation on connectivity between vehicles, and open data. Thus, the impact of the complexity of the legal framework on the mobility ecosystem,

²⁷ The General Data Protection Regulation (GDPR) is a regulation in EU law on data protection and privacy in the European Union (EU) and the European Economic Ar

without a clear strategy plan, can be seen as a factor hindering the development of MaaS, and more precisely to the materialization of the MaaS ecosystem's value proposition.

4.7.3 Absence of MaaS ecosystem business model: hindering the value proposition materialization

Our results demonstrate that the MaaS ecosystem lacks a business model mainly due to (i) uncertainties about the financial model, (ii) poorly structured channels to reach the final client, and (iii) challenges related to the maturity of the technology and data accessibility.

4.7.3.1 *Uncertainties about the financial model*

The lack of a clear revenue structure for ecosystem members to combine product and pricing offers in a MaaS platform is a bottleneck to MaaS scalability and adoption. To this date is not clear to the members of our case how it would be financially beneficial for them to join the MaaS platform. On the contrary, they fear that by joining MaaS they may lose market share to other means of transport, in other words, they fear the competition. This is true, especially for startups, which are still developing their client base. Therefore, entering the "battlefield" with other companies seems very risky to them. Because the competition is too strong for these small firms, they refuse to co-exist together. They, therefore, refuse cooperation, which is also a characteristic element of ecosystems. This refusal clearly hinders the materialization of the value proposition.

"We don't have a financial model associated with MaaS. As long as we don't have the MaaS financial model, no actor will join the MaaS if he does not have a financial model behind it; or if does not help to strengthen its position and become a key player."(Pri7)

Mobility in urban areas is mostly routine. Before they even begin their journey, many users have already decided on the mode of transportation and which app they will use. Changing people's habits is not easy. Members in our sample believe that to attract people to adopt MaaS they need subventions. They also believe that these subventions need to come from the public authority, in this case, the ecosystem leader. However, to this date subventions towards the MaaS solution have been rare.

“In fact, what you have to understand, what I am telling you, is that co-financing is essential. In any case, a community that wants to stimulate MaaS adoption will have to subsidize the journeys.” (Pri5)

4.7.3.2 Poorly structured channels to reach final clients

The MaaS value proposition brought actors together around a shared vision of a seemingly door-to-door mobility solution. This proposal captivates attention due to the idealistic possibility of a fluid integrated mobility that is both mass-centric and personalized. Thus, the MaaS proposal needs to be supported by the alignment structure of different actors that together will deliver a perfect mobility combination to different client segments. However, reality diverges from the idealized MaaS ambition.

Failure in business model design exposes the limitation of the channel structure. Trying to consolidate all users' mobility needs tilt to generalization, however, MaaS proposes a personalized solution, this paradox renders MaaS logistics extremely complex. Transport solutions are then not necessarily viewed as complementary but in competition with each other.

“Its [MaaS] objective is to integrate a whole bunch of applications, for example, car sharing, public transport, etc. in one single place. But technically, it's quite complicated to have something that manages to coordinate all that.” (Pri7)

Furthermore, MaaS is a new concept. It requires users' behavioral change. However, little has been done to reach out to users. One point raised in our results is that some of the services could benefit from subsidies to incentivize users to adopt new mobility solutions.

“In any case, a city that wants to attract users to new mobility services, such as carsharing, needs to subsidize the service, even if just a little bit. That's how we can reach out to users.” (Pri5)

The lack of channels to reach out to clients poses a fundamental problem in terms of value proposition materialization. That is because even if the perfect solution is indeed materialized, it will be useless if it does not reach the final user. Hence, elaborating the proper channels becomes an important task in the MaaS ecosystem.

4.7.3.3 Maturity of the available technology and data accessibility challenges

Our results show that, to this date, the public leader has not been able to prioritize the adoption of a single fully integrated MaaS platform. Instead, they have adopted different platforms for different services. As a result, different apps for public transport continue to grow. Furthermore, some of these solutions are redundant. For example, they have launched a solution called “Pass Sud Azur”, which they market as “the complete travel offer for the Alpes-Maritimes”. This service offers the possibility of traveling by bus, train, or tram, throughout the region. However, this solution is very similar to other solutions currently in place (e.g., ZOU Pass), thus they compete with each other. Furthermore, they only incorporate the traditional public modes of transport. Thus, they lack to provide a multimodal one-stop-shop for mobility.

“In my opinion, we launched it [Pass Sud Azur], but I would say that we launched it very quickly because there was a political will to launch it. It was time to do it... And then, you have to think that there is this additional solution, the ZOU Pass, which has persisted and that people use them, which will fall, but for the moment they both co-exist.” (Pub 7)

The failure to adopt a single platform is made even more difficult due to the lack of data standardization. Harmonizing the whole set of solutions into a single platform has been proven to be challenging in our case. The leader is still undecided about developing its own MaaS platform or opening the possibility for a private platform operator. This indecision is clearly one main barrier to the MaaS value proposition materialization.

“The question that could be asked, should the administration create its own platform, or on the contrary...This is where it's hard.” (Pub5)

The granularity of public transport management, different mobility ecosystems under the same department, and the territorial characteristic impose an integration at the departmental level. Despite the apparent administrative disorder, the LOM makes clear the role of the metropolis of Nice as an ecosystem leader. Although the central elements for ecosystem birth are clearly identified, as the literature proposes, ecosystem birth encounters factors hindering success. These conditions lead us to conclude that the MaaS ecosystem in Nice has not been able to successfully manage the birth stage of the ecosystem life cycle, i.e., they have been failing at the birth stage.

4.8 Discussion

Our results point out three main factors hindering the birth and stability of the MaaS ecosystem in Nice: (i) ecosystem leadership implementation failure, (ii) absence of ecosystem leadership strategy, and (iii) lack of MaaS ecosystem business model. By relating these three factors to ecosystem theory, three distinct facts can be highlighted. The first focuses on the role of public leaders in specific ecosystems such as the one of MaaS. Second, it highlights the importance of business model design at the ecosystem level, more precisely when planning the ecosystem leadership strategy. Finally, it also indicates the complementarities between two ecosystem approaches, the one of “ecosystem-as-affiliation” and “ecosystem-as-structure”. Below we will discuss all these four issues.

4.8.1 Public actor difficulties to fulfill the leadership role

The ecosystem literature highlights the importance of the leader in the different stages of the ecosystem life cycle. More precisely, at the birth stage, the leader is seen as the fundamental actor which’s vision is shared and followed (Gawer & Cusumano, 2002; Iansiti & Levien, 2004c; Moore, 1993, 1996). However, this literature is biased by its view of the private actor as the figure of the leader. In private-governed ecosystems, roles are not given, they are earned. In other words, the leader is the one that is capable to orchestrate the ecosystem, guiding all actors towards the alignment structure that will help materialize the value proposition (Adner, 2017). However, in certain contexts, such as urban mobility, leadership is not earned by merit but by law. In such cases, the leadership challenges are different. For example, public leaders have less freedom to operate, they are restricted by regulations. Furthermore, they cannot expand beyond their delimited boundaries or geographical coverage, which in turn may limit their access to resources of innovation.

Our results indicate that leadership is failing at the birth stage of the ecosystem life cycle. The current urban mobility landscape is still dictated by norms of an old era. That is, very rigid structures, where everything is controlled by the mobility authority. Even though new laws (e.g., LOM) were put in place to render the mobility landscape more agile, the law only changed the locus of authority, without changing the structure of the decision-making process. The leader holds all the decision power, and all members are bound by rigid concessions models. Therefore, differently from private-governed ecosystems, where leaders seek to provide incentives and the proper alignments structure to its members (Adner, 2016; Gawer &

Cusumano, 2002), public-governed ecosystems, as in our case, seek to control and regulate the existing mobility landscape. This control and regulations slow down the innovation process, and it favors large firms that are already used to the rigid process.

Therefore, in contrast to what Moore (1993, 1996) and Adner (2017) suggest, the existence of a leader and a clear value proposition is not enough for an ecosystem to succeed at the birth stage of the ecosystem life cycle. At least not in a public-governed ecosystem as our results indicated. The public-governed ecosystem is characterized by complexity linked to the legal framework and the requirement of administrative formalism. This complexity inhibits new entrants. Added to bureaucracy, heavy investments act as an insurmountable barrier for new companies, keeping the ecosystem sheltered from new entrants.

Furthermore, different from the private-governed ecosystems where leadership can be questioned and challenged by different members (Iansiti & Levien, 2004a, 2004c; Moore, 1993, 1996) in the public governed ecosystem, such as urban mobility, leadership cannot be questioned, since the leader is defined by law. There is thus an absence of leadership co-evolution risk, although the latter is commonly acknowledged by the ecosystem literature as one main driver of an ecosystem life cycle. These factors perpetuate a fragile leadership, reducing its capacity for innovation and transformation on the one hand, and hindering the materialization of the value proposition on the other hand.

Finally, regardless of how the leadership is attributed, it is still the role of the leader to design and implement the ecosystem's leadership strategy (Adner, 2017; Gawer & Cusumano, 2002; Iansiti & Levien, 2004b). However, in public-governed ecosystems, the strategy is bound by a legal framework. In other words, the legal framework imposes the figure of the leader and dictates the main lines of the ecosystem leadership strategy. Thus, leader empowerment is reduced to its capacity to coordinate and execute investments. Furthermore, it exacerbates a paradox between a clear definition of the value proposition and the lack of capacities to enhance its materialization.

These reasons highlight an important and underexplored factor hindering ecosystem birth. In this study, our results pointed out that leadership earned by law is not necessarily good leadership. Furthermore, leadership alone is not a synonym for good leadership. And that, a public-governed ecosystem faces different challenges compared to private-governed

leadership. Those challenges can be summarized as follow: difficulties to drive a business model innovation process, such as the materialization of the value proposition, in a rigid and complex environment due to regulatory constraints.

4.8.2 Ecosystem leadership strategy: the link between ecosystem leadership and ecosystem business models

The literature that addresses ecosystem leadership strategy emphasizes the role of the leader as the one that defines the ecosystem strategy (e.g., Gawer & Cusumano, 2002; Iansiti & Levien, 2004a; Moore, 1996). By strategy, this literature focuses on interdependencies for value creation. Indeed, value creation should be regarded as a strategic process, nevertheless, this approach is incomplete. A good strategy should consider all other elements involved in the success of the ecosystem. Our results pointed out that one of these aspects is the ecosystem-level business model. We define ecosystem-level business models as the value architecture (Foss & Saebi, 2018) created at the ecosystem level. Hence, not focused on one single firm, but on the level of the ecosystem (Snihur et al., 2018). Business models are important to ecosystem leadership strategy precisely because of the interdependencies amongst actors. The ecosystem as a whole will only be healthy when all individual members are healthy as well.

Recently scholars have pointed out the importance of considering the ecosystem when designing new business models (Demil et al., 2018; Teece, 2018a). This is already a start, yet this view takes a single firm perspective. In other words, it addresses what a single firm should consider when designing its business model to fit the ecosystem. Indeed, this is also an important point, but this logic neglects the ecosystem leadership strategy as the main focus lies on the single firm and its business model. It furthermore adopts a view focused on private actors, while our study considers the case of a public-governed ecosystem.

Therefore, our results complement both works of literature by adding that ecosystem leadership strategy should include the design of the ecosystem-level business models and that this ecosystemic business model should be proposed by the ecosystem leader, be it private or public. Failure to do so will hinder ecosystem birth, as it did in our case. That is because the leader is the one with a clear vision of the value proposition, and a clear view of all actors within the ecosystem. Furthermore, the leader is responsible for the health of the ecosystem (Iansiti & Levien, 2004c). As our case showed, one important reason actors resist joining the MaaS

ecosystem is because they fear losing market share, and they cannot see the long-term benefit of cooperating.

More precisely, our results highlighted important elements of the business model that should be taken into consideration. The unique offering of door-to-door mobility hides an ecosystem that operates with different business models. For example, public transport is subsidized, contrary to a private ride-sharing system, with a floating price system given the supply and demand. Both models need to coexist, as a private company would not accept and could not afford to subsidize their services for long periods of time. Furthermore, our results indicate that public-governed ecosystems face another particular challenge as they are governed by long-term monopolistic concessions, which are highly regulated. This model hampers the entry of new actors, especially start-ups, and it is averse to innovation. Finally, members shy away from the MaaS comparison feature, as they perceive that it increases competition rather than complementarities. Hence, MaaS appears as a very good solution for users, but not necessarily for the private mobility service providers.

An important element of a business model that should be considered when designing the ecosystem leadership strategy is related to the final user. The literature on ecosystem leadership strategy pays more attention to the supply side, such as interdependencies amongst actors, complementors, modularity, and bottlenecks (e.g., Adner, 2006; Adner & Euchner, 2014; Adner & Kapoor, 2010; Gawer & Cusumano, 2002; Jacobides et al., 2018). Those are all very important elements, however incomplete. When designing the ecosystem leadership strategy, it is important to consider how users will adopt the new offer. In our case, the results revealed difficulties in convincing users to adopt new mobility services due to the lack of incentives to change the user's behavior. This factor emerges as an important point in the construction of the service offer.

4.8.3 Complementarity between the ecosystem-as-affiliation framework and the ecosystem-as-structure framework

Adner (2017) proposed two approaches to ecosystem analysis. In our study, we applied both perspectives to help us understand what hinders ecosystem birth. We find that the discussion between ecosystem-as-affiliation and ecosystem-as-structure reveals their complementarity when integrating the notion of ecosystem leadership strategy. That is because ecosystem members need to be aligned to deliver on the value proposition. Ecosystem alignment refers to

the mutual agreement different ecosystem actors have regarding their activity and position flow within the structure (Adner, 2017). Assuming this premise, we can distinguish two levels of ecosystem leadership strategy. The first is related to the role of the leader and its capacity to organize the ecosystem and attract followers. The second is related to the structure of the ecosystem that will support the materialization of the value proposition. This indicates that these two views are not exclusionary but complementary (Adner, 2017).

The ecosystem-as-affiliation approach helped us identify that there were factors hindering ecosystem birth related to the relations amongst actors. When the ecosystem leadership strategy is not clear, members find it difficult to have a clear vision of the long term, which blocks them from finding the common ground to cooperate instead of competing. Without their willingness to cooperate, they continue to act in silos, which creates factors hindering ecosystem birth. These aspects highlight the important role of the leader as the designer of a long-term strategy. The clear vision and clear objectives lay down by the strategy will provide members with the assurance they need to cooperate.

On the other hand, the ecosystem-as-structure helped us identify that there were factors hindering ecosystem birth related to the configuration of activities defined by the value proposition. In our case, the value proposition is clear, the actors are present, and the technology is available. Even though all the elements needed to materialize the value proposition is present, the ecosystem struggles to birth. That is because the members' positions and activity flows are not well defined. There is no mutual agreement among the members regarding their positions and flows. Thus, the members are participating in the ecosystem, but they are not aligned. Given that a "successful ecosystem is one in which all actors are satisfied with their positions" (Adner, 2017: 42). In other words, these aspects highlight the importance of an ecosystem leadership strategy and the role of the leader that will orchestrate all other members toward the materialization of the value proposition.

4.9 Conclusion and future research perspectives

When dealing with a public-led ecosystem, the restriction imposed by a complex regulatory framework, the financial capacity of niche actors, and the absence of leadership co-evolution, are all factors hindering ecosystem birth. Those factors are related to the ecosystem leader's capacity to lead and the development of an efficient ecosystem strategy. From the ecosystem-

level business model perspective, we find factors hindering ecosystem birth related to uncertainties about the financial model, poorly structured channels to reach the final client, and challenges related to the maturity of the technology and data accessibility difficulties. We find that it is then, the leader's role to assure that the ecosystem-level business model will address the needs of the parties involved and align them to the ecosystem strategy. Uncertainty about the business model blocks the development of the ecosystem. The inability to define revenue lines prevents the advancement of concrete offers to materialize the value proposition.

The lack of interaction between the actors, added to the technological fragmentation, makes insurmountable factors hindering ecosystem birth, as the results of this study demonstrate. These factors lead to inertia that prevents the design of the structure necessary to overcome obstacles and implement a solid foundation to build the ecosystem. The obscurity of the long-term scenario and the uncertainty of these scenarios prevent actors from positioning themselves on their business plans. In the combination of these elements, uncertainty is established, where individualism overcomes the will to cooperate, directing the ecosystem to paths that may lead to failure.

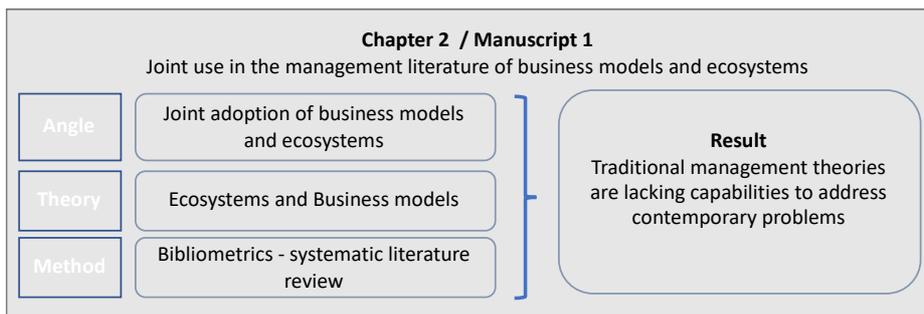
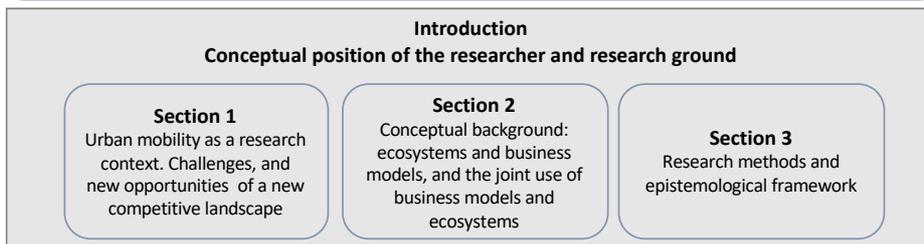
In summary, by knowing and addressing the main elements of ecosystem birth, in addition to the clear value proposition, and leadership, this text proposes the ecosystem leadership strategy, and the ecosystem-level business model as requirements for the success of the birth of ecosystems.

However, we need to be more precise in terms of what are the capabilities an ecosystem leader should have to become a performant ecosystem leader in a public-governed ecosystem. Our results did not explore what those capabilities could be, thus, we recommend further research be conducted to identify what capabilities public ecosystem leaders need to develop to perform good leadership at the birth stage of the ecosystem life cycle.

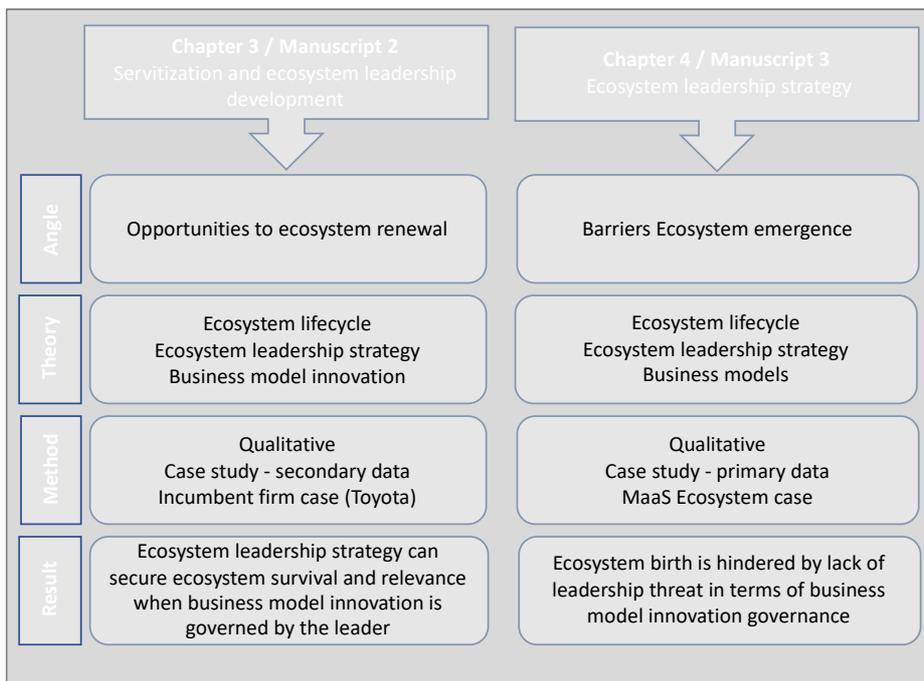
Furthermore, we have highlighted critical factors to ecosystem birth and contributed to the literature by indicating the complementarities between two ecosystem approaches, ecosystem-as-structure, and ecosystems-as-affiliation. Nevertheless, there might be other factors that this study did not uncover. Further research should be conducted to uncover what other elements could hinder ecosystems at the intersection of the structuralist and the affiliative approaches.

Chapter five: Discussion and general conclusion

General phenomenon
Members of urban mobility ecosystems are facing several challenges in terms of business model innovation and leadership development



Research question
How can leadership strategy and business model innovation foster or hinder new ecosystems?



Chapter 5
General conclusion and discussion
Leadership strategy at the ecosystem level could be defined as business model innovation governance by a leader. This role is well assumed when there is a leadership co-evolution risk. It is however less well performed on the contrary case. Thus, business model innovation governance raises the chances of ecosystem birth and survival.

5.1 Introduction: Main results and discussion

This thesis aims to explore the phenomenon of leadership strategy and business model innovation on ecosystem emergence, both from a theoretical and empirical point of view. This work was driven by one main question: “How can leadership strategy and business model innovation foster or hinder new ecosystems?”. This question was further divided into two research topics regarding (1) the role of the leader in ecosystem renewal through business model innovation; and (3) the role of the leader and the materialization of the value proposition at the ecosystem birth stage.

As the research topic is focused on two recent concepts that the strategic management literature tried for long to differentiate, I first did a literature review guided by one hypothesis: the joint application of business models and ecosystems concepts in the management literature. This helped me to clarify that business model is my unit of analysis and ecosystems are my theoretical background, but also the level of analysis of the studied cases I investigated. Through a descriptive and comprehensive approach, this study presents relevant findings on factors to either foster or hinder ecosystem emergence. I suggest that ecosystem leadership strategy and business model innovation exert a complex (positive or negative) influence on ecosystem emergence. In addition, this analysis can only be realized by the joint adoption of two distinct management theories – ecosystem and business models.

This last chapter has two objectives. It aims first to make a synthesis of the results of this work (Subsection 5.2). Second, the general conclusion presents the contributions, the limits as well as the perspectives of future research (Subsection 5.3).

5.2 Synthesis of the main results

For the sake of synthesis, and to facilitate the reading of the results which will then be discussed, I first recall the thesis defended in this work, then I detail synthetically the results of the three research Manuscripts.

From an empirical and a theoretical perspective, this work is interested in what fosters and what hinders ecosystem emergence from the perspective of the joint adoption of the ecosystem and business model literature, a subject of little study in the management literature. On the other hand, it appears that companies are more and more eager to adopt ecosystem business models

as they realize that competition is increasingly taking place on the ecosystem level and less on the firm level (Adner & Euchner, 2014). However, this phenomenon is new to both academics and managers, and we know little about how ecosystem leadership strategy can incorporate business model innovation as a source of competitive advantage at the ecosystem level. Furthermore, we know that the ecosystem leader plays a very important role in the ecosystem emergence (Adner, 2017; Gawer & Cusumano, 2002; Moore, 1993, 1996), but thus far, ecosystem leadership literature has not addressed how ecosystem leaders can either foster or hinder ecosystem emergence through the adoption of new business models.

These inquiries led me to the following research question: “How can leadership strategy and business model innovation foster or hinder new ecosystems?”. In the intersection of the ecosystem and business model literature, my goal is to describe and understand the elements that can lead ecosystems to succeed or fail. To do this, through a bibliometric literature review (Manuscript 1), I have built an analytical framework and carried out case studies, mobilized in two research Manuscripts, based on an inductive approach and a critical realist epistemological positioning. Table 14 summarizes my research approach.

Table 14: Research design summery

Research problem	How can leadership strategy and business model innovation foster or hinder new ecosystems?
Theoretical framework	Articulated around business models (business model innovation, and servitization), and ecosystems (ecosystem life cycle, ecosystem leadership strategy, and ecosystem leadership development)
Research method	Three Manuscripts, each adopted a different but complementary research method <ul style="list-style-type: none"> • Manuscript one: a bibliometric analysis (over 200 articles analyzed) • Manuscript two: a case study based on secondary data (over 1200 documents analyzed) • Manuscript three: a case study based on primary data (20 interviews)
Results	Description and better understanding of ecosystem leading firm’s strategy: (1) ecosystem emergence goes beyond a clear value proposition and the emergence of a leader; it involves the development of an ecosystem business model; (2) ecosystem business models need to be part of the ecosystem leadership strategy in the early stage of ecosystem emergence; and (3) ecosystems need to be regarded as structures that are influenced by their affiliations
Defended thesis	In recent and forthcoming strategic management work, business model innovation needs to be studied at the ecosystem level.

The results from the three Manuscripts have made it possible, in a complementary way, to address the research question. To help answer the question “How can leadership strategy and business model innovation foster or hinder new ecosystems?”, the first article aims to analyze and demonstrate how and why the joint adoption of business model and ecosystem concepts are indeed the most suitable theoretical background to be adopted in this case. Supported by the

findings of the first Manuscript, the second Manuscript's purpose is to specify the adoption of a specific form of business model innovation (servitization) as a leadership strategy to foster the renewal of an ecosystem that is facing death. Finally, in line with the results of the first two Manuscripts, the third Manuscript studies an ecosystem leader that fails to design an ecosystem leadership strategy that considers the ecosystem business model, therefore hindering the ecosystem birth. Table 15 presents a summary of the main results from the three Manuscripts.

Table 15: Summary of the results of the research Manuscripts

Manuscript	Sub-question	Main results
Manuscript 1	Why and how business models and ecosystem complementarities are jointly addressed in management research?	Business models and ecosystem complementarities are jointly addressed in the management literature because the current traditional management theories are lacking the capabilities to address contemporary phenomena. Management scholars are jointly addressing business models and ecosystems mostly by building theory, analyzing ecosystem business models, building new types of ecosystems, and responding to societal problems.
Manuscript 2	How may a threatened incumbent firm reassure ecosystem leadership through the adoption of servitization strategies?	Threatened incumbent firms may reassure ecosystem leadership through the design and implementation of ecosystem-level business models.
Manuscript 3	What are the difficulties that are hindering the birth of new ecosystems?	The birth of ecosystems is hindered by a lack of leadership threat of substitution and the attribution of leadership to an actor who cannot lead.

The subsections below discuss individually the main results of each Manuscript presented in this thesis. Then, the links between the results of the three studies are presented.

5.2.1 Manuscript 1: The Joint Use of Business Model and Ecosystem Concept in Management Literature

The first Manuscript's (chapter 2) aim was twofold, the first was to test the hypothesis that there is a movement in the management field toward the joint adoption of ecosystem and business models as complementary units of analysis. Second, to uncover why and how scholars in the management field are jointly adopting business models and ecosystems in their studies.

The study proved the hypothesis that indeed there is a movement in the management field that is jointly adopting business models and ecosystems as complementary units of analysis. This movement is very recent and still scattered in different domains of management. Interesting to note that even though ecosystems and business model concepts emerged in the

strategic management domain, the joint adoption of both concepts is being adopted by the marketing, industry ecology, and entrepreneurship domains.

The results of the study demonstrate that business models and ecosystem complementarities are jointly addressed in the management literature because the current traditional management theories are lacking the capabilities to address contemporary phenomena, mainly digitalization, circular economy, and sustainability. Therefore, scholars are adopting ecosystems and business models as complementary units of analysis. The results demonstrated that given the complexity of the current management landscape, firms are facing difficulties to thrive alone. Their product, services, or solutions, more often than before need to be complemented by external partners, which sends us to the concept of ecosystems, a concept that regards inter-firm relations. However, only regarding inter-firm relations is useful to understand ecosystems but not enough to understand how ecosystems can thrive. That is because, ecosystems only thrive when all members complement each other not only from a value proposition point of view but also from a financial point of view, in other words when the ecosystem leadership strategy converges to the design of business models at the ecosystem level.

Since the joint adoption of business models and ecosystems is a recent movement, our results demonstrate they are being mostly adopted by scholars for four main purposes. The first emerges from the strategic management domain and its purpose is to build theory. The second emerges from the marketing domain to elevate business model thinking from the intra-firm level to the ecosystem level. The third emerges from the entrepreneurship domain with the purpose to build new ecosystems through a business model framework. Finally, the fourth emerges from industry ecology with the purpose to address societal issues related to sustainability and the circular economy.

These results demonstrate why and how business models and ecosystem concepts are being jointly adopted in the management literature. They are being jointly adopted due to the rise of new contexts such as circular economy, digital transformation, and servitization. To study these phenomenon scholars are adopting business models and ecosystems as unit of analysis, or ecosystems as the level of analysis. Moreover, it demonstrates that both concepts alone are relevant and have been very useful to help us understand inter-firm and intra-firm dynamics. However, through this study we unlock a new purpose for these two concepts, their

complementarities are paramount to addressing contemporary phenomena. Nevertheless, the movement is still very recent and has not been regarded as a new stream of research.

5.2.2 Manuscript 2: Impacts of Servitization Strategies on Ecosystem Leadership Development

The second Manuscript (Chapter 3) builds on the findings of the first study by jointly adopting business models and ecosystems to investigate ecosystem leadership in the context of ecosystem renewal. The study provides evidence that a threatened incumbent firm may reassure ecosystem leadership through the design and implementation of new business models, such as servitization.

The novel contribution of this study is to highlight the powerful impact of business model innovation strategy on ecosystem leadership, allowing latent ecosystems to battle disruption. Our results demonstrate that a leading ecosystem firm that is facing death can regain ecosystem leadership by realigning the ecosystem and converting an initially negative relationship, with a disruptor, into a positive one. Even though a disruptor may start as a threat, the results demonstrate that incumbent firms may choose to partner with competing disruptors to speed up the value creation process and profit from the technologies by pursuing innovation.

Furthermore, the results demonstrate that actors with central roles in the ecosystem can adapt themselves to the system. In some of the examples, the adaptation process is unpretentious, where the role of the ecosystem leader is not evident. In other examples, the incumbent firm reclaims its ecosystem leadership role. In this latter situation, the focus is on the value proposition and on the optimum alignment where every actor accepts their role to achieve a common goal. Beyond affecting ecosystem alignment, business model innovation at the center of ecosystems can alter the direction of ecosystem evolution. This process changes the research, innovation, and investment efforts of the actors involved, as well as the external environment that governs their access to resources.

These results demonstrate that ecosystem leaders can purposely alter ecosystems' trajectory through the deployment of an ecosystem leadership strategy based on business model innovation. In this study, we focus on the renewal phase, where the ecosystem leader is clearly identified as is the disruptor. Given that the renewal phase is the last phase in the ecosystem life cycle it is fair to assume that the ecosystem leader is an experienced one, as it went through the

other three phases. Therefore, there is a chance that during the process the leader developed capabilities that better equipped him to develop an ecosystem leadership strategy and fight disruptors. If this prerogative is correct, it means that we need to better understand leadership development in other stages of the ecosystem life cycle. In other words, what are the capabilities that forge a successful ecosystem leader?

5.2.3 Manuscript 3: What Factors do Hinder Public-Private Ecosystems' Birth? The Case of Nice Metropolis' Mobility-as-a-Service Ecosystem"

Building on Manuscript one (chapter 2) and Manuscript two (chapter 3), the third Manuscript three (chapter 4) adopts business models and ecosystems to study ecosystem leadership at the birth stage of the ecosystem life cycle. Contrary to the renewal stage, where the leader necessarily managed to successfully pass the other three stages of the ecosystem life cycle, hence demonstrating its ability to lead, at the birth stage both, ecosystem and leadership are emerging. The birth stage is volatile, and many ecosystems fail to birth. Therefore, this is the appropriate context to study what could hinder the birth of new ecosystems.

The results presented in Manuscript three demonstrate that the birth of ecosystems is hindered by a lack of leadership ability to design and implement an ecosystem leadership strategy that considers the ecosystem business model. Actors join new ecosystems because they are attracted by a shared vision of a new value proposition. This value proposition needs to be strong enough to convince actors, that are often competitors, that it is more advantageous to collaborate rather than to compete. The collaboration is only advantageous if potential members see some sort of individual gain, which they would not be able to achieve have they decided to continue to work independently. In other words, the ecosystem leadership strategy at the birth stage needs to consider the design of the ecosystem-level business model. Differently from the renewal case in Manuscript two, where the ecosystem business model already existed and the challenge was to innovate the existing business model; in this study, results demonstrate that the challenge at the birth stage is to create the ecosystem business model. Furthermore, the results demonstrate that it is the role of the leader to create and disseminate the ecosystem business model. That is because, in emerging ecosystems, actors' motivations are still weak, in other words, they are either risk-averse or skeptical. Therefore, they look up to the leader and the strategy of the ecosystem before deciding to join the ecosystem or not.

However, what the results demonstrate is that at the birth stage not necessarily the leader is equipped to assume this role. This is because there are different kinds of leaders. Most of the literature on ecosystems has considered private governed ecosystems. This is expected since the ecosystem concept emerged in the strategic management literature. Nevertheless, the ecosystem logic has penetrated the public sphere as well. New technologies and the advent of initiatives such as “smart cities” are pushing the public actor to accept and adopt new governance models, such as ecosystems. The problem that arises is that, differently from private governed ecosystems, where the leadership position is earned, in public governed ecosystems, sometimes, the leadership is granted to the public actor by law, as is the case of urban mobility. In these cases, the public actor plays the role of the leader, but not necessarily is well equipped to do so, given that the *modus operandi* of the public sphere is very different from the private one. The private sector is governed by the market laws, competition, and search for profits, inversely the public sector’s goal is to manage public funds and reverse them to improve citizens’ life quality. Despite these differences, when building ecosystems, the need of every member should be fulfilled, as a healthy ecosystem is only healthy as its members.

5.2.4 Links between the results of the three studies

Taken altogether, the three studies provide a better understanding of the relevance of the joint adoption of business models and ecosystems to uncover how leadership strategy could foster or hinder ecosystem emergence.

Manuscript one demonstrated that ecosystems and business models are more than just complementary units of analysis. They constitute a new approach to studying different management phenomena that lie at the crossroads of intra-firm and inter-firm issues. These phenomena can only be understood when jointly adopting both concepts. Such phenomena include firms’ digitalization, circular economy, servitization, and entrepreneurship. All these phenomena imply concomitantly change and innovation. Furthermore, if ecosystems are purposely built (Adner, 2016; Jacobides et al., 2015; Moore, 1993) and business models are strategic tools (Teece, 2010; Zott & Amit, 2013), then there should be an “architect” to build an ecosystem and conceive the business model. Based on these findings, Manuscript two gives a more nuanced result by adopting business models and ecosystems to study ecosystem leadership strategy through business model innovation. It demonstrates that indeed, leadership can alter the fate of an ecosystem through business model innovation. By doing so, it also

demonstrates the important role of a leader in crafting an ecosystem leadership strategy that can foster ecosystems.

The context presented in Manuscript two favors an already existing ecosystem leadership that is being threatened by a disruptor. That means that the incumbent ecosystem leader had two choices, either react to the disruptor threat or do nothing and face the death of the ecosystem. Therefore, building a new ecosystem leadership strategy and innovating its business model becomes a matter of survival. This case is a case of success because indeed the ecosystem leader was able to reassure its position in the renewed ecosystem. However, even though most of the cases in the literature address success cases, it is also important to understand what could go wrong. Does merely having all the right elements, such as the presence of a leader, an ecosystem leadership strategy, and a clear value proposition synonym for ecosystem success? The answer to this question is addressed in Manuscript three.

Manuscript three continues to build on the complementarities between business models and ecosystems and enhances the results of Manuscript two by analyzing an ecosystem that has all the right elements for success, nevertheless, the ecosystem fails to birth. That is because, indeed all the elements are necessary, but if not applied correctly will lead to failure. The case studied in Manuscript three demonstrates that there are nuances to leadership implementation. While the leader of the case presented in Manuscript two was able to successfully react to the threat of a disruptor and foster the renewal of the ecosystem, in the case presented in Manuscript three, ecosystem birth is hindered by the failure to implement the ecosystem leadership, and the leadership ecosystem strategy that takes in consideration the ecosystem-level business model.

Combined these three Manuscripts converge on two general results of the thesis (Figure 28):

- General result 1: Ecosystem leaders should include ecosystem-level business models in the elaboration of the ecosystem leadership strategy.
- General result 2: Leadership threat of substitution at the ecosystem level is important to motivate ecosystem leaders evolve their ecosystem leadership strategy

These results are of two kinds. The first result provides a summarized answer to the main research question. The second result goes beyond the initial research question and indicates new venues for research opportunities.

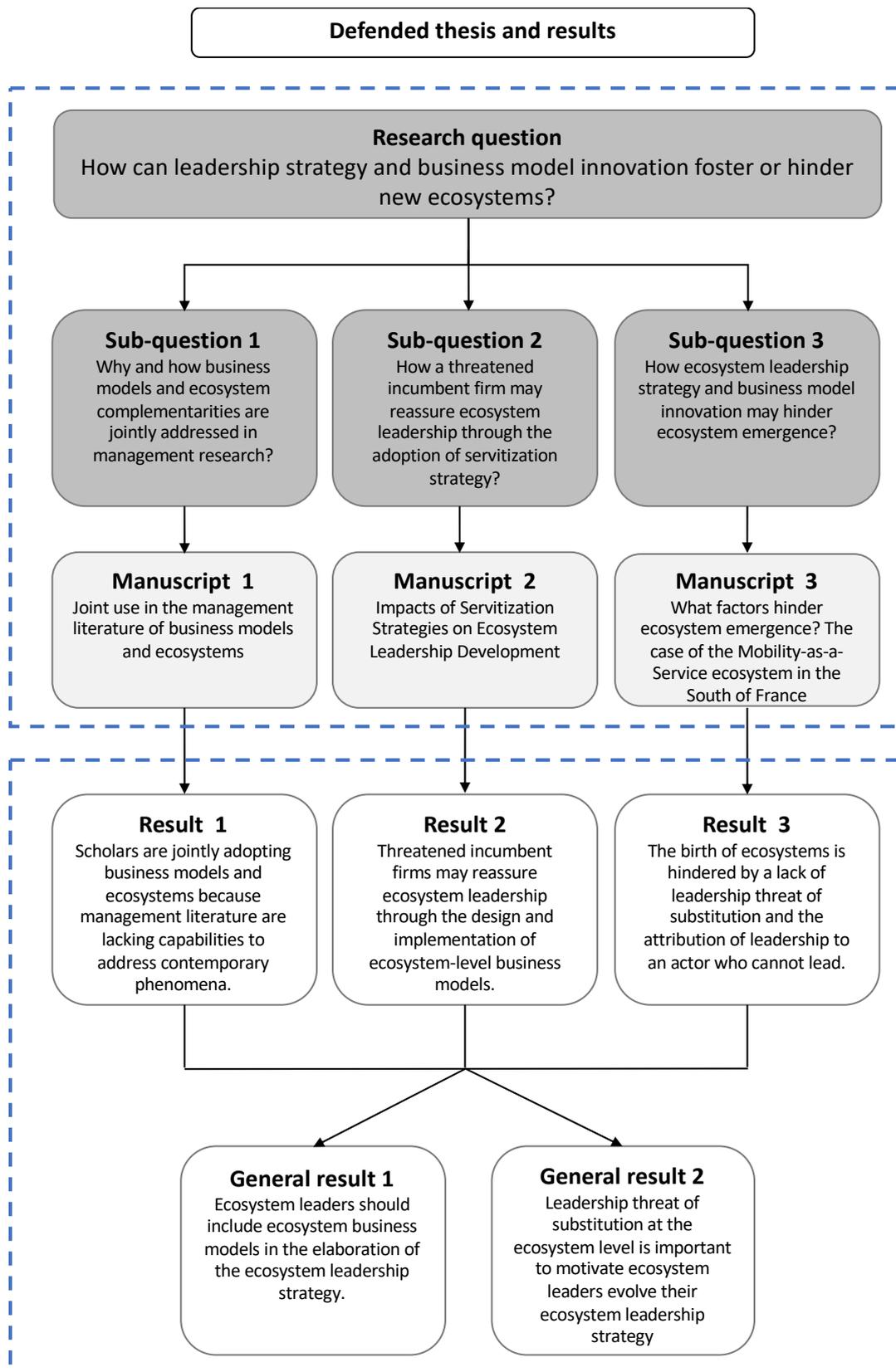


Figure 28: Integrative research approach

5.3 General conclusion

Beyond the previously discussed results, this section presents the general conclusion of this work by, first, developing the contributions of this research. Second by suggesting the limits of this research and future perspectives that I wish to develop after the end of this thesis.

5.3.1 Theoretical contributions

This research aspires to develop new perspectives on ecosystem leadership strategy through business model innovation and their implication to ecosystem success or failure. Ecosystem leadership strategy implies taking into account a complex context ruled by interdependencies (Adner & Euchner, 2014), but we know little about how business model innovation works at the ecosystem level and what role it plays to foster or hinder ecosystem emergence. Demil et al. (2018, p. 1224) pointed out that *“this is a central stake as most of the literature and practice associated with business models is largely focused on the design of focal business models”*. Thus, this study focuses on how business model innovation, ecosystem leadership strategy and ecosystem leadership influence the emergence of ecosystems in either a positive or negative way. These works respond to repeated calls of both ecosystems scholars and business models scholars for a better connection of these two research streams (Adner & Kapoor, 2010; Demil et al., 2018; Gomes et al., 2018; Teece, 2018b; Zott & Amit, 2017). The two studies conducted in this work were always connected to the two theoretical fields of business model and ecosystems (Manuscript one). While Manuscript two focused on leadership strategy and servitization as a means to ecosystem renewal. Manuscript three focused on ecosystem leadership strategy and ecosystem-level business model at the birth stage of the ecosystem life cycle. The theoretical contributions of this work concern several fields of the strategic management literature. More precisely concerning (i) the joint adoption of business models and ecosystems, (ii) ecosystem leadership strategy, (iii) ecosystem leadership, and (iv) ecosystem-level business models.

5.3.1.1 Contributions to the joint adoption of business models and ecosystems

This work contributes to the still evolving literature on the joint adoption of business models and ecosystems. The first Manuscript (Chapter 2) establishes that the joint adoption of business models and ecosystems is a new trend in the management literature.

In recent decades, the parallel development of the ecosystem literature and the business model literature has defined distinct but related concepts. On the one hand, the ecosystem literature aims to explain how value is created outside the company's boundaries (Adner, 2017; Iansiti & Levien, 2004b; Moore, 1993, 1996). On the other hand, the business model literature aims to explain how value is created at the firm level (Amit & Zott, 2012, 2015; Osterwalder et al., 2005). These constitute two different dimensions of the same theme. When analyzing the factors that can either foster or hinder the emergence of the ecosystem, the same question about the relationship between the theories raised by Demil et al., (2018) and Teece (2018b), returns to the surface. When Demil et al., (2018) draw attention to the need to understand the implication that capturing value has for ecosystems and business models, they reinforce the idea defended in this thesis that one is not without the other, and that innovating value creation at the firm level will essentially have an impact on ecosystems and vice versa.

The theoretical silos between ecosystems and business models neglects the important connection between value created outside the company's boundaries and value created at the company level. The different levels of analysis proposed by ecosystem and business model theories on the same topic, combined with technological evolution, and the constant integration of new actors, highlights the complexity of value creation. In value creation, the two theories complement each other. In fact, the elements proposed in the two theoretical lines often intersect. This is exactly what we see through the results of Manuscripts two and three.

Manuscript two (Chapter 3) extends our understanding of two key dimensions which constitute the renewal stage of ecosystems' life cycle: business model innovation and ecosystem leadership strategy. To date, the literature defends the idea that the ability to implement business model innovation at the ecosystem level, relies essentially on the negotiations and interactions among the ecosystem's stakeholders via the design of the new business models (Demil et al., 2018). Indeed, all stakeholders must accept their role and be persuaded to interact in the value creation process under the conditions expected by the focal organization (Adner, 2017; Demil et al., 2018). This approach rests on an implicit assumption that there is always an accepted and established focal organization, which is not always true in practice. Manuscript two (Chapter 3) exposes a threatened focal organization that managed to innovate the ecosystem business model through a three-stage process, and it took that organization nearly five years to do so. It took much more than just the ability to negotiate and interact with the ecosystem's stakeholders regarding the choice or design of the new business model. It also took a long-term strategy,

substantial investments in R&D, and the transformation of the ecosystem as a whole. Because when changing a key element of the ecosystem such as the business model, the result is a new or at least a different ecosystem.

Both Manuscript two (Chapter 3) and Manuscript three (Chapter 4) results extend our understanding of the role of the leader by adding the proposition of ecosystem-level business models as part of the role of ecosystem leaders. The perspective described in the literature addressing business model design for ecosystems focuses on single firms trying to adapt their business models to fit the ecosystem (Chesbrough & Rosenbloom, 2002; Weiller & Neely, 2013). Hence, the business model continues to be an inter-firm strategy, and the ecosystem is the context. However, the results in this thesis suggest that ecosystem-level business models are those designed by the ecosystem leader at the inter-firm level. Manuscript two (Chapter 3) illustrates this well with the example of the in-car apps for Uber drivers. In that example, all elements of the business model, such as the value proposition, the customer market segment, the value chain, the cost and profit structure, the strategic position of the firms in the value network, and the formulation of the competitive strategy (Chesbrough & Rosenbloom, 2002; Osterwalder & Pigneur, 2010) are addressed from the ecosystem perspective, not from a single firm, which makes it an ecosystem-level business model. This result does not contradict the business model literature, it merely extends it to the ecosystem level, and contributes to the ecosystem leadership literature by identifying an additional role for the ecosystem leader.

5.3.1.2 Contributions to ecosystem leadership literature

Ecosystem leadership literature is a topic extensively studied in the management literature. Indeed, it is an important element since the genesis of the ecosystem concept (Adner, 2021; Gawer & Cusumano, 2002; Iansiti & Levien, 2004a; Moore, 1993, 1996). In general, ecosystem leaders have the important role of (i) designing the ecosystem leadership strategy, (ii) attracting new members, and (iii) guiding all actors towards the alignment structure that will help materialize the value proposition.

Manuscript three (Chapter 4) contributes to our understanding of ecosystem leadership, both in terms of role and strategy. The ecosystem leadership literature generalizes the role of the ecosystem leader to a firm. Furthermore, most examples are built on cases considering the private actor (Gawer & Cusumano, 2002; Iansiti & Levien, 2004a; Moore, 1993, 1996). However, the study presented in Manuscript three (Chapter 4) demonstrates that in fact, the role

of the leader is more complex when considering the public actor. That is because, in some cases, public actors' leadership is granted and not earned. The role of the public leader within ecosystems is underexplored in the management literature (with exception of Attour & Rallet, 2014). When leadership is granted, it challenges the current ecosystem leadership literature that attributes competition as a key component of leadership development (Adner, 2021; Gawer & Cusumano, 2002; Iansiti & Levien, 2004a; Moore, 1993, 1996). In other words, if there is no threat of substitution the leader is less motivated to act or to be questioned.

The description of the leader's role in the ecosystem literature is clear. For example, Gawer & Cusumano (2014, p. 423) address the role of the leader in ecosystem design, where leaders *“are organizations that successfully establish their product, service, or technology as an industry platform and rise to a position where they can influence the trajectory of the overall technological and business system of which the platform is a core element. When done properly, these firms can also derive an architectural advantage from their relatively central positions”*. The relevance of the leader in attracting actors to the ecosystem has been discussed in Iansiti & Levien (2004a), and Moore (1993, 1996). Adner (2017), and Moore (1993, 1996) clarified the role of the leader in guiding ecosystem actors in the materialization of the value proposition through the alignment structure and management of their members' interdependencies. Looking at the literature, the importance of the role of the leader to the ecosystem is revealed. Indeed, the results from Manuscript two (Chapter 3) and Manuscript three (Chapter 4) reinforce the importance of the leader in the design of the ecosystem leadership strategy, in attracting new members, and in guiding them towards the alignment structure that will help materialize the value proposition. However, it adds to this literature by bringing to light two important ecosystem leadership perspectives. The first is related to the role of the leader. The results from Manuscript two (Chapter 3) and Manuscript three (Chapter 4) suggest, that in addition to the roles already mentioned, it is also the role of the ecosystem leader to propose an ecosystem-level business model. The second is related to the nature of the leader, the large majority of the work done in ecosystem leadership addresses private ecosystem leaders. Yet, results from Manuscript three demonstrate the important role and challenges faced by public ecosystem leaders.

The second contribution from this thesis to ecosystem leadership literature lies in the nature of the leadership. As mentioned earlier, the great majority of the ecosystem leadership literature addresses private-led ecosystems. Yet, Manuscript three (Chapter 4) brings to light the

relevance of public actors as ecosystem leaders. Different from Attour (2014), Attour & Della Peruta (2016), and Attour & Lazaric (2020), Manuscript three (Chapter 4) indicates that the role of the public actor is not limited to the birth stage of an ecosystem. In some ecosystems, such as the one of MaaS, the leadership role needs to be assumed in all stages of the ecosystem life cycle. Indeed, the role of both public and private leaders remains the same, that is: designing the ecosystem leadership strategy, attracting new members, and guiding all actors towards the alignment structure that will help materialize the value proposition. The difference lies in the challenges faced by the public leader. Public ecosystem leaders have less autonomy to operate given that they are constrained by strict regulations, and public value ideals (professional, efficiency, service, and engagement) (Hofmann et al., 2019). Furthermore, the ecosystem logic that has been present for over two decades in the private sector, is much more recent in the public arena (Micheli, Schoeman, Baxter, & Goffin, 2012). Consequently, as the results of Manuscript three (Chapter 4) highlight, public actors still lack some of the capabilities to fully develop the ecosystem leadership role. Thus, even if the literature addressing ecosystem literature is extensively studied in the management literature, the results of this thesis nevertheless complement the works of Adner (2017); Gawer & Cusumano (2014); Iansiti & Levien (2004a); Moore (1993, 1996) by adding the specificities of public actors as ecosystem leader.

5.3.1.3 Contributions to the ecosystem leadership strategy literature

Beyond the literature on ecosystem leadership, this work enriches the literature on ecosystem leadership strategy, particularly concerning its importance, and factors leading to ecosystem failure (Adner, 2006; Adner & Euchner, 2014; Ozcan & Santos, 2015), a subject also little studied in the literature.

Adner (2006, 2017) and Adner & Euchner (2014) address ecosystem leadership strategy from two main perspectives – innovation and risks. From the innovation perspective, the authors depart from the principle that when a leading firm thinks about ecosystem leadership strategy there are two important actions they should take. First, they need to identify all the partners and all partnerships' dependencies necessary for the success of the materialization of the value proposition. Second, they should fathom how partners should be aligned to make the value proposition work in the real world. Both actions have a procedural nature – identify and align. The results in this thesis also identified important actions leading firms should take when

thinking about ecosystem leadership strategy, but do not follow the same procedural direction proposed by the authors. Indeed, the process of identifying all partners, their dependencies, and aligning them in the right direction is important. However, they need to be complemented by other actions that are non-procedural. Both results from Manuscript two (Chapter 3) and Manuscript three (Chapter 4) suggest that when a leading firm is crafting an ecosystem leadership strategy they need to consider what problem the ecosystem will help solve for every single member, individually. Our results demonstrate that, in the real world, motivations to join an ecosystem are self-centered. Moreover, they are based on the business model logic. More precisely, on revenue streams, financial incentives, and market share. If those elements are not *a priori* clear, and well defined, the ecosystem leader will face difficulties attracting members and aligning them. Thus, it seems that, contrary to Adner (2006, 2017) and Adner & Euchner (2014), the ecosystem leadership strategy is not limited to the mere process of partner identification, interdependencies, and alignment. The ecosystem leadership strategy needs to also include the ecosystem-level business model.

From the risk perspective, Adner (2006, 2017) and Adner & Euchner (2014) highlight two main risks – co-innovation risk and adoption-chain risk. Co-innovation risk refers to the dependencies one firm’s innovation has on other firms. Adoption risk refers to the stakeholders that need to adopt the focal firm’s innovation before it reaches the market. Even though the authors classify those risks as ecosystem leadership strategy risks, they are in fact risks to the materialization of the value proposition. Indeed, not being able to materialize the value proposition poses an important risk to the ecosystem, as it does for every firm, regardless if they are part of an ecosystem or not. The results presented in this thesis, and more precisely in Manuscript three (Chapter 4), raise risks at the ecosystem level, in other words, what could hinder ecosystem emergence. An ecosystem can still exist if, at first, the value proposition fails, in fact, is part of the process, as demonstrated by Adner (2017) himself in his famous PAX tire example. However, the results presented in Manuscript three (Chapter 4) raise ecosystem leadership strategy risks that could lead to ecosystem failure. Such as lack of adherence to regulations, or underestimating regulations. In our MaaS example, all the elements for ecosystem success are present. However, strict regulations in the mobility sector and regulations restricting the actions of the public leader, either stop or slow down the innovation process. When crafting an ecosystem leadership strategy, there is a tendency to focus on the materialization of the value proposition from an operational perspective, thus neglecting

external forces such as regulations. Ecosystem strategies, especially the ones concerning complex contexts (e.g., mobility) need to account for barriers raised through regulations. Regulations can change, and they do, hence the ecosystem leadership strategy could include the identification of the stakeholders that could help in this process, and account for the time it takes for the change to take place. Regardless of the choice – work within the boundaries of the existing regulations or trying to change them – this is a key element to be included in the ecosystem leadership strategy.

Another ecosystem leadership strategy risk emerging from our results refers to the difference between crafting a successful strategy and implementing it. Indeed, these are two very distinct things. Manuscript two (Chapter 3) demonstrates a successful case, where a leading firm was able to craft and implement a successful ecosystem leadership strategy. The strategy had two important purposes, the first to retain the ecosystem leadership position, and the second to renew the ecosystem. The implementation process was done in stages and considered a long-term view, at least six years. However, this is not always the case as suggested by the results of Manuscript three (Chapter 4), where little attention was given to crafting the strategy, resulting in poor implementation. Thus, different from Adner (2006, 2017) and Adner & Euchner (2014), which see ecosystem leadership strategy risks as the risks related to value proposition materialization, my results suggest that ecosystem leadership strategy risks should be considered at the ecosystem level.

Finally, in a review of recent literature on relevant ecosystem leadership strategy research avenues, Cha, (2020) indicate that little is still known about the mechanisms of why, when, and how firms formulate and implement ecosystem strategies. By identifying and specifying some of the actions and factors that influence ecosystem leadership strategy, we provide some answers. We highlight that the materialization of the value proposition, and identification and the alignment of actors are certainly relevant to ecosystem success, they remain incomplete to address the complexity of ecosystem leadership strategy.

Manuscripts two (Chapter 3) extends our understanding of two key dimensions which constitute the renewal stage of ecosystems' life cycle: business model innovation and ecosystem leadership strategy. To date, the literature defends the idea that the ability to implement business model innovation at the ecosystem level, relies essentially on the negotiations and interactions with the ecosystem's stakeholders by the choice or design of the new business models (Demil

et al., 2018). Indeed, all stakeholders must accept their role and be persuaded to interact in the value creation process under the conditions expected by the focal organization (Demil et al., 2018). This implies a simplistic view that there is always an accepted and established focal organization. However, in the real-world things are more nuanced than that. Manuscript two (Chapter 3) exposes a threatened focal organization that managed to innovate the ecosystem business model through a three-stage process, and it took that organization nearly five years to do so. It took much more than just the ability to negotiate and interact with the ecosystem's stakeholders regarding the choice or design of the new business model. It also took a long-term strategy, substantial investments in R&D, and the transformation of the ecosystem as a whole. Because when changing a key element of the ecosystem such as the business model, the result is a new or at least a different ecosystem.

5.3.2 Managerial contributions and recommendations

From a managerial point of view, this research allows firms attempting ecosystem leadership to identify points of vigilance to understand this process and bring it to maturity. The research presented in this thesis provides practical contributions to top-level managers in the public and private sectors, as well as to start-ups.

The first managerial contribution relates to the factors fostering or hindering ecosystem emergence. Given the expected benefits of creating ecosystems in terms of value capture, value creation, and value delivery, it appears that leading firms are generally surprised at the number of difficulties they must face when they adopt an ecosystem logic. Even when they are aware of these difficulties, they are generally not prepared to manage these challenges. They wonder first about the nature of these challenges and then about the actions to be taken to deal with them. Our research thus makes it possible to identify several factors that can foster, or on the contrary hinder, the emergence of ecosystems. Whether when creating new ecosystems or renewing existing ones, managers need to first design the ecosystem-level business model. This is the surest way to attract other members to follow the venture. Especially in cases where members already have a working business model (e.g., mobility services), leaders will need more than just an attractive value proposition to attract or retain members. They will need to show how each other member will benefit from the proposed ecosystem.

The second managerial contribution is based on identifying when these factors are most influential during ecosystem emergence. In addition to the model presented in the second

Manuscript (chapter 3), several recommendations can be addressed to leading ecosystem firms, depending on their progress in the ecosystem life cycle process:

- At the birth stage, the priorities of the leader - apart from having a clear value proposition, as stated in the literature (Adner, 2017; Iansiti & Levien, 2004b; Moore, 1993, 1996) - should be toward building the ecosystem community. That implies providing the right incentives to attract members, generating trust so that members would accept to cooperate instead of competing, and designing and implementing an ecosystem-level business model.
- At the renewal stage - in addition to what is stated in the literature, that is focusing on the product or service innovation (Moore, 1993, 1996) - the priorities of the leader should be towards the adaptation of the existing ecosystem-level business model to face emerging threats and reassessing members participation and roles within the renewed ecosystem. Business model innovation at the renewal stage is paramount to survival. The consequences of the new business model are that some members may no longer have a place in the renewed ecosystem, others might need to accept a different role, and space should be created for new members.

Beyond the factors during the birth and the renewal ecosystem stages, it seems essential to insist on the different nature of leadership. Manuscript three (Chapter 4) highlights the distinction between private-governed ecosystems and public-governed ones. The literature addressing ecosystem leadership is mostly focused on private-governed ecosystems (e.g., Adner, 2016; Adner & Zemsky, 2005; Gawer & Cusumano, 2002; Iansiti & Levien, 2004a). However, given the rise of new technologies and societal demands, the public sector is also facing changes and is confronted with an ecosystem logic. Therefore, it is very important that public ecosystem leaders become aware of their role. This is a considerable challenge as public actors face different challenges from the private actor:

- Regulations: the public leader is constrained by strict regulations. Those regulations sometimes slow down the innovation process within the ecosystem, which can generate a high level of frustration for the other ecosystem stakeholders. Thus, public ecosystem leaders need to balance members' expectations, and citizen demands, and obey the regulations, while also delivering the value proposition in a timely manner.

- Large incumbent firms versus new start-ups: especially in the context of this thesis (urban mobility) most of the actors are large traditional incumbent firms. However, due to new technologies (e.g., CASE) new and innovative start-ups are emerging. This is a very positive thing as start-ups are a source of innovation. However, contrary to large incumbent firms, start-ups lack the same experience and resources to compete in the bureaucratic public process. Thus, public ecosystem leaders need to oversee that start-ups are given a fair chance to enter the market, for example by drawing specific calls for proposals. Furthermore, they need to ensure that once a start-up wins a proposal it will have all the support needed to face resistance from the large incumbent firms.
- Building new capabilities: ecosystems are complex systems that imply a change in mindset. The literature has addressed this issue (e.g., Adner & Euchner, 2014; Kapoor, 2018; Moore, 1993) considering private companies. However, public actors also need to change their mindset regarding the ecosystem logic. The public actor is not used to having an active leadership role. Their position is more passive, as facilitators and regulators. To better lead ecosystems, the public actor needs to accept a more active role concerning the ecosystem leadership strategy, the design of the ecosystem-level business model, and orchestrating the alignment structure of the ecosystem.

Finally, the third and final managerial contribution is aimed at ecosystem-level business models. For many years universities and management programs have thought managers about the importance of business models as a tool of competitive advantage through value capture, value creation, and value delivery at the firm level (Belussi et al., 2019; Casadesus-Masanell & Ricart, 2010; Zott & Amit, 2013). However, given that competition is changing from between firms to between ecosystems (Demil et al., 2018), managers need to integrate into their strategic plan the ecosystem-level business model. The ecosystem-level business model considers that members will collaborate in the co-creation of the value proposition and each member will have a defined source of revenue in the value delivery process. The ecosystem-level business model is more than a tool for competitive advantage, it assures the health of the ecosystem. A well-designed ecosystem-level business model assures that each member is capturing enough value to stay afloat. When every member is healthy, so is the ecosystem.

5.4 Limitation and future research directions

This section is divided into two subsections. The first presents the limitations of this thesis according to their nature (theoretical, conceptual and methodological) and propose some research perspectives to try to answer them. A second subsection presents other perspectives that could feed a research program that I wish to develop in the future.

5.4.1 Limits and research perspectives

First, the construction of the analytical framework for leadership development in the renewal stage of the ecosystem life cycle is based in particular on the servitization business model of Cusumano et al. (2015). This model, made up of three stages (smoothing, adapting, substituting), is helpful but has some limitations. First it leads to the idea of a linear and deterministic process. Second, it does not consider intra-firms' relations. Third, during the empirical investigation, it was found that even though these three stages make sense from a theoretical point of view, the transition from one stage to another is not easy. Thus, inspired by Frank et al. (2019) I added to the model two elements, one related to ecosystem development, and the second related to leadership development. Despite the relevance of the new additions, the lack of more cases did not allow to exploit this model further. Studying other cases would allow to address this limitation, and further investigate the impact of business model innovation through servitization strategies to ecosystem renewal.

Secondly, the literature on ecosystems describes a few elements to be necessary to ecosystem emergence, such as the emergence of a leader, a clear value proposition, and interdependencies between members in the value co-creation process (Adner, 2017; Moore, 1996). However, by studying what hinders ecosystem birth this study demonstrates that even if all the elements necessary to ecosystem birth are present, success is not guaranteed. Specially concerning ecosystem leaders, results indicate that ecosystem leaders need to develop certain capabilities to be able to perform their role. Capabilities such as being able to craft an ecosystem leadership strategy, and ecosystem level business model. Even though those are relevant findings and complement the existing literature, they are still superficial. That is because, it was not the aim of this thesis to dive into ecosystem leaders' capabilities, however this could have been anticipated beforehand in the research, as those findings could have enriched the analysis and results of ecosystem leadership.

Finally, this work faces two methodological limitations. The case method (Yin, 2013) generally does not aim to generalize the results, given their too limited number. The question of generalization is all the more delicate as the selection of the cases mobilized in this thesis mainly focused on mobility services. Even if I took care to diversify the context of the samples and use private governed ecosystems and public governed ecosystems as examples, the study of companies mostly from the mobility landscape induces a bias. As we have seen in chapters 2, 3, 4 as well as in this chapter, mobility services are a new phenomenon that implies the emergence of many and very interesting ecosystem cases. However, as seen in Manuscript 3 (Chapter 4), it is also a particular context where the level of complexity is elevated by the private and public relations, and the high level of regulations. This undoubtedly influenced some of the factors that hinder ecosystem birth. A study on factors that hinder ecosystem birth in private governed ecosystem could change both the weight of the hindering factors and their nature. The conclusions of this work must therefore be limited to the companies studied and to the context of this thesis.

More generally, the qualitative methodology involves a certain number of biases. I have tried to limit these biases thanks to the precautions presented in Chapter 1, particularly regarding the sampling, reliability and validity of the study. The comprehensive approach used in this work (Saunders et al., 2009) led to question various actors and to analyze thousands of documents to try to have a global vision of the factors that foster or hinder ecosystem emergence. However, in this study the final user perspective was not considered. Nevertheless, the final user, is also a very important member of ecosystems. The critical eye cast by the final user should be studied given that ecosystems' purpose is to materialize a value proposition aimed at them.

5.4.2 Research direction

The perspectives raised while addressing these work's limitations, allowed me to identify other avenues that could form the basis of a research program.

The first element that I wish to put forward consists of further testing the model proposed in Manuscript two (Chapter 3). As a reminder, this model suggests that (i) there is a relationship between leadership level of development and ecosystem renewal success, (ii) servitization strategy can leverage ecosystem leadership development, and (iii) business model innovation can be used as a strategic tool at the ecosystem level. I would like to test this model further in

different cases to compare the results. Many mobility services ecosystems are emerging in the same context as the one studied in this case. It would be interesting to test the model in similar conditions.

Another avenue suggested by the results deserves further investigation. Insofar ecosystem leadership capabilities are mainly supported by general ideas. It seems particularly interesting to deepen these ideas and to take an interest in what precisely are the capabilities an ecosystem leader must possess to be considered a good ecosystem leader, and one capable of navigating through all stages of the ecosystem life cycle. The literature about corporate leadership could be very helpful to complement the current ecosystem leadership literature in this regard. In addition, our results indicate that there is a distinction between private-governed ecosystems and public-governed ecosystems. I would like to explore those distinctions further from the leadership capabilities perspective by comparing cases where the ecosystem is led by private actors versus ecosystems led by public actors. Still, on the public versus private governed ecosystems, our results indicate factors hindering ecosystem birth, these factors were identified in the context of public led ecosystems. It would be interesting to compare those results to private-governed ecosystems.

The two research avenues presented above are all in line with this work and can be regarded as the logical evolution of the research. However, there is a third and final research avenue that subtly emerged from the results and that I think deserves further exploration. I am referring to the death of transportation ecosystems in detriment to the birth of mobility service ecosystems.

The current social context has placed on the world agenda the need to act on the effects of greenhouse emissions. Different analyzes point to the people transport sector as one of the main causes of the problem (Redman, Friman, Gärling, & Hartig, 2013). Added to this context, the saturation of urban infrastructure reveals the gap between people's need for transportation and the ecosystem's value proposition, forcing it to renew itself or face death. This scenario exposed the fragility of an outdated transport ecosystem, with difficulty in transforming itself. It is worth mentioning that the ability to transform is not linked to technological innovation, since the sector stands out as a driving force for innovation. The inability to transform lies in the structure of ecosystems, their strategies, and the rigidity of regulations. Therefore, what we are witnessing is the death of transport ecosystems and the emergence of mobility services

ecosystems (Enoch et al., 2020). From a research point of view, this context is extremely rich, it could be compared to what we witnessed two decades ago in the telecommunication industry.

The growing gap between the transport needs of people, derived from the degradation in the quality of services, and the inability to innovate, reveals the need for a change in the value proposition. A value proposition oriented to user needs, aligned with socio-environmental needs (Andersen, Mathews, & Rask, 2009; Hull, 2008; Kębłowski, Van Criekingen, & Bassens, 2019). The same urgency is observed in the need for innovation in the business model, and in changing the ecosystem leadership strategy (Polydoropoulou et al., 2020). The challenges imposed by the characteristics of the ecosystem need to be removed, enabling the attraction and entry of new actors. All these changes require the reconfiguration of the structure and the alignment of the ecosystem. Structural changes, which, by not being adopted, are preventing people transport ecosystems from succeeding in the renewal phase and giving space for the emergence of mobility services ecosystems. Moore (1993, 1996) describes the death of an ecosystem as an inability to fight innovation and therefore being replaced by a new ecosystem. However, to the best of my knowledge, little research has been done to understand the process of ecosystem death.

Complementing the point above, according to Moore (1993, 1996) and as demonstrated by the results of Manuscript two (Chapter 3), death means substitution. Thus, it is logical to say that at a given time two fighting ecosystems will co-exist. This concomitant dynamic of ecosystem fight for survival and emergence rest underexplored in the management literature. In my future research agenda, I would like to conduct qualitative studies to explore cases where transportation ecosystems are dying while being replaced by new mobility services ecosystems. The data collected from the interviews helped to identify some important distinctions between the two ecosystems, as demonstrated in Table 16.

Table 16: Transportation ecosystem versus mobility ecosystems

	People Transport Ecosystems	Service Mobility Ecosystem (MaaS)
Ecosystem leadership	Public actor	Public actor
Value proposition	<p>To offer mass transportation that is operationally efficient and cheap for daily use</p> <p>To guarantee that a certain minimum level of transportation service is assured and provided for all members of the society</p> <p>To enhance road network capacity through development and improvement of the road network.</p> <p>To improve transport safety</p>	<p>To offer door-to-door service and to be an alternative to owning and using a private car (Lyons et al., 2019).</p> <p>To bridge the gap between public and private transport operators on a city, intercity, and national level (Kamargianni & Matyas, 2017).</p> <p>To offer every public and private transport option in a single app, in which both payment and booking are handled while providing the users with dynamic route-planning information at the same time.</p> <p>To integrate fragmented modes of transportation and transport services (such as planning, booking, access to real-time information, payment, and ticketing) that travelers need to use to conduct a trip.</p>
Ecosystem leadership strategy	Loi d'orientation des transports intérieurs (LOTI ²⁸) « Inland transport orientation law »	Loi d'orientation des mobilités (LOM ²⁹) « Mobility orientation law »

When analyzing people transport and mobility services ecosystems the distinction between them becomes evident. On the one hand, transport ecosystems are approaching their death. On the other hand, we witness the birth of the mobility services ecosystem such as MaaS. The precision of these elements is necessary due to the potential discussion between the birth of a new ecosystem, and the renewal or death of the existing ecosystem. When discussing the people transport ecosystem, the inclination to classify it in the renewal phase is deterred. Moore (1993, 1996) describes the requirements for framing an ecosystem at the renewal life cycle stage, by highlighting the need in the search for new ways to innovate. He also highlights the risk of extinction of an ecosystem hardened by convenience, and by denial of the new. The value proposition presented in the people transport ecosystem puts the need to innovate in the background and emphasizes the preservation of the current model.

²⁸ Loi d'orientation des transports intérieurs (loi n° 82-1153 du 30 décembre 1982)

²⁹ Loi d'orientation des mobilités (loi n° 2019-1428 du 24 décembre 2019)

<https://www.ecologie.gouv.fr/lorganisation-mobilite-en-france>

Finally, the advancement of the sharing economy, supported by technological platforms, fosters opportunities for new service offerings. At the same time, the decline of the transport ecosystem, and the absence of supply to meet the pent-up demand, generate a market gap. The meeting of these new offers with the pent-up demand led to the emergence of mobility services ecosystems. Among the solutions, ridesharing, carsharing, and micro-mobility stand out. Despite filling the gap in the supply of transport services, these innovations have driven the disruption of the value proposition, business model, and leadership strategy of the transport ecosystem. What has been observed since then was the establishment of urban chaos. Taxi driver strikes against ride-sharing solutions could be seen around the world. Micro mobility solutions have appropriated urban space in an anarchist way. This context raises questions regarding policymakers' ability to react at the same pace of innovation. This topic has gained relevance in the literature on transport and public administration (e.g., Audouin & Finger, 2019; Jittrapirom et al., 2018; Polydoropoulou et al., 2020; Sochor et al., 2018). However, I believe there is a strategic management perspective that merits further exploration.

This conclusion highlights the main contributions, limitations, and perspectives of this thesis, as well as new avenues for research for the post-doctorate. At the end of this doctoral work, I hope to contribute to the field of strategic management by offering a better understanding of factors that can foster or hinder the emergence of ecosystems, and in particular of the role of the leader in the process of adopting business model innovation as a source of ecosystem leadership strategy.

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Appendix

Appendix 1

Business model publication analysis by academic journal

To which journal is the most frequent publisher on the topic of business model, we searched the Web of Science. This resulted in 9,414 papers. We refined our search in line with a process similar to Zott et al. (2011) and consulted leading academic and practitioner-oriented management journals. The final list of articles is presented in table 17. The search criteria were based on the CNRS³⁰ categorization of Journals in Economics and Management (2018) and included management, innovation, or strategy journals ranked 1 or 2. Finally, since articles on business models are of interest to practitioners, we included three leading practitioner-oriented journals in the list (*California Management Review*, *Harvard Business Review*, and *MIT Sloan Review*) which resulted in a total of 18 journals.

Table 17: List of academic and practitioner-oriented management journals

Academic journals	Practitioners-oriented journals
Academy of Management Journal (AMJ)	California Management Review (CMR)
Academy of Management Review (AMR)	Harvard Business Review (HBR)
Administrative Science Quarterly (ASQ)	MIT Sloan Management Review (MSM)
British Journal of Management	
International Journal of Management Reviews	
Journal of Management (JOM)	
Journal of Management Studies (JMS)	
Journal of the European Economic Association	
Kyklos	
Long Range Planning (LRP)	
Management Science (MS)	
MIS Quarterly	
Organization Science (OS)	
Research Policy (RP)	
Strategic Management Journal (SMJ)	

Having finalized the list of journals we searched on the term “business model” with no period limitation. This ensured that every article published (in the list of selected journals) was considered. In terms of content, the criterion was the inclusion of the terms “business model”

³⁰ CNRS is the French National Centre for Scientific Research, for detailed information see: <http://www.cnrs.fr/en/cnrs>

or “business models” at least once in the “topic” (for topic the WoS considers Title; Abstract; Author Keywords; Keywords Plus®). Since the term “business model” is generic and this ensured that the topic was central to the paper. Running this search reduced the sample to 213 articles. Finally, we filtered on “document type” which guaranteed that every article had been peer-reviewed and resulted in a sample of 193 papers.

To make sure that every article was relevant to the study, a reading of all abstracts was conducted. As a criterion for exclusion, it was considered the fact that certain articles, despite containing the term “business model(s)” either in the title or as a topic, did not address the concepts of “business model” as their central theme or as part of their theoretical contribution. After reading the abstracts, 53 articles were excluded, leaving a final sample of 140 articles published in 13 journals from the selected list, from the years of 1996 to 2019.

In total and in terms of publication efforts, the numbers are fairly balanced with 45% from practitioner-oriented journals and 55% from academic-oriented journals. We observe one academic journal that publishes a high number of articles on the topic: *Long Range Planning (LRP)* accounts for 54% of publications in its group (academic journals) and 32% among total publications. Ranked second and third are *California Management Review (CMR)* and *Harvard Business Review (HBR)* which are both practitioner-oriented journals. These three journals account for 69% of all publications. These results indicate that discussion on business models is concentrated in three leading journals in the management field. Some journals had not published any work on business models, that is *Academy of Management Journal (AMJ)*,

publication periods, the number of publications grew compared to numbers in the period 2000-2010.

To conclude, the descriptive analysis highlights important and interesting findings regarding the evolution of the business model construct such as the increased interest from academic-oriented journals. Although publications in academic-oriented journals came later than in practitioner-oriented journals, the academic debate has increased, and the numbers now are fairly close. The second interesting finding from this analysis is the publication peaks. The 2010 peak is due to the *LRP* special issue, and the results of the articles included in it. Finally, the debate is concentrated in three main journals.