Politecnico di Milano

School of Industrial and Information Engineering

Master of Science in Management



"How to design scalable Platform-based business model: evidence from HOC"

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# ABSTRACT

## *English version*

Besides the increased disruption that platform business models are bringing, literature has identified a dangerous threat for the sustainability of our ecosystem: the spiral of dead. Literature written about platforms and scalability points out how the platform business models that are leveraging on idle resources are rapidly expanding towards different markets, destroying the competition and ruining the whole economic ecosystem. In order to avoid this phenomenon, disruptors are slowly shifting towards more capital-intensive companies. The goal of this master thesis is to identify a paradigm shift where high capital-intensive companies are becoming much more like matchmakers and reach hyper scalable business models. Starting from the bike-sharing market, more specifically with a startup project called HOC, this research defines a three-step design approach that makes this shift possible. The main takeaway here is that hybrid organizations can be built leveraging on the power behind platforms and reaching hyper-scalability, but at the same time keeping some characteristics of an asset-based company.

## *Versione italiana*

Negli ultimi anni la società è stata radicalmente cambiata con l'esplosione del "platform business", che permette ai nuovi emergenti player di conquistare quote rilevanti del mercato sfruttando risorse inutilizzate ed andando a stravolgere quelli che sono i paradigmi di un sistema competitivo. Queste dinamiche sono spesso rappresentate con un'accezione negativa dalla letteratura in quanto possono innescare un meccanismo pericoloso ed irreversibile, definito dai critici "the spiral of dead". Per evitare di essere catturate da questa spirale queste imprese emergenti stanno migrando verso modelli di business sempre più *capital intensive*. L'obiettivo di questa tesi, tuttavia, è quello di cogliere e descrivere il fenomeno opposto, in cui aziende *asset-based* facendo leva sulla piattaforma raggiungono una struttura ampiamente scalabile.

Tale ricerca parte dal mondo del Bike-Sharing, in particolare da un progetto imprenditoriale di nome HOC, per definire un approccio basato su 3 step che renderanno questa soluzione implementabile. L'evidenza più rilevante risiede nella possibilità di costruire organizzazioni

ibride che sfruttano la piattaforma per raggiungere l'iper-scalabilità e allo stesso tempo perseguono una sostenibilità sociale tipica delle aziende strutturate tradizionali.

## EXECUTIVE SUMMARY

### Introduction:

Within the last few decades, there has been an increasingly emerging phenomenon that is reshaping the world economic structure: the advent of platforms. Today, we see companies like Airbnb, Uber, Alibaba, Facebook, Amazon, YouTube, eBay, Wikipedia, iPhone, Twitter, Instagram and dozens more that have adopted the platform business model and have completely disrupted the market. Those companies are called matchmakers because of their ability to provide platforms for multiple groups to get together.

The main reason behind the success of platforms is its capability to scale much more efficiently than traditional pipeline business models. Obviously, the scalability efficiency is not the only reason for its overwhelming success. A lot of new and improving technologies have turbocharged the platform business model, such as powerful chips, the world wide web, broadband communication, programming language, internet and cloud. Within the research project, we'll analyse how platforms can help businesses to scale more efficiently.

### Two sided platforms

A proper literature review is then needed to better understand the disruptive power of platform business models and in order to have a full view on the academic knowledge about platform. Let's start with a clear definition of how a platform can be defined: Products and services that bring groups of users together in a two-sided network. (Rysman, 2009).

In the past, two schools of thought have been developed; one economic theoretical perspective which sees platforms as double-sided markets, and the other as an engineering design perspective which sees platforms as technological architectures. During my dissertation, I will not take a fixed perspective since I want to have a broader view of the platform's concept by having a focus on both competition and innovation.

That being said, the economic view will definitely be helping my analysis more profoundly because it focuses its attention on the reason behind total platform dominance. Many platform classifications have been provided, but the most relevant is: internal (company-specific platforms) vs external (industry-wide platforms).

This new ecosystem is leading to a "paradigm shift" (Baldwin, et al., 2011) because users are increasingly able and willing to engage in distributed and collaborative innovation.

The pillar of this new business model is network effect (Parker, et al., 2005). Literature distinguishes two types of network effect: direct network effect and indirect network effect.

Indirect network effect, or cross side, are the main drivers of value creation within a platform ecosystem and which strongly influences the price decision. A platform provider must be able to choose a different price for each side, always taking into consideration the willingness of the other side to pay. (Kaiser, et al., 2011). The definition of a correct monetization strategy is probably the trickiest part mainly because of feedback loop dynamics. Developing a sustainable and successful platform business model leads to having to overcome many challenges, but researchers agree that the biggest one is the chicken and egg dilemma about which side brings the first on board. (Hagiu, 2006). Analysing many platform success stories, many strategies have been deployed but there still isn't a universal answer to the challenge since it strictly depends on the market configuration of both sides. There are many more challenges provided by diverse research but each one strictly depends on the platform's moment in time. Many different frameworks provide information over the different situations during a startup's lifecycle. The core of my dissertation will focus on a specific moment: the scalability phase.

## Scalability

Before understanding how platforms are much more scalable than traditional pipeline business models, a proper explanation of the word scalability must be provided. Over time, the word scalability was first associated to the IT world, but now it is linked to many different fields. The most generic definition of a scalable system is "if there is a simple way to update the system to enable support for increased trade while maintaining proper efficiency." (Menasce, et al., 1999)

Scalability has been identified in literature as a key factor of innovative business models. The key factors to identify a scalable business model are the ability to customize the technology to the customer's expectation, the capability to create a flexible cost structure and the ability to adapt and respond quickly to both environment and external change. (Christensen, et al., 2009).

During the literature review, another word has been linked to scalability: disruption. The only way to disrupt a market is by creating a scalable business model. A scalable business model can be described as a business that is capable to improve or maintain its effectiveness while the number of components is increasing or reducing. Researchers provided many different dimensions to characterize a scalable business. The most common are vertical/horizontal or linear/ sub linear/ super linear/ negative (Acquier, 2015). Once we understand the true meaning and the many characterizations of scalability, it can be said that the main challenge for theoreticians and practitioners is designing scalable business models. In the words of Steve Blank, one of the fathers of the Silicon Valley ecosystem, a startup is a temporary organization in search of a scalable, repeatable and profitable business model. We must underline here that the goal of scaling a business model should not be the ability to hire 10% more employees, 10% more capital or resources and get 10% more output out of it. Even if often, in this scenario, synergies usually provide cases of linear return-to-scale, a truly scalable business model must promise to exponentially increase return-to-scale. (Basu,2008). In today's platform market, it's about something way bigger than exponentially increased return-to-scale. In a situation where there is a completely different magnitude, we're talking about hyper scalability. (Mohout, et al.,2017). These business models have forced all the managers and researchers to take a totally different approach on scalability.

The main characteristics behind architectural innovation are the intangible assets. Hyper scalability in literature has often been linked to the global brain (a neuroscience futuristic vision of interconnection between humans and digital artefacts) building block.

The most relevant building blocks are intangible assets.

At the base of this word, there is "ownership inefficiencies" seeing as owing something reduces the usage of that thing.

A common example of dead capital is a car that stays parked for most of its existence, since a car and a multiplicity of other goods and tools a person owns are used in an efficient way. This approach can be seen like the service innovation approach. (Kastalli, et al.,2013).

Obviously, a hyper scalable business model also has a dark side: it is impossible to have the disruptive and world-changing results without a skeleton in the closet. Researchers described this phenomenon as the: "spiral of dead". An example of this spiral of dead is the example of companies who chop down forests faster than they can grow back. Hyper scalable

companies are represented as companies who possess a hyper efficient chopping machine capable of wiping out the whole rainforest. (Morozov, 2014).

Today, many of these disruptors are realizing the negative effect of their business model and are shifting or hybridizing their business models from a purely intangible asset company to become more capital-intensive. (Omar Mohout, 2016). These matchmaker companies are slowly going toward an infrastructure provider business model, hence the paradigm shift.

*Research question:*

So, what should these shared infrastructure providers do? Wait for the big disruptor to destroy their market? Obviously not.

They must react and try to compete in the same way by moving to the other side of the line and becoming more and more like a matchmaker in order to build a hyper-scalable business model. These capital-intensive firms must find a way to leverage the power of the platform to scale in a completely new and efficient way.

## Research Design

A universal solution to this specific question can't be provided, so the focus will be on a specific industry and then it will shift towards a more universal pattern. The focus will be on the bike-sharing industry since it clearly represents a capital-intensive sector. This industry is still far from reaching a hyper scalable solution. Moreover, we analyse HOC, a startup project that aims to provide a P2P (peer to peer), free-floating bike-sharing platform powered by common bicycles with a smart lock and a mobile app.

The empirical data of the solution are a survey sent out to 500 potential customers of the platform and 15 extensive interviews with bike mechanics. All the financial and business considerations were deployed during an acceleration program at Eptagon Lab with the support of C-level mentors. Throughout time, bike-sharing services changed their business model many times. Three generations of bike sharing (DeMaio, 2004) can be defined and today, it is mainly represented by smart bikes without stations that have an internal GPS and an alarm system and that can be activated with a mobile app.  This new, growing business model is reshaping mobility in many cities around the world but there are still some challenges that have not been solved. First of all, there are many thefts and vandalisms that occur, which are the main reasons for bankruptcy in bike-sharing companies. A second big problem is related to sustainability. There are millions of bikes that sit in landfills today. The

third and probably the biggest challenge that companies today are facing is scalability. Adopting the literature framework, we can say that the bike-sharing business model represents an infrastructure provider. So how can the power of platforms be leveraged to design a hyper scalable business model?

## Paradigm Shift for bike-sharing: HOC

The main objective of this project is to prove that even capital-intensive business models can reach hyper scalability. The HOC project was born from a competition called "Hack Your Move" promoted by Polihub with the objective to develop sustainable mobility solutions. HOC uses common bikes that can be shared with the use of a smart lock and can create a bike-sharing ecosystem. To overcome the chicken and egg dilemma, HOC provides an initial fleet in order to bring one side of the platform on board. After, it allows common people driven by the desire to offer a service to its own city and gain some money to share their bikes enabled by the smart lock. In order to be successful and scale, HOC settled on the goal to start from the Italian market. The geographical focus includes mainly middle-sized municipalities, from 50k to 400k inhabitants. The launching phase will be characterized by a focus on millennials, targeting them as early adopters of the service. They will be responsible for the company's capacity to reach a critical mass both in terms of user and fleet. This new business model, validated by a lot of data collected, will provide an interesting solution to the hyper scalability issue. HOC solved the first challenge of vandalism and theft thanks to the creation of a strong community that is more responsible, and due to the locker, which guarantees a higher security level. The sustainability problem will be faced by shifting the business from mass production towards zero-production using idle resources. The real goal and the core of this dissertation is related to the third challenge: to obtain a paradigm shift from infrastructure providers to matchmakers for the bike-sharing industry.

Thanks to the locker, the bike is no longer an asset of bike-sharing companies, but it becomes a resource shared by one side of the platform. At the base of this shift are the bikes that represent the idle resource that makes this business model possible. This is also proven by economics by analysing HOC's cost structure as a more matchmaker type of configuration with a low level of fixed and variable costs. Moreover, the fixed fleet will allow it to open in a much faster way in a new market once it has finished the asset dependency. Thanks to the cross-side network effect, HOC's system will follow the demand. More and more people

will look for a bike and consequently, more citizens will be incentivized to offer their bike to the platform. No need to saturate its production in order to make the business efficient. Observing the global brain structure, it can be said that HOC represents all of the building blocks: technology, user base and dead capital. HOC will leverage on idle resources like bikes in garages or in municipality warehouses that represent ownership inefficiencies and finally reach hyper scalability.

## Discussion

Within this chapter, we'll analyse how a common infrastructure provider can reach hyper scalability by leveraging on the power of platforms. Here, we'll define a new business model that represents a hybrid of the two, matchmakers and infrastructure providers. (Mohout, 2012)

Thanks to the assets that are already available, the chicken and egg dilemma will be solved by making the platform more efficient. Once the dilemma has been solved, we will focus on the creation of a strong user base that, due to the support of new ways to approach technology as sharing enabler, will allow the community to provide/share its own infrastructure. Literature on platform and scalability allows us to identify a relevant trend within the platform's business model: escaping from the spiral of dead (Christensen, et al., 2003). Many tech giants are becoming more capital-intensive companies. This new hybrid model will allow large capital-intensive companies to reduce their asset dependency.

A three step design process that characterizes the new business model design and represents a paradigm shift of the current scenario has been developed:

1. Creation of an asset that will bring one side of the platform on board
2. Development of a user base that shares the same vision of the business project itself
3. Identification of an idle resource enabled by the power of technology

**Market entry:**
Company provides its own assets

**One-side on board:**
Strategy to solve the chicken
and egg's dilemma

**Idles resources
Engagement:**
Configuration of an aligned community

**2SM:**
Technology empowered the
platform and enabled idle resoure

**100% Platform
business model:**
Company becomes a real
matchmaker

**New market entry:**
Company asset leveraged to
hyperscale
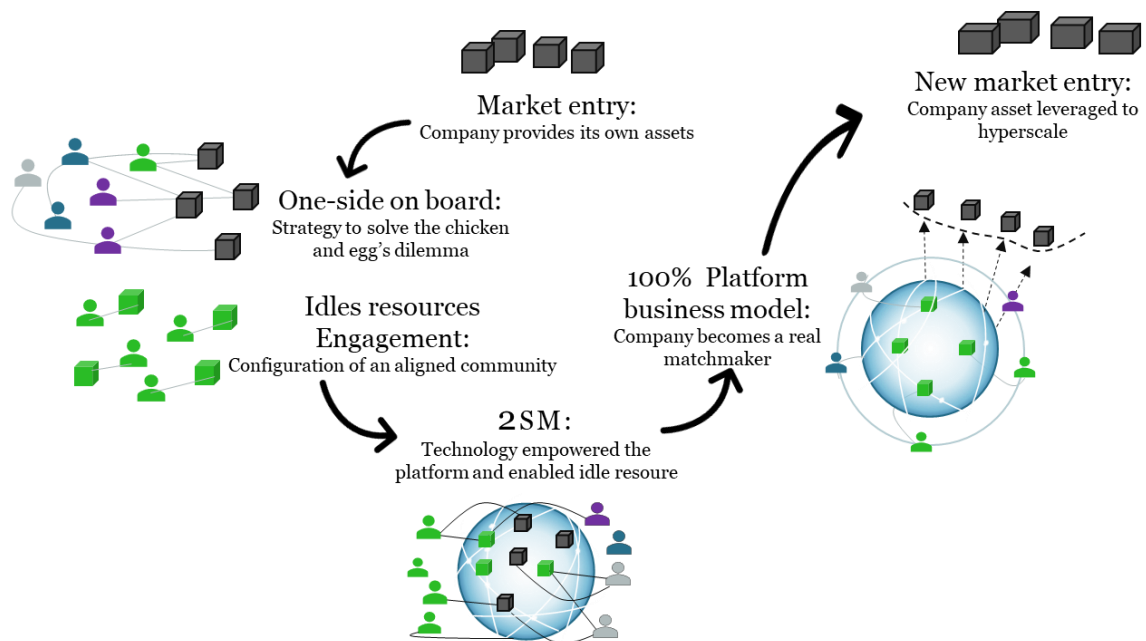
This model underlines how the power of the platform can also be unlocked by asset-based companies that build hyper scalable business models. I truly hope this solution will bring new points of view to both academic and management for platform business models to create more and more hybrid companies.

## Conclusion

The three-step business model design obviously does not have a static configuration. What should be done from now on is monitoring the market and seeing if companies such as HOC are emerging.

To conclude, there are three main takeaways that emerge from this dissertation. First of all, an interesting solution to solving the chicken and egg dilemma is by starting with a traditional pipeline business and then enlarging the traditional business model towards a platform business model. The second is the secret behind hyper scalability: the user base. In fact, the unique competitive advantage of today's disrupters is their user base, a hard to trade skill. The third and probably most challenging consideration is the design approach to spot ownership inefficiencies. In the discussion chapter, we analyse how a service innovation approach can be a lever for hyper-scalability. Still, the most relevant point within the thesis has not yet been underlined: the possibility to build hybrid organizations that are not only infrastructure providers and not only matchmakers. These hybrid organizations will leverage

on the power behind platforms in order to reach hyper-scalability, and at the same time they will keep some characteristics of an asset-based company. This configuration could be the solution that moves the paradigm shift in the opposite direction and put an end to the spiral of dead.

# 1. INTRODUCTION

## 1.1    History of Platforms

Platforms have completely changed the world economic scenario. Susan C. Athey, Stanford University professor and former chief economist at Microsoft believed that platforms have transformed the economy over the last two decades, but the biggest effects are yet to come. Back in October 2007, Brian Chesky and Joe Gebbia, who at the time were designers who couldn't afford their rent, posted an ad in an online newsletter offering an unusual housing alternative for designers attending an event in San Francisco that week.

Hotels were completely booked, and attendees of the event were running out of options. Chesky and Gebbia saw this as an opportunity to rent out an air mattress in their living room. Their casual solution to their money problems would launch a revolution in one of the world's biggest industries and give way to one of the most successful platforms: Airbnb. Today Airbnb is a giant enterprise active in 119 countries, where it lists over 500.000 properties and has a business valuation of over 10 billion dollars.

The reason behind all their success is hidden behind the power of the platform. The same power that allowed a smartphone-based car service called Uber to reach a business valuation of over 50 billion dollars in less than 5 years. The platform uses new technology solutions as a lever to connect people, organizations and resources creating and exchanging a huge amount of value. (Argentesi et al.,2007)

The power of this type of platform is so innovative that other companies like Airbnb, Uber, Alibaba, Facebook, Amazon, YouTube, eBay, Wikipedia, iPhone, Twitter, Instagram and dozens more were also able to use it to disrupt the market. This disruptive power is not just reshaping the economic scenario but it's also transforming the lives of individuals like lawyers, doctors and teachers. It seems that no matter what kind of lifestyle a person lives, there is a high possibility that a platform while change it.

To fully understand the revolution behind platforms, let's talk about how pipelines represent the way value has been created and exchanged before this revolution. "*A pipeline business can be described as a linear value chain with producers on one side and consumers in the other*" (Parker et al., 2016). The real reason why platforms beat pipelines is that platforms have the ability to scale more efficiently by eliminating any sort of middleman and creating

a more hands-off system. For example, in the publishing industry, editors (pipeline) select just a few books between the thousands they receive while Amazon Kindle (platform) allows anyone to publish anything and the consumers are the ones who rank them.

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*"The platform system can grow to scale more rapidly and efficiently because their traditional gatekeepers/editors are replaced by market signals provided automatically by the entire community of readers."*

(Parker et al.,2016)

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## 1.2   Reasons behind platform success

The scalability aspect of platforms will be deeply analysed in the following chapter since it represents the biggest challenge of my dissertation.

Besides the fact that scalability is the main reason that platforms succeed, there are other aspects that justify platform success:

- Platforms unlock new sources of value creation and supply
- Platforms use data-based tools to create community feedback loops
- Platforms invert the firm

These types of platforms are called matchmakers because of their ability to provide physical or virtual platforms for multiple groups to get together, and a large part of the platform's success can be attributed to this matchmaker factor: it's the technological progress that generates the disruptive power behind platforms and turbocharge the old matchmaker model. (Hagiu et al.,2011)

*"Six new and rapidly improving technologies have driven matchmaker innovation by reducing the cost, increasing the speed, and expanding the scope of connections between platform sides."* (Evan et al.2016)

- More powerful chips: Consider that the chip of the first IBM PC, introduced in 1981, had twenty-nine thousand transistors on it while the chip of the iPhone 6 in 2014 had two billion transistors.

- The internet: More than 3.25 billion people worldwide have internet access over fixed or mobile devices. This number represents 44% of the entire world's population.
- The world wide web: Consists of all the sources of content, written and transcribed in a standard way, that are available over the internet. In just 2015, there were 173 million active websites connected to the internet.
- Broadband communication: Its speed has become three times faster since 2008, allowing to play a move sent from a server in real time. The same for mobile broadband penetration that with 4G technology in 2014 was almost four times as high as it was in 2009.
- Programming language and operating systems: In 2014, one survey identified more than 11 million professional software developers in ninety countries.
- The Cloud: Now there are more than 5.5 million computer servers connected to the internet.

Identified the relevance of that world changing phenomenon, will be analysed how platform can help business to scale more efficiently.

To truly understand how platform can scale first must be understood the meanings of platform and scalability.

For this reason, the paper has the following structure. Section 2 and 3 analyse the literature over Platform and Scalability to provide a clear theoretical picture. Section 4, after the research question explication, represent the design process of the research. In section 5 is presented the experimental case that provide an answer to the question while in Section 6 the solution will be generalized and discussed. Finally, in section 7 the conclusion with all the implication for managers and academic.

# 2. TWO-SIDED PLATFORMS

## 2.1. Definition and main Characteristics

Due to the history behind the platform, it is necessary to define what can be considered a platform. Throughout the years there were several authors that provided different definitions for what a platform is. Van Alstyne, who is a professor from Boston University and a research associate at the MIT Initiative on the Digital Economy who with his team; Thomas Eisenmann and Geoffrey Parker, wrote on the specific differences between a traditional value chain and a two-sided network. A traditional value chain moves costs from the left, and revenue from the right, whereas a two-sided network, the costs and revenue are both coming from the left and the right side since the platform has a distinct group of users on each side. The platform incurs costs in serving both groups and can collect revenue from both parties, although one side is often subsidized, as we'll soon see.

That being said, platforms can be defined as products and services that bring groups of users together in a two-sided network. (Rysman, 2009)

### Different Platform Perspective

In the past, two school of thoughts have been developed; one economic theoretical perspective which sees platforms as double-sided markets and the other as an engineering design perspective which sees platforms has technological architectures.

Those two perspectives have been profoundly analysed within Annabelle Gawer's paper: "Bridging differing on technological platform: Toward an integrative framework" and below I will provide the main observation of the paper identifying which of the perspectives fit better with my analysis.

Management research on technological platforms have been developed from two separate streams of academic literature: industrial economics (Rochet et al., 2003; Evans et al., 2006; Armstrong, 2006) and engineering design (Meyer et al.,1997; Krishnan et al., 2001; Jiao et al., 2007). The economic perspective focuses on how platforms as markets mediate transactions across different customer groups and how network effects fuel platform competition. In contradistinction, the engineering design perspective views product platforms as technological designs that help firms generate modular product innovation. The following table 1. highlights the main differences and similarities between the two perspectives.

| Literature | Economics | Engineering design |
|---|---|---|
| Conceptualization | Platforms as markets | Platform as technological architectures |
| Perspective | Demand | Supply |
| Focus | Competition | Innovation |
| Value created through | Economies of scope in demand | Economies of scope in supply and innovation |
| Role | Coordinating device among buyers | Coordinating device among innovators |
| Empirical settings | ICT | Manufacturing and ICT |

*Table 1-The two-academic streams: Industrial economics vs Engineering design*

To provide a deeper meaning of the two perspectives and to understand at a conceptualized level the concepts there have been, Industrial organization theorists were not the first to develop the concept of platforms.

More than ten years before Rochet and Tirole (2003) characterized platforms as two-sided markets, the term was seeping through in new product development literature, where it soon gave rise to a well-developed theoretical perspective on platforms and their effect on innovation.

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*"the earliest management scholars to refer explicitly to the concept of platform, platforms are products that meet the needs of a core group of customers, but can be modified through the addition, substitution, or removal of features."*

(Clark et al.,1992)

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For McGrath (1995), platforms are collections of common elements, especially technological ones, implemented across a range of products.

Meyer and Lehnerd (1997) define a platform as a set of subsystems and interfaces forming a common structure from which a stream of products can be developed.

During my dissertation I will not take a fixed perspective since I want to have a broader view of the platform's concept by having a focus on both competition and innovation.

That being said, the economic one will definitely be helping my analysis more.

The economic view allows us to understand the reason behind a platform dominance and the effect of the winner-take-all dynamic. a static demand side-view of platform competition can be seen within the economic view (competition not within different platform ecosystem but just within the platform).

It allows you to understand how and why a platform can rapidly reach a position of sustainable market dominance but does not focus at all on the issues of platform evolution and platform innovation.

Moreover, the other perspective (the design perspective) has different limitations. (Simpson, 2004)

"This perspective sees essentially platforms as structurally stable: innovation happens on modules, within stable system architectures, and facilitated by stable interfaces; this view therefore does not help explain how platforms themselves evolve." (Gawer,2014).

All the research that focuses on this perspective does not provide any insight on competition, a critical factor to fully understand the winner-take-all dynamic that strongly characterizes platforms.

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*"A Platform is an intermediary that facilitates economic interaction between two sets of agents where in the decisions of one set of agents are likely to have an effect on the other via direct and/or indirect externalities."*

(Sriram, et al.,2014)

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In this definition, you can find the word 'externalities' which is defined by Investopedia as "an economic term referring to a cost or benefit incurred or received by a third party." The capability to capture these externalities is the core behind platform success. In this definition, we're talking about two agents and this is why we usually talk about two-sided platforms

that have been defined by different authors: (Eisenmann et al. 2006);(Osterwalder, et al.,2010) has: "specific multi-sided platforms that bring together two distinct but interdependent groups of customers." They create value as intermediaries by connecting these groups.

Now that we have provided a wider definition of platforms by examining the externality effect linked with them, we have to underline and define the main features of these 2SM (two-sided markets) being backed by all the papers that define different types of framework to classify the different platform business models. (Katz et al., 1986)

## Classification of platform

## Internal vs External

The first relevant classification has been provided by Annabelle Gawer and Michael A. Cusano that identifies two predominant types of platforms: internal or company-specific platforms, and external or industry-wide platforms. Internal platforms are "a set of assets organized in a common structure from which a company can efficiently develop and produce a stream of derivative proaducts". Whereas external platforms are "products, services, or technologies that act as a foundation upon which external innovators, organized as an innovative business ecosystem, can develop their own complementary products, technologies, or services." (Gawer,2014)

A few fundamental design rules and principles have also been defined by researchers: "In internal product platforms, the stability of the system architecture, and the systematic or planned reuse of modular components (Baldwin, et al., 2000)." We can see a fundamental trade-off as well couched in terms of functionality and performance: the optimization of any subsystem may result in the sub optimization of the overall system. (Meyer et al., 1997), (Simpson et al. 2007)

Therefore, internal platforms mainly promote incremental innovation or constrain some types of innovation. We must introduce the concept of a supply-chain platform that can be seen as a special case of internal platforms.

The tab 2. clearly incorporates all the attributes that characterises the differences between internal and external with an addition of another group: supply chain platform. Some authors also identify it within internal platforms and its differences are well underlined within the tab. (Muffato et al., 2002)

| | Internal platform | Supply-chain platform | Industry platform |
|---|---|---|---|
| Level of analysis | Firm | Supply-chain | Industry ecosystem |
| Platform's constitutive agents | One firm | Assembler | Platform leader |
| | Its constitutes sub-units | Suppliers | Complementors |
| Technological architecture | Modular design | | |
| | Core and periphery | | |
| Interfaces | Closed interfaces | Interfaces selectively open | Open interfaces |
| | Interfaces specifications are shared within the firm, but not disclosed externally | Interface specification are shared exclusively across the supply-chain | Interface specifications are shared with complementors |
| Accessible innovative capabilities | Firm capabilities | Supply-chain's capabilities | Potentially unlimited pool of external capabilities |
| Coordination mechanisms | Authority through managerial hierarchy | Contractual relations between supply-chain member organizations | Ecosystem Governance |
| | | | In the specific case of multi-sided markets: exclusively through pricing |
| Literature | Sanderson and Uzumeri (1995) | Brusoni(2005) | Gawer and Cusumano (2002) |
| | Meyer and Lehnerd (1997) | Zirpoli and Becker (2011) | Baldwin and Woodard (2009) |
| | Simpson (2004) | Sako(2009) | Boudreau (2010) |
| | | | Eisenmann et al. (2011) |
| Examples | Black and Decker | Renault-Nissan | Facebook |
| | Sony Walkman | Boeing | Google |
| | | | Apple iPhone and Apps |

*Table 2-Different framework of Platform: Internal, Supply chain, Industry*

The new platform ecosystem leads to "the paradigm shift" (Baldwin, et Al., 2011) where innovation is no longer restricted to producers, but the user is increasingly able and willing to engage in distributed and collaborative innovation. This change has been driven by the increasingly digitized and modularized design along with the much higher communication capability, thanks to the internet.

For those reasons, organizations are reshaping themselves since platforms allow for multi-modal interactions both within their agents and across the platform itself.

As shown above, the classification system is based on an analysis of various platform literatures and associated key examples (Table xx). Platforms have been classified within three increasingly broader organizational settings: within firms, across supply-chains and

within ecosystems. Each of the three organizational settings have a corresponding type of platform for which are highlighted: the level of analysis, the platform's constitutive agents, its technological architecture, the nature of its interfaces, its innovative capabilities and its coordination mechanisms. In addition, a representative set of relevant empirical examples have been included along with key research articles.

## Four platform's types

Last but not least, an interesting classification is divided into "4 broad types. (Sriram, et al., 2014) The first type of platform is *exchange* (e.g., eBay or eHarmony), which facilitate transactions between buyers and sellers by enabling them to search for feasible contracts. The second type is *advertiser-supported media* such as television and newspapers (e.g., HBO or the New York Post), which bring advertisers and audiences together. The third type is *transaction systems* such as card payments (e.g., Mastercard) which bring together the merchants and their customers. The fourth type is *hardware/software* platforms such as video game consoles and computer operating systems (e.g., Playstation or Windows). These classifications are interdependent, so within the dissertation both the internal/external and the 4 broad types will help define which are the main features that characterize my research solution.

## Pillars of Platform Business Model Network effects

- ### Network Effects

This new business model is based on completely different patterns, seeing as it is based on a 2SM dynamic. Which are the rules that are at the base of its pricing structure?

There is one simple answer to that question: Network effects. (Parker et al., 2005)
Network effect is so important that most platform definitions include it, directly or indirectly. For example, two-sided markets have been defined as "markets involving two groups of agents interacting via 'platforms' where one group's benefit from joining a platform depends on the size of the other group that joins the platform" (Armstrong, 2006) or as "businesses

*Figure 2-Traditional network effect dynamics*

in which pricing and other strategies are strongly affected by the indirect network effects between the two sides of the platform" (Evans, et al.,2008).
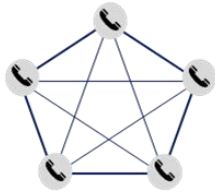
To explain in the most comprehensive way what a 2SM is, we can consider the case of video game consoles. (Muzellec et al.,2015) (example of the Nintendo Wii game consoles).

It starts with an initial base of end-users (gamers) that have the effect of increasing the incentives for developers of complementary products or services (video game developers) to join the Wii platform and develop Wii-compatible video games. This increased provision of complements would, in turn, help to attract more end-users to the Wii platform.

The literature distinguishes between two main kinds of network effects: *direct* network effects and *indirect* network effects. Direct network effects (also called same-side network effects) arise when the benefit of a technology to a user depends positively on the number of other users of this technology, as in the example of a telephone network or the network of Skype users. Indirect network effects and the associated notion of cross-group network effects defined as: "A cross-group network effect arises if the benefit to users in at least one group (side A) depends on the number of other users in the other group (side B). An indirect network effect arises if there are cross-group network effects in both directions (from A to B and from B to A) and side B's participation decision depends on the number of participants on side A so that the benefit to a user on side B depends (indirectly) on the number of users on side A."(Hagiu, et al., 2011), (Clements et al.,2005).
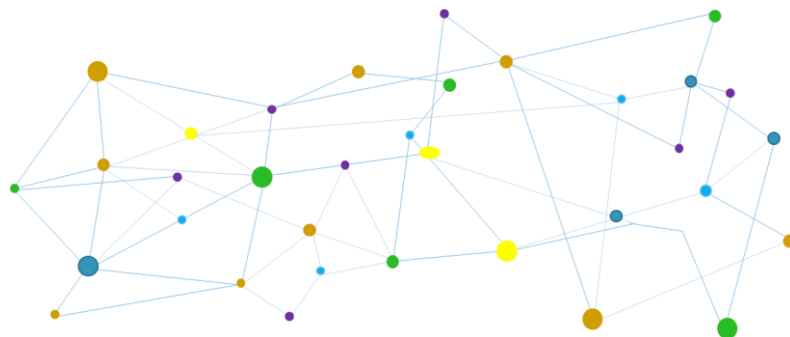


*Figure 1-True power of network: connectivity (cross side, same side)*

- **Price structure**

Once we understand what the network effects are and the different types that exist, we can analyse the relationship it has with the price structure.

The price structure is much more complicated than in traditional competitive industries.

Traditionally the price is determined by the marginal cost of producing one extra unit and usually that margin is thin unless it's an industry with high barriers to entry and the price is settled depending on the customer's willingness to pay, so margins become much fatter.

Platform providers have to choose two different prices: one for each side. They must be able to calculate the impact on each side, always taking into consideration the willingness of the other side to pay. (Kaiser et al.,2011)

Typically, in that scenario there is a side that it is subsidized since there is a group of users that, if attracted, create a high monetary value to the platform.

For this reason, the focus is not on the creation of the common network effect but on cross side network effects. "If the platform provider can attract enough subsidy-side users, money-side users will pay handsomely to reach them. Cross-side network effects also work in the reverse direction." (Muzellec, et al., 2015), (Hagiu,2006)

Of course, same-side network effects are also relevant in the definition of the pricing structure. It is generated when drawing users to one side helps to attract even more users to that side. (Nair et al.,2004)

Since I've already provided exhaustive examples of cross side, same side network effects can be further explained by providing PlayStation's example. As more people buy PlayStation consoles, new users will find it more valuable since they can find partners for online games and they can trade games with friends. (Liu,2010)

The term adopted by economists to describe that dynamic is snowballing pattern.

Same side effects can be just as negative as cross side (generating a negative effect usually when it is also linked to exclusivity).

| NETWORKED MARKET | SIDE 1 | SIDE2 | PLATFORM PROVIDER |
|---|---|---|---|
| PC operating system | Consumers | Application developers | Windows, Macintosh |
| Online recruitment | Job seekers | Employers | Monster, CareerBuilder |
| Miami Yellow Pages | Consumers | Advertiseres | BellSouth, Verizon |
| Web search | Searchers | Advertiseres | Google, Yahoo |
| HMOs | Patients | Doctors | Kaiser, WellPoint |
| Video games | Players | Developers | PlayStation, Xbox |
| Minneapolis shopping malls | Shoppers | Retailers | Mall of America |
| Linux application servers | Enterprises | Application developers | IBM, Hewlett/Packard, Dell |
| Wi-Fi equipment | Laptop users | Access points | Linksys, Cisco, Dell |
| DVD | Consumers | Studios | Sony, Toshiba, Samsung |
| Phoenix Realtors Association | Home Buyers | Home sellers | 100+ real state brokerage firms |
| Gasoline-powered engines | Auto owners | Fueling stations | GM, Toyota, Exxon, Shell |
| Universal Product Code | Product suppliers | Retailers | NCR, Symbol Technologies |

*Table 3-Different characteristics of 2SM*

This tab 3. underlines all the different sides and the platforms connected to them. It's easily understandable how most of these examples do not imply physical assets since the generation of network effects is much easier for companies that are not capital intensive, and the reason resides in the network effect definition itself.

Despite the ability to capture network effects (both cross and same side) and user sensitivity to price, there are two other factors that must be considered to take the best price decision: user sensitivity to quality and output cost.

The first one could look counterintuitive but suggests not to charge the side that strongly demands quality but the side that supplies quality. A field where this strategy is easily applicable and understandable is within the video game industry. In order to deliver high quality, developers incur enormous fixed costs and to be sure to coincide with the cost, the platform must assure a huge number of users.

Output costs on the other hand explains that you also need to take into consideration the cost related to onboard a new user onto the platform. In this scenario, pricing decisions are more straightforward when each new subsidy-side user costs the platform provider essentially nothing. (Rochet et al.,2003)

- **Value creation and monetization**

Another relevant reading that will help to enlarge the comprehension of these theories and the link between network effect and price structure is: Platform strategy: Monetization, capturing the value created by network effect.

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*"monetize network effects poses a unique challenge; Network effect makes a platform attractive by creating self-reinforcing feedback loops that grow the user base, often with minimal effort or investment by the platform manager. Higher value creation by producers on the platform attract more producers and further value creation."*

(Parker, et al., 2016)

---

Ironically this feedback loop dynamic makes monetization very tricky. *"Charging for access may lead people to avoid the platform; charging for usage may inhibit frequent participation charging for production reduces value creation, making the platform less attractive to consumers and charging for consumption reduces consumption, making the platform less attractive to producers.".* This is the dilemma.

The book tries to provide an answer to the difficult question: How do you monetize a platform without damaging or even destroying the network effects you've worked so hard to create?

First, in order to monetize it is necessary to start with an analysis of the value created on the platform.

In fact, within traditional pipeline businesses that task was simple since they just deliver value to the final customer with a product or a service.

The value that can be collected by platforms, according to Parker's and Van Alestyne's theory that was mentioned as part of the 2014 Nobel prize awarded by Tyrole, fall into four broad categories:

- For consumers: Access to value created on the platform. An example is YouTube since users find videos to be valuable.

- For producers or third-party providers: Access to a community or market. An example is Airbnb since hosts find access to a global market of travellers valuable.
- For both consumers and producers: Access to tools and services that facilitate interaction so they can reduce friction and barriers between users and producers. An example is Kickstarter which helps creative entrepreneurs raise money for new projects.
- For both consumers and producers: Access to curation mechanisms that enhance the quality of interactions. An example is Winelivery which allows consumers to buy good bottles of wine at any moment and allows the producer access to consumers who are willing to pay a fair price for it. (Chu et al.,2013)

This factor creates an excess value: a value that can be exploited by the platform without inhibiting the continuous growth of network effect.

An important question that should be asked after the analysis step is how we can generate revenue without reducing our positive network effects? And can we devise a pricing strategy that strengthens our positive network effects while reducing our negative one?

There are different solutions and strategies that can solve the challenge: Firstly, charging a transaction fee is considered a powerful way of monetizing the value created by the platform without hampering the growth of network effects. Since buyers and sellers are charged only when an actual transaction occurs, they are not discouraged from joining the platform and becoming part of the network. Another solution could be charging the producers for access to a community. This would allow the platform not to charge members for access to the platform and without weakening the network effects. There could be also the possibility to charge for enhanced access. For example, access to better targeted messages or interaction with particularly valuable users. (Shriver et al.,2013)

Another challenge of the platform is to define the side or sides that you should charge or subsidize. As we mentioned above, there are some criteria to subsidizing a side's price or quality sensitive or to charge all users. We will not go deeper on this topic since the core of the analysis is focused on another challenge that has to be taken.

Among everything, the biggest challenge that a platform business model has is the chicken and the egg problem.

## 2.2. Creating a two-sided platform: a process perspective

- **Chicken-and-egg problem**

The core issue which is faced by platform business models with two-sided markets is that of "getting both sides on board." (Lett, 2015). In fact, if we are dealing with positive cross group externalities, the scenario in which none of the two sides want to participate is easily identifiable since they have unfavourable expectations regarding the other side.

The important role in this dynamic is the capability to coordinate the expectations of one or both sides in order to get both sides on board.

Several studies tried to overcome that challenge, like Hagiu, a Boston University Professor in a 2006 study showed different markets where the sellers (one side) took the decision to participate on the platform before the buyers (the other side). The platform could monopolize the market and delay the price for the buyers waiting to understand how many sellers would be attracted to the platform.
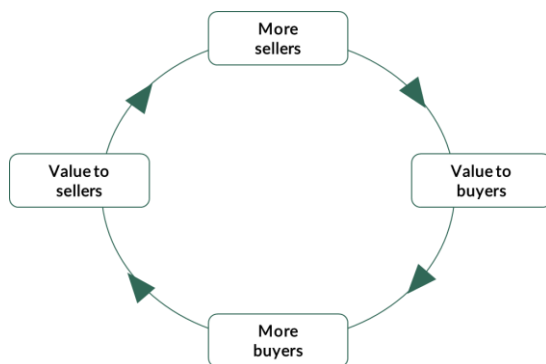


*Figure 3-Value circle*

Later in 2013, Hagiu explained that: "a platform can overcome unfavourable expectations of sellers by providing first-party content (e.g., in-house video games developed by the console manufacturer) that can substitute for the content to be provided by sellers." Of course, all the aspects that have been and will be analysed in order to understand how to solve the chicken and the egg problem are complementary with the pricing strategy. Since depending on which side, you subsidize or which side you charge, you start by bringing one of the sides onto the platform first.

The chicken-and-egg problem is the biggest challenge addressed by those who want to successfully launch a platform business model. The right question to ask is: When trying to build a two-sided market in which both sides are equally essential, which come first? And how do you attract one without the other?

I want to provide an extensive answer to this question by providing a real case of a platform that responds successfully to this question: PayPal is an American company operating a worldwide online payment system that supports online money transfers and serves as an electronic alternative to traditional paper methods like checks and money orders. Back to

1999, the new payment mechanism posed a great challenge. How could they attract buyers without sellers that accepted this payment method? And if they can't attract buyers, sellers won't invest time, effort and money in using that technology.

Logically this challenge cannot be solved since no one jumps on board without the other one doing it first, but luckily in life and also in business, it's not always a matter of logic.

PayPal solved this problem thanks to a series of ingenious strategies.

First, they reduced the friction to accept online payment as much as possible. All you need is an email and a credit card.

In a lecture Peter Thiel (PayPal founder) gave at Stanford, he explained what happened:

"PayPal's big challenge was to get new customers. They tried advertising. It was too expensive. They tried BD deals with big banks. Bureaucratic hilarity ensued. Over ice cream, the PayPal team reached an important conclusion: BD didn't work. They needed organic, viral growth. They needed to give people money." (Parker, et al.,2016)

Thanks to this strategy, they reached millions of users. Perhaps it wasn't the best or most stable strategy but for their business model, it was a success.

PayPal's example makes us understand how far this new business model is from the pipeline model. From a marketing point of view, push strategy became obsolete and pull strategies became one of the main pillars.

Therefore, the marketing function has been totally reshaped and the platform has to be so attractive that they naturally attract customers into their orbit.

The marketing strategy that Paypal used for its chicken-and-egg problem is not universal. After them, so many businesses tried to adopt the same solution and have failed. Each platform has its own characteristics and respond to different market rules, so it is impossible to provide a clear and universal answer to this challenge. (Caillaud et al.2003)

What can be done is try to identify some successful patterns that have been able to beat this dilemma.

**The follow the rabbit strategy**: Starting with a non-platform project and then creating the infrastructure on a platform that you already elevated. An example is Amazon, which never faced the chicken-and-egg problem since it started successfully as an online retailer and then transformed itself into a platform that is open to external producers.

**The piggyback strategy**: Connecting a platform that has been created to another already successful one in order to attach the customer base of a different platform. An example is PayPal that leveraged on eBay's customer base and "piggy-backed" onto eBay's online auction platform.

**The seeding strategy:** Focusing the value generated from a platform on a single specific user and the other sets of users who want to engage in an interaction with them will follow. An example is how Google tried to beat Apple by launching its Android smartphone operating system. Google offered app developers 5 million dollars in prizes to the best apps in each of the different categories. By doing that, winners raised money and became the market leaders thereby attracting many customers to the platform.

**The marquee strategy:** create and provide incentives to attract key users to the platform. This strategy has been seen in many cases since often there is a specific type of user that can make or break the success of the platform. A common example is PayPal that provide a cash incentive to shoppers in order to adopt their payment method.

**The single side strategy:** Creating a business around products or services that benefit a single set of users; later, convert the business into a platform business by attracting a second set of users who want to engage in an interaction with the first set. An example is the Indian bus reservation platform RedBus. They give bus operators a free sitting inventory management system and after they spread the adoption of the system, they opened up the platform to consumers.

**The producers' evangelism strategy:**  Consisting in designing the platform with the specific goal of attracting producers, that later attract consumers to become users of the platform. Some examples are platforms such as Kickstarter and Indiegogo that target creators in need of funding and provide them with the best infrastructure to host and manage the funding of their campaign.

**The big-bang adoption strategy:** Adopting the most traditional approach of push marketing strategy to create hype (high volume of interest and attention) to your platform. An interesting example is Twitter who, during its launch in 2007, did not receive a relevant response from the market until they invested $11,000 to install a pair of giant flat panels in the main hallways at SXSW festival.

**The micro market strategy:** Focusing on small markets with members that are already engaging in interactions. An example of the application of this specific strategy is Facebook. When it first started, they focused on a closed community within Harvard University ensuring the creation of an active community.

All these 8 strategies have been resumed analysing the most successful stories of platforms today and obviously they can be mixed and adopted following different criteria and strategies.

The chicken-and-egg problem is not the only challenge that a platform business model has to face.


## Winner-take-all dynamics

Another big challenge is the winner-take-all dynamic, seeing as network markets are likely to be served by a single platform when the following three conditions apply

1) Multi-homing costs are high for at least one user side

2) Network effects are positive and strong—at least for the users on the side of the network with high    multi-homing costs.

3) Neither side's users have a strong preference for special features."


A concrete example to better understand this second challenge can be found within the DVD industry.

The DVD industry matches all these three conditions. First, both consumer and studios have high multi homing cost since it's expensive for consumers to buy multiple players and studios cannot provide the same content in multiple incompatible formats without increasing inventory and distribution costs. Second, both sides have impactful cross side network effects since studios can realize scale economies if selling to a huge number of customers and for consumers it's valuable to have a wide variety of titles. Third, there is not that much opportunity for technical diversification due to the connection of DVD players with TV sets that limit DVD picture and quality. (Eisenmann et al.,2006); (Sridhar et al.,2013)

## Threat of envelopment

The third challenge is the threat of envelopment. In fact, what often happens is that platform businesses become so big that they "eat" others platform. (Fan,2013); (Farrell et al.,2007)
This phenomenon on a bigger scale can be seen with the tech giants like Google, Amazon, Facebook that are trying to enter in many different platform markets due to their huge customer base and their capability to reach the critical mass.

An example is Amazon with Prime Video that is trying to destroy Netflix or Facebook marketplace and many more. These huge companies understood before the others the power of the platform and how it grows exponentially with the interconnectivity between business.
This phenomenon is simple since often platforms share the same user base, so leveraging on these shared relationships can make it easy and attractive for one platform swallow the network of another. (Evans et al.,2008)

There are many more challenges that a platform business models face during its road to success, but each one could be different and could be solved with a completely different solution. As Sun Tzu said, "Know your enemy and know yourself and you can fight a hundred battles without disaster."
Moreover, each challenge can be faced in a different moment of the platform's lifecycle.

## 2.3.  Platform lifecycle

When we talk about platform business models, but more generally in every type of business model, we must always remember that it refers to a specific moment in time, like a picture. More theoretically, "the business model is therefore a structural template that describes the organization of a firm's transactions with its external business partners in factor markets as well as with its consumer audience or product market" (Zott, et al., 2008).

For a business model to be sustainable over time, it must be able to strategically change and evolve since the ecosystem in which it exists is a dynamic one.

This capability to evolve, change and improve the business model is something that is not strictly related to platform businesses but to all the business.

In fact, as Doz, INSEAD professor mentioned in a recent article:

*Many companies fail, not because they do something wrong or badly, but because they keep doing what used to be the right thing for too long and fall victim to the rigidity of their business model.*

Indeed, two-sided platforms evolve over time. An example is the evolution of internet ventures. (Muzellec et al.,2015); (Clemons,2009)

At the beginning, they just focused on the end customer. Their value prop is internally directed to them and their effort is mainly focused on convincing the final customer to jump on board with service. Usually the service in the early stage is offered for free since they want to reach the critical mass. During the second stage of development, the internet ventures that previously focused on the final customer shifted their attention to business partners. They started thinking: How can we make money with our service?

### Evolution perspective- Different Phase

The most generic life cycle perspective to analyse the different phases of a platform business model consists of three steps: Start-up phase, the growth phase, and maturity.

Below we will provide other framework that will help us analyse the lifecycle of a business. All of them can somehow lead back at this generic view.

Usually the most difficult part is always the first since most of the tools from general management are not designed to flourish in the harsh soil of extreme uncertainty in which

start-ups thrive. Yet you can see more "garage" start-ups that are managed with standard enterprise forecasts, product milestones and detailed business plans. It's the most difficult phase since it is an ever-changing phase, customers always have a growing array of alternatives and the future is completely unpredictable.

After the first phase, the second phase is to reach the critical mass and the manager's focus shifts on the value creation. Usually at that point, the inflow of engaged users exceeds the outflow, so the platform continues to grow. The main issue with this phase is the platform management since it's hard to manage and to keep the balance on both sides of the market. Once a platform business has moved past the phases of start-up and early growth, new challenges and issues emerge. In the maturity phase, as Eric Ries says in its famous book The Lean Startup, the greatest challenge is to pursue incremental innovation and be able to measure it. The companies must remain vibrant, slightly change themselves following customer needs and always monitoring the competitive and regulatory environment around them. (Tiwana et al., 2010)

### Different Framework Perspectives

Another interesting perspective to have if you want to divide the lifecycle of a company is the of investors. This phase is not only adopted for platform businesses, but for any company. In the following tab we can see how each phase is matched with a different investor relationship. this allows you to understand how different moments require different partners to work with.
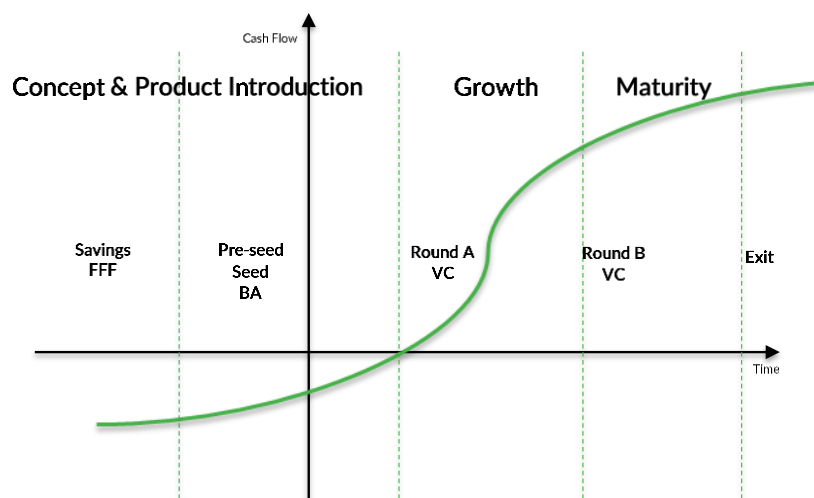


*figure 4 Start-up & investor relationship*

Talking about the start-up lifecycle, we can't forget to mention the start-up's guru, Steve Blank that created a 4-phase framework. Phase 1 and 2 are the phases in the creation of a model while phases 3 and 4 are phases of execution of the model (see figure 5.)
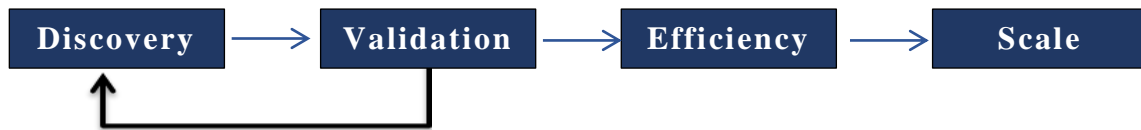


*Figure 5- Blank framework*

## Start-up Lifecycle

Continuing with the illustration of different frameworks, we can say that company growth can be seen like human life, or any other living being for that matter. (Lindgreen et al.,2012) Throughout this journey growth, an entrepreneur will get to experience everything from the birth (that is an idea of the start-up) to the start-up itself, and if it is successful, through to its maturity as well. Each new phase brings about new challenges that the entrepreneur must learn to handle with care. After all, the parenting technique one adopts for a toddler is in no way similar in the case of a teenager. That being said, here are the five phases of start-up development.

## Start-up

Every big company starts from an idea. That moment essentially signifies the birth of the business. This phase is obviously considered the riskiest part of the entire lifecycle according to many investors and corporates.

During this phase, once the idea has been thoroughly tested, it comes the moment of legalisation of the venture. The biggest entrepreneurial challenge during this phase is a cash burnout, since they have a small amount of money and it is not easy to estimate the correct cash requirements. The key factor of this phase is adaptability seeing as if you want to capture the customer base, startups must be able to shape and reshape the product according to the different feedback that they receive from the customers.

### Growth

If this phase has been reached, it means that there is a consistent growth of new customers and a steady source of income.

The cash flow of the company should improve, slowly but always with an upward movement in income. There are several challenges during this phase such as time management, customer management and the most relevant: competition.

### Establishment

If a startup reaches this phase, it means that the business model is successful, it has a steady flow of income, a solid grounding in the market and a loyal customer base. The business has become more predictable for all the employees including those at c-level, resembling more an ordinary routine job. Despite this, the CEO and the rest of the company shouldn't shift their focus and attention from the bigger picture: continuous growth and expansion. They should always be reactive and able to change their initial idea to keep growing their customer base and success on the market.

### Expansion

This phase is characterized by internationalization and expansion: expanding the distribution channels and entering into new markets. During this phase, companies try to capitalize on new ventures and possibilities. Thanks to expansion, businesses rapidly increase their revenue and cash flow growth. It is the time when huge benefits start to finally paid off.

### Maturity and possible exit

During this moment, competition is drastically increasing since other companies are also realizing the profitability of your market, despite the sales and profits remaining stable over the years. This phase is characterized by a big dilemma: entrepreneurs must choose between continuing to expand their company or make an exit. Operations are no longer ordinary and standard like in the previous phase since the CEO must make both short-term and long-term decisions.

Another point of view that until now has not been taken is the economic point of view. The following framework analysis business life cycles according to two axes. The horizontal axis as time and the vertical axis as dollars or various financial metrics.

This graph is divided into five stages: launch, growth, shake-out, maturity, and decline.

However, repeating what we mentioned about the other frameworks, start-ups don't always precisely follow this exact chronological order. It happens very often that start-ups experience rapid growth and a fast exit since corporates are realizing more and more the disruptive capabilities of small start-ups. The cleverness of the CEO resides exactly in always being ready to change and adapt to the situation and take the optimal decision for that specific moment in time.
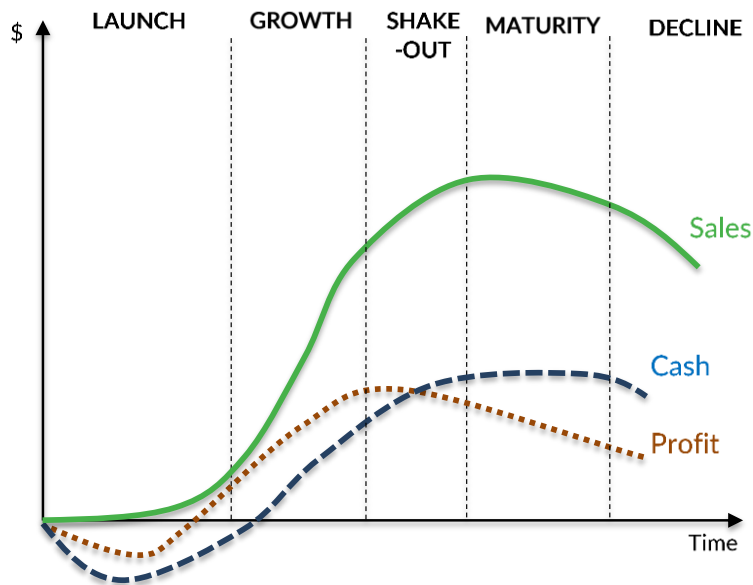


*Figure 6- Business lifecycle: Economics*

**Phase One: Launch**

Companies start their business operation as usual: launching new products or services. This phase is obviously characterized by very low sales but hoping to increase steadily. There is a huge advertising effort to target their target consumer segments and to deliver the value proposition. Despite low revenue due to the high initial face costs, businesses know that during this phase they will incur into losses.

That happens because during the business' life cycle, the profit cycle lags behind the sales cycle and creates a time delay between sales growth and profit growth. This lag also respects the funding life cycle of the previous framework. The perfect scenario is that despite the negative cash flow, its dip is lower than the profit. This is due to the capitalization of the initial start-up costs that may not be reflected in the business' profit but that are certainly reflected in its cash flow.

### Phase Two: Growth

In the growth phase the sales increase rapidly, and the business starts seeing profit after it passes the break-even point. However, as the profit cycle still lags behind the sales cycle, the profit level is not as high as sales. Finally, the cash flow during the growth phase becomes positive, representing an excess cash inflow.

### Phase Three: Shake-out

Here we start seeing a slower rate increase of sales which usually depends on the entrance to the market of new competitors or just a market saturation. In this phase there is a sales peak but although sales continue to increase, profit start to decrease.

### Phase Four: Maturity

Since the market is mature, this is the first moment where sales start decreasing. The margin becomes thinner and thinner while the cash flow stays relatively stagnant. As firms approach maturity, major capital spending is largely behind the business, therefore cash generation is higher than the profit on the income statement. However, many businesses can escape from this phase, expanding their business life cycle, always reinventing themselves by leveraging on new technologies and entering new markets. This new repositioning of the company allows them to shift to the growth phase of the marketplace.

### Phase Five: Decline

Last phase where the company exit from the market.

### Focus on platform scalability

Given all the framework, we establish a clear overview of lifetime's business model. The core of the analysis will focus on a specific moment in time of a platform business: its scalability.

The scalability phase or growth phase (or scale or expansion), depending on the framework you are focusing on, is the most crucial phase of all.

Here, businesses come to face whether or not they are a true disruptor, and if they are not only sustainable but truly successful. And here they face the biggest challenge. (Feinleib,2009)

Let's start from the very beginning to understand the true meaning of scalability and all the features, issues and challenges that characterize it.

# 3. SCALABILITY

## 3.1. Definition and main characteristics

In the history of the world, scalability has been linked to different meanings and adopted in different sectors from IT to economics.

If we Google the word scalability, the first definition that comes up in the Oxford dictionary is: "The capacity to be changed in size or scale." And immediately after:" The ability of a computing process to be used or produced in a range of capabilities."

As is it shown, the definition shifts from being highly generic to a definition that can be easily linked to the world of information technology. In fact, IT was the first real adopter of scalability, but even though it was born in the IT world, scalability can now be found in all sorts of fields.

If we continue our research and move onto some more recent definitions of scalability on the web, we can find a definition that, in my opinion, perfectly defines how we associate scalability to the IT world today: "Scalability is a characteristic of a system, model, or function that describes its capability to cope and perform well under an increased or expanding workload or scope. A system that scales well will be able to maintain or even increase its level of performance or efficiency even as it is tested by larger and larger operational demands."

This definition is no longer the one that refers to computing power but gets closer to the business model and financial perspective. Therefore, we often hear the term 'Economies of Scale' that can almost be synonymous with the word scalability within the economic world. Economies of scale is no more than the capability of certain companies to reduce their production cost, increasing profitability as they grow larger and produce more. (Gelles, et al.,1996)

This refers to the feature of the computing network to expand continuously. Those systems have three basic components that lead to their scalability:

- The adoption capability to drive an increase in users
- The capability to accommodate larger and larger amounts of data
- The low maintenance effort required by the system

When we talk about computing power scalability, it must be underlined that we are not only talking about computational speed, but also about effectiveness. Effectiveness measures how

efficiently and quickly certain calculations can be performed. (Scalability that's not a fixed feature measures the trend of the efficient growth). (Basu,2008)

"The system is scalable if there is a simple way to update the system to enable support for increased trade while maintaining proper efficiency. Simple means that no change in the system architecture or software should be required to scale the system" (Menasce, et al.,1999).

## The Universal scalability law

Over time, a solution has been found to forecast the scaling capacity of both hardware and software: The universal scalability law (USL). The USL is a function that uses system performance as a function of load to forecast system scalability.
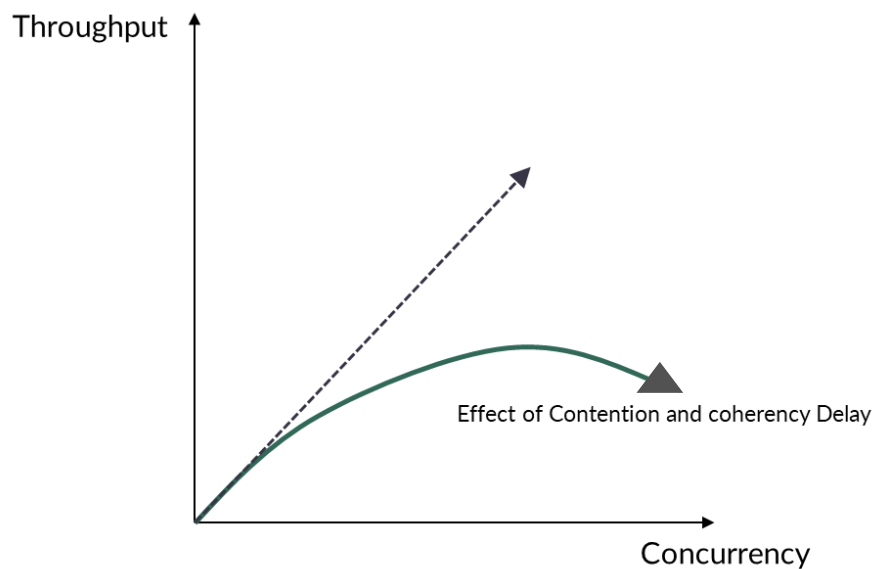


Throughput

Effect of Contention and coherency Delay

Concurrency

*Figure 7- Universal Scalability Law*

This law has been formulated by Neil J. Gunther and is characterized by two coefficients:

1) Sigma that is able to model the contention

2) Kappa that is equal to the coherency delay of the system.

Scalability is not just about computing power nor economies of scale; it's all of that and much more.

Scalability is a predominant feature of successful business models and we can easily say that it's a must-have attribute for disruptors. To include all the concepts, I'll provide a tech company definition of scalability that better includes all the aspects previously mentioned:

Scalability is an attribute that describes the ability of a process, network, software or organization to grow and manage increased demand. A system, business or software that is described as scalable has an advantage because it is more adaptable to the changing needs or demands of its users or clients. (Techopedia).

This definition only gives us a business perspective but in the following paragraph we will focus more on an analytic perspective.

## Analytic approach of Scalability

Moore's law helps explore the scalability phenomenon through a quantitative approach. The first analogy that can be found is that Moore's law has been used in computers since the very beginning but has slowly moved towards a bigger point of view. In 1965, Gordon E. Moore, the co-founder of Intel said that the number of transistors on a microchip doubles about every two years, though the cost of computers has halved. This observation has been true up until today and for that reason, it has taken the name of Moore's law. (Chandler, et al.,2009)

So, in the same way, key considerations and assumption of business model scalability has been developed starting from the main principles of Moore's law, as seen in (How to Create Value in the Sharing Economy: Business Models, Scalability, and Sustainability; (Acquier, et al.,2015)):

1) We treat the company embedded in the network as an organization capable of achieving high performance through the network.

2) We define core resources, processes and stakeholders of the company embedded in the network that are necessary to build a scalable business model.

3) We determine the technological and organizational boundaries of the business model of the company embedded in the network.

4) We convert the business model of the company embedded in the network into a discrete model.

5) We analyse how to expand the business model in the best possible way in terms of components and apply the principle of how much we can reduce the cost of its operation.

Based on Aurelien Acquier (ESCP Europe professor), and others co-authors' paper they conduct a simulation of the business model of the company embedded in the network, assuming some specific boundary conditions. Then they start changing the parameters and the structures of the components, reaching the actual situation in business from the discrete model. In the end, there was a validation phase where those parameters have been tested on the market, implemented it into practice and has identified two groups of components within a business model subject to scalability: primary and secondary components.

### Enlarging the world of scalability

### Innovative Business Model

In the literature, Amit and Zott, Rappa, and Bouwman and MacInnes define scalability as a key factor of innovative business models contributing to the achievement of results by the company. Scalability, therefore, is an important feature of the business model as it is included in its configuration, whereas strategy sets a business model in motion and gives puts its resources in the right direction, in line with the expectations of business model decision-makers, and scalable business processes are used to implement operational objectives and will be more effective when a business model is highly scalable as well. (Baden, et al.,2010);(Nielsen, et al.,2015). In order for a business model to be considered truly innovative, it must be scalable. But which factors identify a scalable business model? First, it must have the ability to customize the technology to the customer's expectations and requirements of the product. It must be flexible, mainly in terms of infrastructure, and have the ability to adapt to their current needs. At the same time, the ability to allow flexibility into their cost, adapting to the needs and resource used.

It must have the capability to adapt and respond quickly to both environmental and external change. As we said before, another characteristic of success that leads to be extremely scalable is the capability to leverage on network effect. (Christensen, et al.,2009)

## Disruption for Scalable Business Model

It is mandatory to address the word disruption to business model scalability since digital disruption without a scalable business model is impossible. This word allows us to understand the business potential and the true disruptive effect that a new business can create. (Christensen, et al.,2009); (Christensen, et al.,2000) Let's back up a little and focus on a definition of two words that will be frequently adopted within the paper: disruption and business model. Disruption, according to Christiansen (Professor of Business Administration at the Harvard Business School of Harvard University) describes a process whereby a smaller company with fewer resources can successfully challenge established incumbent businesses. They go on to argue that disruptive entrants typically begin by successfully targeting segments that are overlooked by the incumbent companies, because these segments might have profit-margins that are too low for the business models currently applied. The second word, business model, is now one of the most explored subjects in the theory and practice of management.
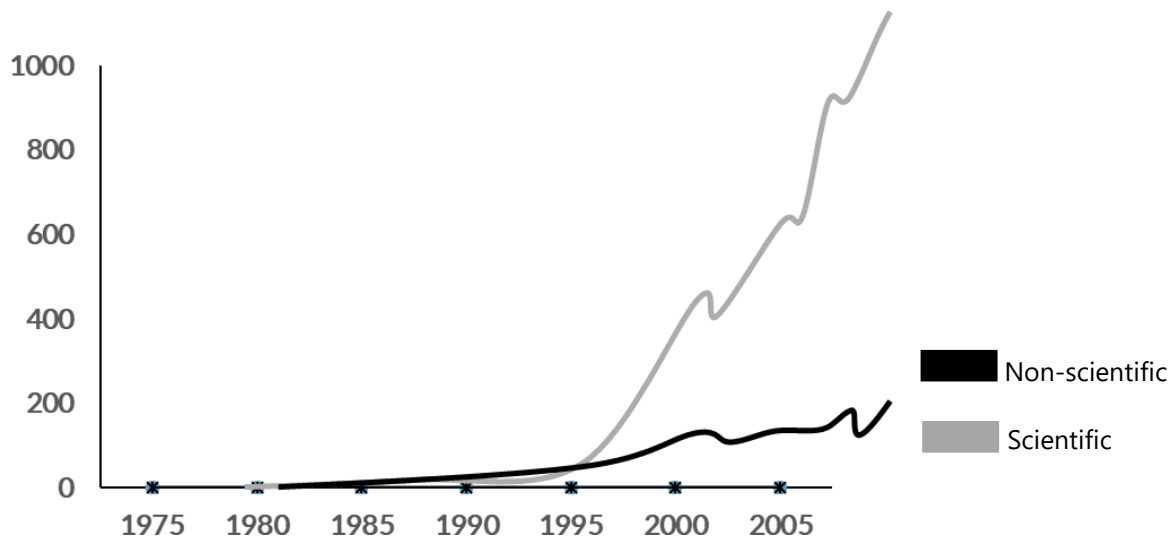


*Figure 8-Number of publications with the term "business model" in the EBSCO database between 1975 and 2009.*

As it can be seen in the EBSCO database (Elton B. Stephens Company) between 1975 and 2009, the adoption of the word within the publications grew exponentially.

This growth leads to a mass utilization of the word, generating a multitude of definitions and completely different approaches in the adoption. A business model describes the rationale of how an organization creates, delivers, and captures value in economic, social, cultural or other contexts. The process of business model construction and modification is also called

business model innovation and forms a part of business strategy. (Osterwalder, et al.,2004); (Osterwalder, et al.,2010); (Hedman, et al.,2003)

Now that the term 'business model' has been defined, we move onto 'business model scalability'.

Business model scalability can be described as the capacity of the business to improve or maintain its effectiveness while the number of components is increasing or reducing.

It is also the capability of a business to adjust constantly to its boundaries and level of its impact, therefore the capability to always adapt into a new network environment.

Scale means effectiveness, so adding or removing the components to this attribute must not reduce but always increase.

At the base of this concept there is the conviction that not every unit of revenue is generated by an equal cost unit. Often, a term that is associated with scalability is growth. A company is considered scalable when it is able to grow in a sustainable way while always remaining economically profitable. For that reason, investors always look for scalable business models since these are the companies that are going to have higher and higher revenue and profit. (Taran, et al.,2016); (Jablonsky, et al.,2016)

Despite those considerations, what is happening within the e-business model is that the profitability is not the first aspect that investors take into consideration. There is a higher focus on market share since it's a better indicator of disruptive power. These innovative companies could also have negative profit short to middle term. The most important thing is that they scale efficiently so that their exit growth is less inclined in comparison to their sales.

To summarize, it has been said, that business model scalability refers, among other things, to:

- adjusting the size of the company to the expectations of the market,
- adjusting the volume of engaged resources to building an efficient, networked business model,
- adjusting the structure of costs and revenues,
- adjusting the selected technologies resulting from the above elements.

(Nielsen, et al.,2017)

## Scalability Framework

All these elements have a direct impact on the potential of a business model and could negatively affect the company's performance. Following the analysis over the term scalability, it is necessary to provide some framework that clearly defines the different scenarios linked to scalability.

Scalability can be defined in many ways: vertical/horizontal, linear/sublinear and many more.

Here we will provide an overview of the main types of scalability that can be found.

Two dimensions in which all business models can be defined as is vertical or horizontal:

Vertical scalability is scaling where the components of a business model within a company are added or removed.

Horizontal scalability is scaling which adding or removing companies embedded in the network creates its own network business model.
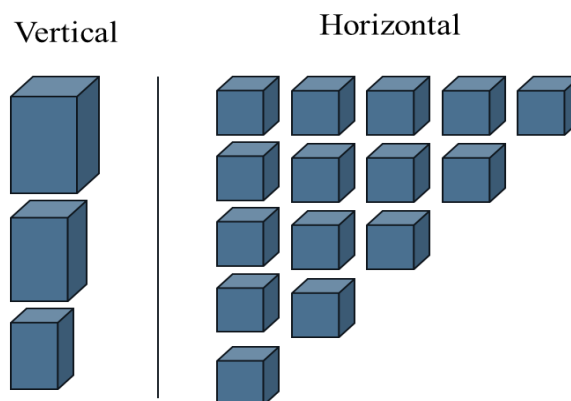
Vertical                    Horizontal

*Figure 9-Vertical vs Horizontal Scalability*

Another interesting classification which refers to information systems divide scalability into these different categories.

Linear: The performance of the company grows linearly with the number of business model components. In this scenario the effectiveness of scaling is 100%. There is no saturation scenario.

Sub-linear: The performance of the company grows, but slower and until they reach a certain limit with the expansion of the business model components. This situation differs from the first one in that it does not reach an infinite business model scalability, but rather it is finite.

Negative: The company performance declines with the expansion of the business model by other components. This is the situation in which companies are not able to adapt to the scale.

Super Linear: This is a special case where there is exponential growth of the performance of the company.

(Acquier, et al.,2015); (Chesbrough,2010); (Lambert,2015)
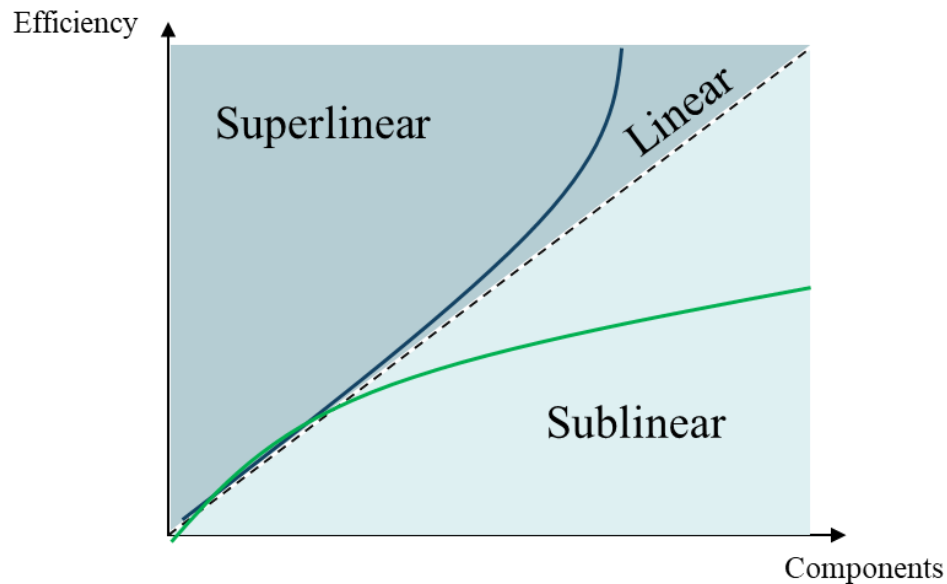


*Figure 10-Superlinear, Linear and Sublinear scalability graph*

**Key Attributes and Features of Scalability**

Establishing this different cluster, it important in order to define the main attributes that lead towards the best scalability scenario.

These attributes within the business model scalability determine the design and operationalization towards the goal that was set.

Key features of the business model affect its scalability, which ensure its ability to achieve high company performance. (Jablonsky, et al.,2016)
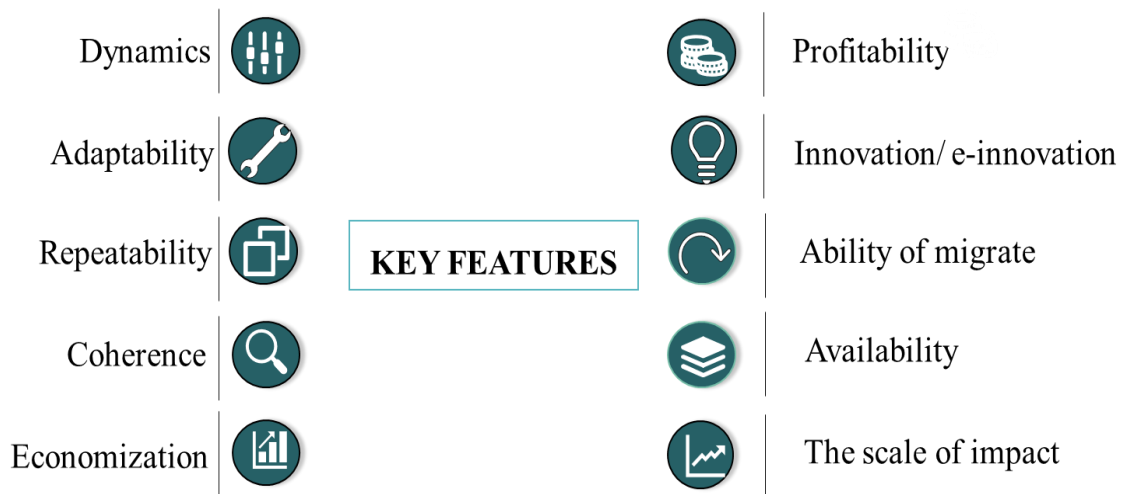


*Figure 11- Key Scalability Attributes*

All these attributes facilitate the measurement to analyse and define business model scalability.

Despite taking into consideration all the endogenous factor previously underlined, the measurement system must also be able to change according to the environment (exogenous factors). A continuous monitoring of these external and internal factors is the only way to constantly be able to respond to market needs.

The best way to keep it under control or somehow manage external factors is through the relationships in the network.

The network "is conducive to scalability as it is easier to change the business and such changes may occur faster due to obtaining information faster by participating in the network" (Jablonsky, et al.,2016)

Since a business model requires an iterative approach, it must constantly be evaluated following each market change. (Osterwlder, et al.,2010)

Therefore, the measures that are adopted to evaluate a business model are the same that are adopted in classic business plans and the validation phase is represented by the clash with a company's direct customers.

Regarding what has just been mentioned, it can easily be said that the main challenge for theoreticians and practitioners is designing scalable business models.

"The design process, or design in short, is a substantial and creative activity of man that is a conceptual and pragmatic preparation (related to methodology) for executive functions." (Jablonsky, et al.,2016); (Gunzel, et al.,2013)

Design, as described in the definition above, is a structure that must be verified and then implemented. The first pillar for a valuable business model is the definition of a solid and structured design that should be constantly verified and then must implement all the necessary changes to follow the market.

According to Christian Nielsen and Morten Lund (university professors from the US), besides the identification of a solid design, the main features that characterize scalable business models are:

- Exponential return to scale characterized by the business potential

- The typical capacity constraints of classic businesses are removed

- Thanks to partnerships, they can enrich the value proposition without touching profits

- Different stakeholders create value for one another

Nevertheless, out of all the characteristics that have been analysed until now, the simplest way to measure the scalability of a specific business model is by taking into consideration the relationship between the operating margin and revenue. (Nielsen, et al.,2017)

A model is certainly scalable if the operating margin increases with increasing revenues.

Business model scalability is a concept usually applied for startup organizations. In fact, according to Steve Blank (Silicon Valley Entrepreneur, pioneer of the lean start-up method), a startup is a temporary organization in search of a scalable, repeatable and profitable business model.

This definition clearly defines the relevance of the concept of a business model that represents the main (and only) factor that determines the success or failure of the company. In organizations, it's not the strategy that will determine its success, but a well-designed business model, based on credible premises. For that reason, Steve Blank developed a new design approach for startup organizations.

Founders should not start by developing a business plan, but by searching for a business model.

So far, we've identified what is scalable, the main characteristics around scalability and how we can cluster it. In the following paragraph, we will see how a scalable company can be built from scratch.

## 3.2. Create a scalability business model: a process perspective

### What it is and it is not scalable

Starting with an example, imagine a small but stable design company that has four different partners that work together to generate a profit of 80,000$ USD.

In their second year, they hire a new partner that leads the company to a 100.000$ USD profit. If you split the profits up with the number of partners (components), it is clear that you reached constant return to scale.

This is a common case present in a lot of consultancy companies where scalability is achieved merely by selling more hours of a given service. It is rarely an activity with increasing returns to scale. It often happens that companies believe that they are scalable just because hiring new people makes them increase their profitability, but today it is known that these are not scalable business models.

Before going further, the point I want to make here is that the goal of scaling a business model should not be the ability to hire 10% more employees, 10% more capital or resources and get 10% more output out of it. Even if often, in this scenario, synergies usually provide cases of linear return to scale, a truly scalable business model must promise to exponentially increase return to scale. (Basu,2008)

"The promise of exponential returns to scale are found in cases where the applied resources, competences and value propositions of a business model in combination with one another evolve to completely new properties" (Nielsen, et al., 2010).

Those properties can be achieved only through true digital disruption.

### Strategies

There are different strategies that companies can adopt to innovate their business model in order to achieve better scalability attributes.

All those mechanisms can be both of a purely digital nature or in other instances, disruptive in both physical and digital manners. The following are 5 mechanisms that allow a company to achieve business model scalability:

1. Adding a new channel enriches the value proposition to existing customers

2. Selling data instead of selling man-hours or products

3. Letting strategic partners create lock-in for existing and new customers

4. Letting customers do the marketing or become salespeople

5. Altering the business model so that competitors become customers


All those mechanisms could be a solution for companies that are trying to innovate their business model, but clearly, they are not the only way for a company to be scalable. (Nielsen, et al.,2017); (Foss, et al.,2017)

The following example is a completely new approach of scalability first adopted by Apple, which relates to none of the five previous patterns.

In the case of SkyWatch, a company that develops and produces drones with fewer financial constraints and other resource constraints than the firm's competitor, they developed the business model following Apple's "lock-in mechanism".

SkyWatch stuck to developing its core platform and let the other companies develop the software and hardware technologies the drone could carry.

Much like Apple's business model, where software developers create content for the iTunes platform and pay to have it presented there, SkyWatch's partners create both software and hardware for checking oil tanks, mapping minefields, & search and rescue operations, just to name a few.

This example shows how scalability can be achieved through completely different mechanisms that can often be replicated in diverse industries. This example and strategy make the CFO very happy since money, which is almost never free or in abundance, was pushed over strategic partners, therefore diminishing cash flow and working capital attributes.

How can we establish the best strategy and method to adopt in order to reach scalability?

Which are the main steps to follow towards this specific common goal and how can a company analyse its business model and reconfigure it towards a more scalable one?

We will attempt to answer that question in the following lines.

An interesting article suggests a three-step roadmap that managers can apply to analyse their own business model scalability potential. Usually, when there is a business reconfiguration,

the classic path to follow is by cost analysis, product segment profitability and a market segment growth. However, that analysis is not relevant when the focus is on a business model perspective. In order to design and reach scalability, a completely novel angle must be taken. Based on all the article research that has been provided, a three-step roadmap for testing and designing business model scalability can be described. The article suggests going through a three-stage schedule with almost 2-hour meetings with the goal to find out if there are novel ways to tweak the existing business model during different brainstorming sessions.

Making the most out of all the considerations and methodologies, I would like to close the paragraph with 10 tangible tips that are useful to build a successfully scalable company:

(1) If investors are needed, start with a scalable idea.

(2) Create a business plan and model that is attractive to investors.

(3) Use a product with a minimum necessary functionality (MVP) to authenticate a model.

(4) Build a strong team to get out of the critical path.

(5) Subcontract what is not strategic to optimize financial leverage.

(6) Focus on indirect marketing channels to quickly convey a message.

(7) Make the most of automation.

(8) Attract and use investment funds.

(9) Consider the possibility of buying licenses and franchising.

(10) Define a business that is flexible and constantly improving.

Those tips should become a mantra while startups are working on their business model, but all those features and consideration are still not enough to create the tech giants that are currently disrupting the market. (Nielsen, et al.,2017)

## 3.3. Hyper-scalability

### Tech Giants are Hyper Scalable

The situation that we are seeing on the market with the tech giant's designs are completely different, not only because they are exponentially scalable business models but because of something way bigger than that.

There are cases where it is clearly shown that the growing and disruptive power of these specific business models follow completely different dynamics. In that case, we start talking about hyper scalability.

We mention hyper scalability, and not just scalability, because what truly happens with companies such as Airbnb, Uber and many more cannot be described as a common scalable business model. It is something with a completely different magnitude. (Mohout, et al.,2017)

Let's put the spotlight on Airbnb, an online marketplace that connects people looking to rent out their homes with people who are looking for accommodation. This company today has a market capital higher than Accor, Hyatt, and Intercontinental hotel chains and already has the market capital double that of the almost 100-year old Hilton Group.

This unicorn (start-ups that reach over a billion in valuation) has 800 employees and offer over a million rooms to the market with not even a penny invested in real estate.

You can understand the disruptive power of Airbnb when you compare this information to the Hilton Hotel Group, which has 300.000 employees and possess almost 700.000 rooms. (Guttentag,2015)

Basically, Airbnb is using someone else's assets as a free lever. These completely disproportionate relationships can be seen in many different business models today: Uber, Twitter, Netflix, Kickstarter, EventBrite, Dropbox, Blablacar and Booking.com.

These companies forced all the managers and researchers to take a totally different perspective on scalability.

These business models cannot be considered as a business designed to reach exponential scalability because what we are looking at today is something very far from that situation. (Kenney, et al.,2016)

Another example that allows us to understand how these business models are on a completely different level is Skype. Skype manages over 40% of all international telephone traffic with just 1,600 employees. Despite having thousands of employees on the payroll, national telecommunication providers can claim only a fraction of Skype's call volume.

To understand just how crazy these business models are, Skype takes a free ride from the existing players' infrastructures that bear the whole cost.

So, we can say that the main characteristic of hyper scalable innovation are intangible assets and radical difference compared to incumbent organizations. This difference is clearly a business model innovation that resides in an architectural innovation. For that reason,

incumbents have so many issues to deal with in regard to their competitions with startups. (Evans, et al.,2016)

"Architectural innovations" (Henderson, et al.,1990) focus on big changes, since it's easy to innovate modularly (e.g. the engine), but hard to innovate across the whole system. This change of architecture is the true business model change that leads to hyper scalability. Start-ups reach hard-to-trade skills (the user base) that are different and increasingly more difficult to copy in comparison to incumbent, hard to trade skills (organizational architecture).

## The Global Brain

Hyper scalable innovation has a strong relation to the main feature of the Global Brain (synergies between people and technologies). In fact, this hyper scalable innovation adopted two specific levers: the strength of machines (precision and scale) and the strength of people (insights and creativity). (Mayer, et al.,1995) ;(Bernstein, et al.,2012); (Heylighen,2008)

Since the global brain is a "neuroscience inspired and futurological vision of the planetary information and communications technology network that interconnects all humans and their technological artefacts" (Wikipedia) there are three critical building blocks to create hyper scalable business models:
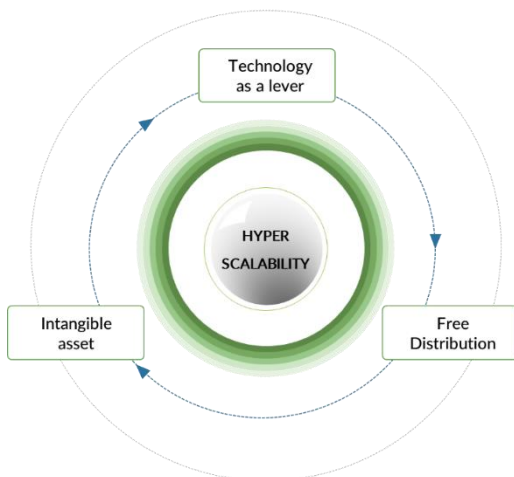


*Figure 12- Three Global Brain Building Blocks*

The first building block is "technology as a lever". Technology is the first critical factor to reach hyper scalability since without a world-changing technology, disruption cannot occur. An example is the media industries that were born with no relevant scalable capacity, but that thanks to the investigation on the "camera obscura" and its further development, along with the capacity to re-code sound developed in 1877 with the phonograph, media industries have changed the world.

Usually what happens is that they don't recognize the potential of a specific technology until it's too late to react because technology is usually characterized by exponential growth. For hyper scalable innovation, technology is not the most relevant building block but rather just an aspect.

What is truly necessary in order to reach hyper scalability is the second building block: the user-base reached by free distribution.

Following the media example, the true change from scalable to hyper scalable occurs when the media got digitized thanks to the internet's free distribution.

Obviously, nothing is free but what happens often is that the infrastructure cost is so broadly carried in our society that it appears to be free. This "free" effect can be considered a side effect of digitalization. (Goertzel,2002)

The third pillar that has already been analysed is the so called "dead-capital" (De Soto, 2003) De Soto describes dead capital "in the context of underdeveloped regions (e.g. slums) and the natural development of extra-legal systems, which has no relation to technology." (Mohout, et al.,2017)

What seems to happen is that thanks to digitalization, hyper scalable innovation can identify new forms of dead capital. At the base of that word, there are "ownership inefficiencies" seeing as owing something reduces the usage of that thing.

A common example of dead capital is a car that stays parked for most of its existence, since a car and a multiplicity of other goods and tools a person owns are used in an efficient way.


This approach can be seen like the service innovation approach. As service approach is all about transforming product companies into service companies in the same way hyper scalable organizations focus on leveraging someone else's assets and creating a market on it. (Kastalli, et al.,2013)

Obviously, a hyper scalable business model also has a dark side: it is impossible to have the disruptive and world-changing results without a skeleton in the closet.

## The Dark side of Hyper Scalable Business Model

Firstly, Hyper scalability is something that is not that easy to reach. This innovation has what they called 'the service paradox' since only a few start-ups have created the proper valuation that fits. This paradox is obvious but it's not the main issue that hyper scalable solutions bring. (Gebauer, et al.,2005)

Hyper Scalable business models not only have a disruptive effect on the market but also a disruptive effect on social fabric. This is the reason why many cities or countries have banned hyper scalable organizations. The danger is much bigger than what has been recognized.

To provide an example of this disruptive effect, we can use the example of companies like Airbnb. In the classic business (before the advent of Airbnb), to rent a room you need to build hotels, invest in decoration, hire people and many more activities.

These activities bring value to the society that is stimulating a monoculture, as opposed to Airbnb, which reduces the resilience of our economy.

To make this example even more clear, let's use the metaphor of chopping a forest: chopping a forest is not destructive when the chopping is less than the regenerative ability of the forest. Now imagine a hyper scalable organization as a company who possess a hyper efficient chopping machine capable of wiping out the whole rainforest. (Morozov, 2014)

*The big problem here is that we are making a tremendously successful company that might be killing our future.*
*This paradoxical logic is described as "the spiral of dead"*

Christensen, et al.,2003

Once disrupted, the incumbent must cut costs since sales are going down, usually killing projects that have no direct value. What happens is that all these projects could provide a positive contribution to the future, but because of the disruptor, the incumbent's CEO is forced to have a short-term vision.

"The process is clearly recognized and may be one of the inevitable reasons behind the short lifetime of fortune companies." (Hamel, et al.,1992)

As we can see, the top 100 fortune companies change in a way that was unbelievable in the past.
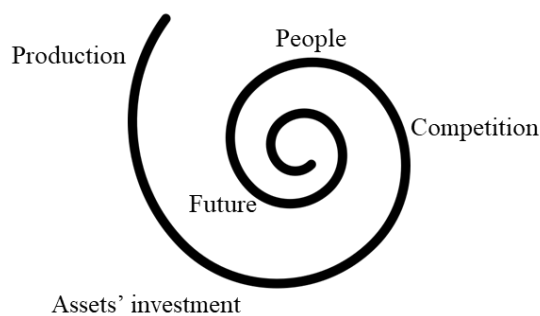


*Figure 13- The spiral of death*

The traditional spiral of dead is still creating a huge amount of collateral damage, so imagine how a hyper-scalable innovation could result in hyper dead spirals. This hyper dead spiral could kill the whole market since those dominant companies are already conquering a whole sector. A scene

like this is frightening, and scenes such as real estate or banking crisis are becoming more and more common. (Mohout, et al.,2017)

There are different studies that prove that crisis such as the one in 1929 or most recently in 2008 will occur within less and less time elapsed. Luckily most of the disruptors start to realize the dead spiral phenomena and they are trying to resolve this challenge. (Murillo, et al.,2017)

## How to stop the Spiral of dead

- **Change of paradigm**

This specific moment in time, in my opinion, is a world-changing moment since we are seeing how all these disruptors are slowly shifting or hybridizing their business model from a pure intangible asset company to become more capital-intensive. This scenario is proven by the investment and effort that Uber and Airbnb are putting towards assets and infrastructure. (Godelink,2014)

What is happening is that they are investing part of the revenue that they generate towards some tangible assets into two directions. I believe this could be pursued in the future with Uber partners going towards garages and Airbnb providing an entire travel experience or a secondary offer to host in terms of accessories to create guest rooms. These implementations could stop the spiral since they are all business models that require investment in people and assets.

Uber, for example, has already invested a billion dollars towards the self-driving car business company, shifting from a zero-car based company to something completely different.

Like Uber, Airbnb is also shifting its business model by not only renting rooms but by offering entire travel experiences. In some cities, you can already find Airbnb offering activities and experiences around cities. In this way, they are working in partnership with travel agencies and single people, regenerating the economy of the city where it is available. These business model shifts have been deeply analysed in Omar Mohout's paper that also provides an interesting framework on how these sharing companies' platform bases differentiate. (Daudigeos, et al.,2017)

Despite what has already been analysed, the following tabs provide a comprehensive framework of the different business models presents on the market. Our focus will only be on matchmakers and shared infrastructure providers.
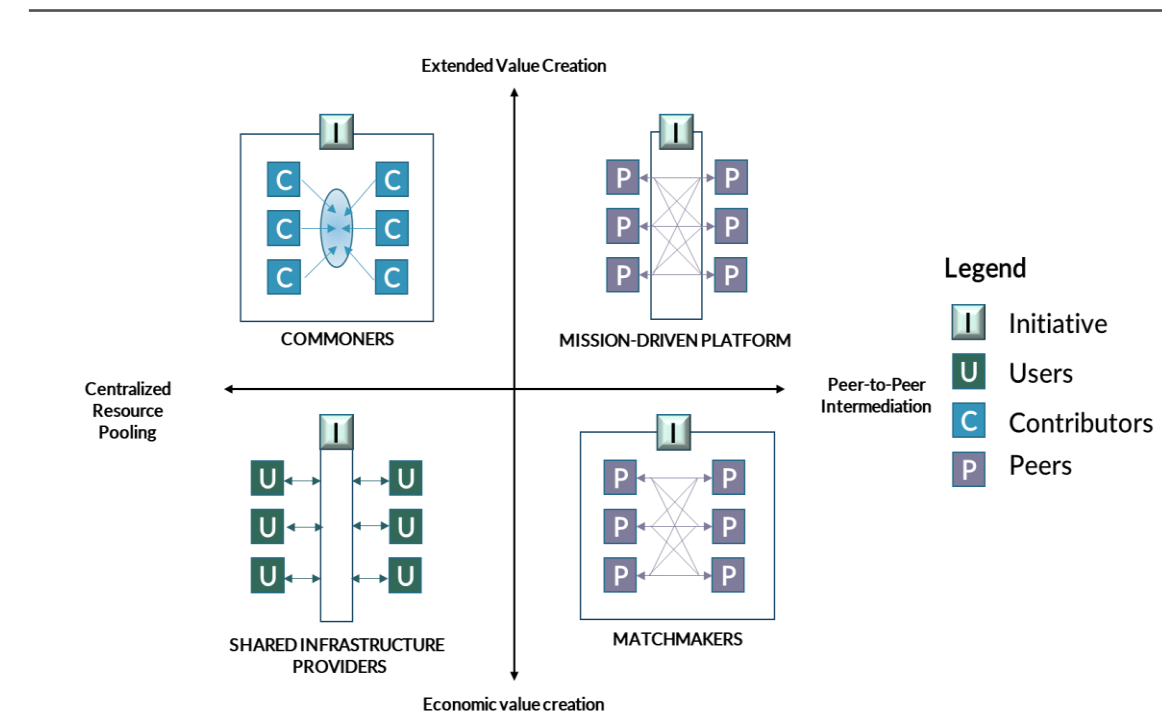
*Figure 14-Platform Business Model Frameworks*

**Shared Infrastructure Providers vs Matchmakers**

Even though the main difference between these two groups is quite clear, I will provide an interesting example within the mobility sector to show these two businesses and explain how they scale in the most traditional way.

For example, in the mobility sector of a shared infrastructure provider, there is ZipCar, an American car-sharing company, Communauto, an analogue company based out of Canada, and Car2go, based out of Europe. These companies basically manage a proprietary network of vehicles in urban areas and members usually access the service by paying monthly or annual fees in addition to usage fees, often linked with a mobile app to unlock the cars. (Bardhi, et al.,2012)

Basically, what these companies require in order to scale is a huge level of activity in the area where they are moving and a significant financial resource.

Usually what they do to scale when they enter a new market is to invest a huge amount of money to create new assets and form strategic partnerships with organizations that are willing to co-invest, since it is a high-capital intensive business model. (Chandra et al.,2009)

In 2007, Zipcar (now the world's largest car sharing company) merged with Flexcar (the oldest and second largest car-sharing company in the US).

Later during the international expansion, they acquired Avancar in Spain in 2009 and Streetcar in the UK in 2010. (Martin, et al.,2011)

It's clear that this is a completely different strategy and scalable capacity compared to matchmakers who use idle resources as a lever (in economics, this term refers to money, capital or labour that is being wasted).

| | Shared Infrastructure Providers | Matchmakers |
|---|---|---|
| **Examples** | TechShop Zipcar,Communauto | Airbnb, BlaBlaCar |
| **Value-creation mechanisms** | Providing monetized access to a centralized pool of proprietary resources | Intermediating between peers to develop decentralized market transaction |
| **Value-capture mechanism** | Membership fees<br>Pay per use<br>Public subsidies | Commissions<br>Freemium model<br>Two-sided market business models |
| **Scalability issues** | Membership fees<br>Pay per use<br>Public subsidies | Managing high scaling potential through:<br>• Constant sourcing of supply and demand<br>• Development of trust among clients<br>• Access to financial capital<br>• Managing regulation and social controversies |

*Table 4-Comparison between Shared Infrastructure Provider and Matchmakers*

With that information, we can discuss a "paradigm shift" where matchmakers are somehow becoming more like infrastructure providers. Once they've reached hyper scalability and conquer the whole market and destroying competition, companies such as Uber are also building a capital-intensive company to exit from the spiral of dead. This move probably has not only been done to escape the spiral of dead, but it is probably also a response to all the controversy and regulatory risk that currently characterize matchmakers.

Uber and all of these disruptive companies are also moving to a new ground with the high probability to destroy the competition such as Zipcar in their capital-intensive field. This high probability has given tech giants incredibly huge financial capability and the main competitive advantage of these companies (the user base) is impossible to copy.

## 3.4. Research question

So, what should these shared infrastructure providers do? Wait for the big disruptor to destroy their market? Obviously, no.

They must react and try to compete in the same way by moving to the other side of the line and by becoming more and more like a matchmaker in order to build a hyper-scalable business model. These capital-intensive firms must find a way to leverage the power of their platform to scale in a completely new and efficient way.

My entire dissertation will focus on this specific question:

*How can these shared infrastructure providers (high capital-intensive platform companies) leverage on the power of the platform to reach hyper scalability?*

The paradigm shift will go in the opposite direction: no longer from matchmaker to infrastructure provider, but the other way around.

Resuming my research question: Seeing that a lot of platform companies that conquer the market and reach hyper-scalability are slowly shifting to less scalable business models and are more capital intensive, how can it be the other way around, and how can a company that is already capital intensive reach hyper scalability?

# 4. RESEARCH DESIGN

Obviously, it's not easy to provide a universal answer to that question. For that reason, we will focus on solving the challenge of a specific industry and then identifying if there are some patterns that can be universally adopted.

Driven by the uniqueness of the research question a single case has been selected and analysed. This single case allows us to demonstrate an experimental solution to the question and discover its most relevant features and variables. We used the different literature over platform and scalability to contextualized and define a universal pattern of the single case deployed. (Yin,1984).

We deliberately choose to focus on the bike sharing industry since it is a perfect example of a capital-intensive business model.

Mobility is a growing innovation field where many companies are competing but still it is characterized by most of the feature common of an infrastructure provider.

This industry is still far from reach a hyper scalable solution.

For those many reasons the bike sharing represents a relevant empirical setting for the proposed research question.

Moreover, we analysed HOC, a start-up project, that aims to provide a P2P (peer to peer) and free-floating bike sharing, powered by common bicycles, a smart lock and a mobile app. HOC's goal is to develop a business model able to reach hyper scalability and become the first true matchmaker within the bike sharing ecosystem.

The empirical data that will support HOC paradigm shift are: a survey sent towards 500 potential customers of the platform, 15 extensive interviews towards bike mechanicals and all the financial and business considerations deployed during an acceleration program at Eptagon Lab with the support of C-level mentors. During HOC's project there have been many validation phases where HOC's team discussed with investor, mentor and accelerator collecting many data to provide a valuable business model and create a powerful economic analysis.

## 4.1. The bike sharing history

Bike sharing is a world-changing phenomenon that is changing the mobility of all the main urban cities on earth, allowing for a better and more sustainable first and last mile transportation. From San Francisco to Tokyo or Milan to Buenos Aires, there are bikes everywhere.

Today, bike sharing is represented by smart bikes without stations that have an internal GPS and an alarm system and that can be activated with a mobile app. Obviously, there have been many changes to the industry since the first bike sharing program was launched.

### Three generation of Bike-sharing

On July 16th, 1965 in Amsterdam, some white bikes were making their first appearance on urban streets. They were the Wiette Fitsen, ordinary bikes painted white for public use. This 1st initiative enters in one of the "three generations of the bike-sharing system over the past 45 years." (DeMaio, 2004)

In 1965, Amsterdam's citizens could take a bike, ride it to his or her destination and leave it there for the next user. This 1st initiative did not get the results that were anticipated since the program lasted just a few days. One of the first big issues emerged: the bikes were thrown into canals or taken for private use.

In 1991, a 2nd generation bike-sharing program was born in Farso and Grena in Denmark. This initiative was not on a large scale, but only amounted to 26 bikes and 4 stations.

We had to wait four more years to see the first large scale program: a 2nd generation bike-sharing program in Copenhagen under the name of Bycyklen or City Bikes. Compared to the 1st generation, this new program had implemented many improvements: the bikes were especially designed for a high rate of utilization with solid rubber tires, wheels with advertising plates and users could only pick up the bike with a coin deposited and returned in specific locations. This second program already solved many challenges that the first one faced thanks to the stations and the non-profit organization that was running the operations, but they still experienced many thefts due to the anonymity of the user. The theft and anonymity problem gave rise to a different bike-sharing initiative with completely improved customer tracking: the 3rd generation of bike sharing.

In 1996, a program called Bike about from Portsmouth University (England) gave rise to the 3rd generation. The students of the university could temporarily rent a bike using a magnetic stripe card.

This 3rd generation program had been characterized by the technological advancement of that time. They start adopting electronically-locking racks or bike locks, telecommunication systems, smartcards and fobs, mobile phone access and on-board computers. These initiatives did not spread widely until the launch of Velo'v with 1.500 bikes in 2005 in Lion. This launch was without a doubt the largest 3rd generation bike-sharing program of that time. The impact on the city was notable. They had over 1.500 members and bikes being used an average of 6.5 times per day.

"Lyon's big sister, Paris, took notice." (Henley, 2005)

Exactly two years later, Vélib' launched in Paris reaching almost 23.600 bicycles in just a few months. This was seen as the moment where the bike-sharing industry completely changed. The news of the enormous success in Paris was spreading fast around the world, generating a huge interest in this mode of transit.

From that moment, new programs like this started to appear in China, New Zealand, South Korea, Brazil, Chile and in the US. All of them were 3rd generation bike-sharing programs. "By the end of 2007, there were about 60 3rd generation programs globally." (DeMaio, 2007) One year later, these 60 initiatives became 92 and by 2009 there were 120 programs. This data allows us to understand the exponential growth that these programs have. In the last decade, these programs became even more wide-spread and many companies in this industry started to appear.

## Bike sharing Today

Today, the global bike-sharing service market is valued at 1570 million USD dollars and it is expected to reach 5440 million USD by the end of 2024, growing at a CAGR of 28.3% between 2019 and 2024. The Asian-Pacific market will occupy more market share in the following years, especially in China, India and Southeast Asian regions.

These crazy numbers are waking up a lot of private companies that are developing specific business models to enter and win the mobility challenge. JUMP Bikes, Citi Bike, LimeBike, Capital Bikeshare, Divvy Bikes, Blue Bikes (Hubway), Ford GoBike, Mobike, Hellobike, Nextbike are the key suppliers in the global bike-sharing service market, just to name a few.

The first two tech giants who took this challenge were mobility giants Uber and Lyft who both acquired different bike-sharing companies with both dockless and dock-based platform solutions.

Also, the Asian tech company Alibaba is investing huge amounts of money into this business through its venture fund.

The two biggest start-ups in terms of market cap within this sector is the Chinese company Mobike and the American company Lime.

The first one, Mobike, is the biggest shared bicycle operator by number of bikes, making Shanghai the world's largest bike-sharing city. Like most platforms, bikes are activated by downloading a QR code via the company's app. Mobike made its first international move in 2017 when it began to provide bicycles in Singapore. The Chinese company has since expanded to 15 countries, finding a global foothold outside of China's saturated bike share market. This company reached a market valuation of 3 billion dollars.

The second one, Lime, runs a bicycle and scooter sharing platform in over 40 US cities and 4 European cities. As of October 2017, Lime had 150,000 users. It costs $1 for a 30-minute ride on a traditional Lime bike, while the electric alternatives cost $1 to unlock plus 15 cents per minute to use. Following a $335m funding round in 2018, Lime became a unicorn company, achieving a valuation of over 1 billion. Differently from Mobike that focuses just on the first and last mile challenge, Lime is also famous for its scooters which are providing micro-mobility solutions.

From all the progress made by the 1st generation bike-sharing programs to newer companies such as Mobike that are changing the mobility of an enormous city such as Shanghai, none of it would be possible without the technological advancements mainly driven by the tracking capability improvements.

The future of bike-sharing is clear: there will be a lot more of it. Gilles Velesco, the vice president of Greater Lyon, quotes his mayor when saying that "there are two types of mayors in the world: those who have bike-sharing and those who want bike-sharing".

"As the price of fuel rises, traffic congestion worsens, populations grow, and a greater world-wide consciousness arises around climate change, it will be necessary for leaders around the world to find new modes of transport and better-adapted existing modes to move people in more environmentally sound, efficient, and economically feasible ways. Bike-sharing is evolving rapidly to fit the needs of the 21st century." (De Maio, 2004))



*Figure 15- Bike-Sharing main companies 2019*

Despite all the positive contributions that this new business model is providing to society, we can say with a high level of confidence that there are many bike-sharing challenges that up until now have not been solved.

## 4.2. Bike sharing main problems and challenges

This platform-based business model has three main issues:

- Theft and Vandalism
- Sustainability
- Scale

### Theft and Vandalism

The first big challenge that bike-sharing programs must overcome is the huge amount of theft and vandalism that occurs to hundreds, even thousands of bikes every year. This problem was present even in the first bike-sharing program and collapsed for exactly these two reasons. Ever since then, theft and vandalism has always been an issue with these types

of programs. A 2009 survey of Vélib's reported from since it launched in 2007 shows that almost 8.000 bicycles disappeared and another 12.000 were vandalized.
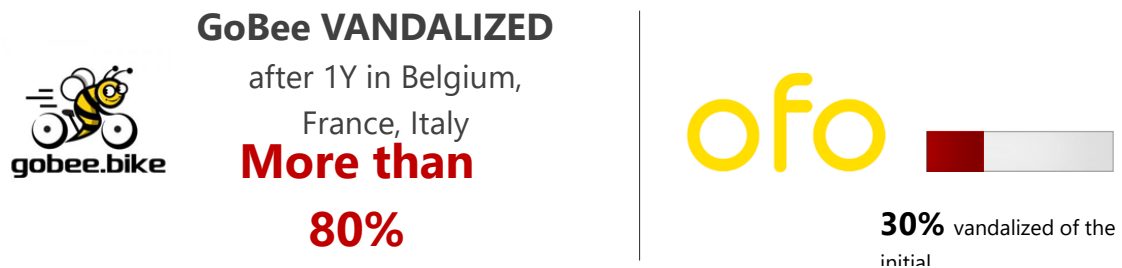
**GoBee VANDALIZED**

after 1Y in Belgium, France, Italy

**More than**

**80%**

**30%** vandalized of the initial

*Figure 16- Vandalism Data in Europe*

After just one month of activity, most bike-sharing companies lose 60% of their initial fleet because of robbery and vandalism. This is the main reason why so many bike-sharing companies are shutting down after less than three years, like in Italy where these bad behaviours happen really often.

A solid solution to this problem hasn't been found. They've inserted alarm technology on the bikes, but this hasn't brought any real results. Another solution that has been tried by many municipalities like Hangzhou, is the adoption of low-quality, inexpensive bikes, but makes the situation even worse. These low-quality bikes don't even last a month with the bad behaviour that users have while riding these bikes.

### Sustainability

Another big problem is sustainability. In my opinion, this is the most impactful issue because the overproduction of these bikes make them seem like a disposable product. There are no words for how grand this issue is. In fact, it is easier to understand how massive this problem is when you see the physicality of the issue.

For this problem, many entrepreneurs believe that the bike-sharing business is a bubble because this challenge is too big to overcome. Many VC and private equity funds invest millions into this sector, and the companies with all of that liquidity are not trying to solve the theft and robbery issues but rather they are just producing more and more bikes without taking into consideration all of the problems linked to their mass-production.
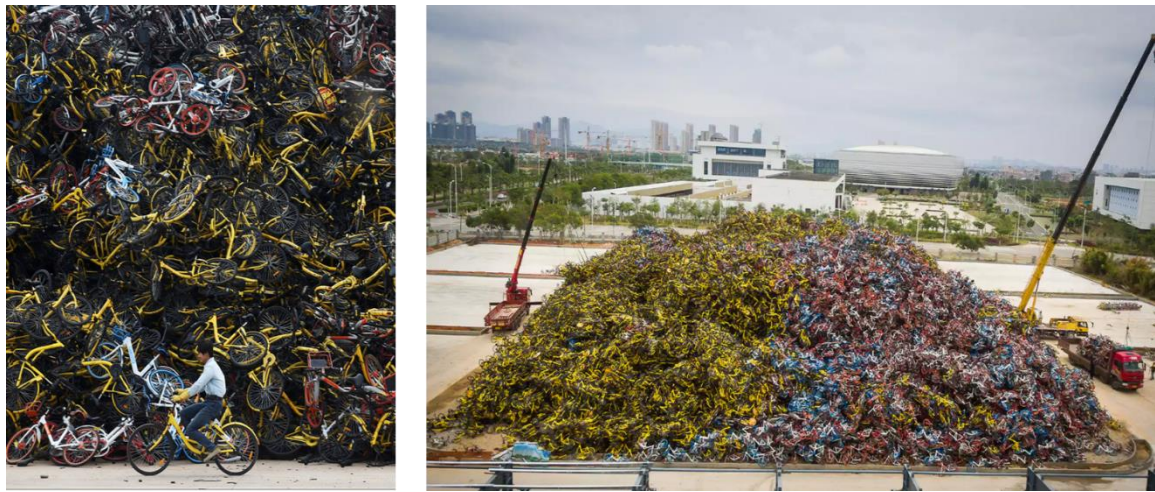
*Figure 17- Situation in Shanghai: Monumental graveyard*

## Chinese bike share graveyard a monument to industry's 'arrogance'

To truly understand how far this dynamic goes, think that Shanghai currently has 1.5 million shared bikes in the streets while London (whose population is just ⅓ of Shanghai's) only has 11.000 bikes.

It seems like we went back in time, during the industrial revolution where there was Taylorism and the only goal for companies was to produce and increase efficiency.

On the contrary, nowadays, being sustainable is something that has become a core strategic pillar for most companies since customers care increasingly about the planet. The reuse of products and its possible regeneration is something that innovative companies have to think about when introducing a new product on the market. This is the biggest criticism of the bike-sharing business model structure. It does not take into consideration what is now critical: a circular economy.

A negative cycle has been triggered; vandalism does not incentivise companies to produce high quality bikes, so they produce low quality bikes. For them, it is convenient to produce a new bike in mass-production instead of doing maintenance on them or regenerating them. Because of these low-quality bikes, people see them more and more as disposable objects.

So despite bike sharing or bikes in general being a better sustainable solution to mobility than cars for example, there is still a big challenge to solve.

*Figure 18-Rubbish dump close to Shanghai*

Companies should be able to grow in a sustainable way, following the demand in some other way than through mass-production and leveraging on the absence of rules and regulations that limits their activity and decisions.

Today, a specific solution has not yet been provided. There are companies, mainly American and European, that are producing higher quality vehicles (even electric) that are longer lasting. By doing this, the lifetime of the asset increases and incentivizes maintenance since they are an expensive product for which it is more convenient to maintain than to produce.

## Scalability

The third big challenge that all the bike sharing companies are facing is the scalability challenge.

Adopting the literature framework, we can say that the bike-sharing business model represents an infrastructure provider.

These companies (infrastructure providers) have a lot of problems linked with scalability; they dream of hyper scalability reached by other business models. Bike sharing is no different. They need high financial resources and high customer utilization in order to enter a new city or country.

In terms of cost, bike sharing is a high capital-intensive business since the cost of production, maintenance and logistics along with the short lifespan of the asset makes this business burn a tremendous amount of cash.

A lot of industry experts agree that due to all these costs, bike sharing will never reach enough profitability to make the business scalable.

The products are not easy to manage. They are prone to break down, the chains come off, the brakes fail, the seat adjustment clasps are wrenched off and the companies need to hire a large staff to maintain and repair bikes.

The whole operating costs of the bike-sharing business model depends on many factors.

- The population density, service area and fleet size that limit the scalable power of those platforms seeing as in order to be profitable, they require an intensive usage from the very beginning.

- The fabrication of the bikes and their relative stations, depending on the characteristics of the model (if they are dockless or not).

- The back-end system used to operate and connect the equipment with the relative distribution, maintenance and installation.

- All the staff, insurance and property-related costs.

Clear Channel Outdoor's smart bike system is estimated to have capital costs of around $3,600 per bicycle; JCDecaux's Cyclocity system is estimated at $4,400 per bicycle and Bixi is estimated to be $3,000 per bicycle (New York City Department of City Planning 2009). New York City's analysis of several systems conclude an average operating cost of about $1,600 per bicycle.

Surely, this cost decreased thanks to all the technology improvements but still gives a good understanding of how capital-intensive this specific sector is.

This scalability issue is even more visible when you compare the relevant cost with the revenue that this business can generate, and they only manage to make a small profit.

The most obvious source of revenue is the usage or monthly annual fees linked with the adoption of the service, but a successful business model is able to generate many different secondary revenue sources to expand the profit.

| | |
|---|---|
| *Brand cooperation* | offering coupons for a store that is on a rider's route, companies can capitalize on the competition between cafes. Tie-ups and parking spaces can potentially lure customers into picking one over the other. Mobike already reported having a deal with McDonalds. |
| *Advertising* | on wheels could be another revenue source. |
| *Online payment* | For example, Ofo, backed by Alibaba, now uses Alipay as its primary payment method. Alipay users with good credit ratings can also ride Ofo bikes without pre-paid deposits, which potentially helps to attract more people to Alibaba's platforms. |
| *Data* | is also a potentially valuable resource as the bikes track how they are being used. Mobike shares its data with city planners and public transport agencies, and has its own AI platform, Magic Cube, to interpret the data each of its bikes collect as they track their use. |

*Table 5-Bike-sharing revenues stream*

Despite all these sources, the profit generated by bike-sharing companies is still not even comparable to matchmakers who don't have to bear the asset cost.

History shows us how difficult it was for these companies to scale. Think that Mobike has incredibly deep cash resources yet they still have trouble entering a new city or country.

We can confidently say that the hyper scalability reached by other platform companies is nothing more than a mirage with high probability that companies such as Uber or Lyft will completely destroy the competition as soon as they decide to enter in the market. This is not just because they will acquire companies, but because they will be able to leverage on their customer base. In this scenario, there is a start-up project that is aiming to solve all of these challenges by leveraging on the true power of the platform to design a business model that is able to reach hyper scalability.

# 5. PARADIGM SHIFT FOR BIKE SHARING: HOC

This project has the objective to show that even capital-intensive platform businesses can reach hyper scalability.

This company, called HOC, will try to go in the other direction by shifting the paradigm from an asset company who is not able to scale efficiently to a zero-asset company capable of hyper scalability.

## 5.1. HOC History

The HOC project was born from a competition called "Hack Your Move" promoted by Polihub with the objective to develop sustainable mobility solutions in order to cover the first and last mile transportation. At the end of the three days of competition, HOC received an honourable mention from FNM (Ferrovie Nord Milano), the sponsors of the initiative.

After HOC had been mentioned at Hack Your Move, the team participated in the Entrepreneurship Lab (an accelerator program that proposes the collaboration with mentors in c-level) where they work on the structure of creating a solid business model and a technical validation of the idea. In parallel with the ideation process, the team tried to develop the first prototype of the product's solution and its possible patenting with the help of the technology transfer office of Politecnico.

Today, the project is temporarily on hold due to different factors and the necessity of each individual of the team.

### HOC Team



Gianluca Geneletti, 22 anni
Esperienza:
- Laurea triennale in Ing. Energetica, Polimi
- Consulente e Presidente in JEMP – Junior Enterprise Milano Politecnico (2 anni)
- Laurea magistrale in Energy Eng., Polimi (in corso)
Ruolo: organizzazione e operazioni
Caratteristiche chiave: attenzione al dettaglio, leadership

Mario Borruto, 23 anni
Esperienza:
- Laurea triennale in Design del Prodotto Industriale, Polimi
- Laurea magistrale in Design Engineering, Polimi (in corso)
- Consulente e HR in JEMP – Junior Enterprise Milano Politecnico (1 anno)
Ruolo: prototipazione smart lock (produzione)
Caratteristiche chiave: ambizione, spirito di gruppo

Massimo Sabatini, 23 anni
Esperienza:
- Laurea triennale in Ing. Gestionale, Polimi
- Laurea magistrale in Management Eng., Polimi (in corso)
- Consulente e Commerciale in JEMP – Junior Enterprise Milano Politecnico (1 anno)
Ruolo: organizzazione e finanziario
Caratteristiche chiave: attitudine alla negoziazione, orientamento al risultato

Mirko Incerti Fornaciari, 22 anni
Esperienza:
- Laurea triennale in Design del Prodotto Industriale, Polimi
- Laurea magistrale in Product Service System Design, Polimi (in corso)
Ruolo: prototipazione smart lock (progettazione)
Caratteristiche chiave: creatività, comunicazione

Paola Maria Periti, 29 anni
Esperienza:
- Laurea magistrale in Ing. Edile/Architettura, Polimi
- Laurea magistrale in Ing. Civile, ESTP (Parigi)
- Business Developer presso Hilti (in corso)
Ruolo: commerciale
Caratteristiche chiave: flessibilità, intelligenza emotiva

Pierstefano Bellani, 25 anni
Esperienza:
- Laurea triennale in Design del Prodotto Industriale, Polimi
- Laurea magistrale in Digital & Interaction Design, Polimi (in corso)
Ruolo: progettazione app
Caratteristiche chiave: iniziativa, autoefficacia

*Figure 19- Team Composition and Competences*

I personally hope that after graduation, most of the team members will be able to start again. This project has been taken on by a team of 6 people with complementary backgrounds.

## 5.2.  HOC Solution

HOC can be described as a bike-sharing platform, free floating and peer-to-peer with the goal to revolutionize today's bike-sharing ecosystem and bring a true paradigm change for society.

HOC's solution is based on 4 fundamental elements:

- Bikes
- Smart locks
- Mobile app
- Maintenance ("HOChi")

### Bikes:

HOC bikes are not the smart bikes produced by Mobike or Lime but it uses a common bike, usually retrofit or regenerated.

The HOC fleet is composed of two main bike categories:

- The first part that creates the initial base is represented by means given by municipalities, flea markets or regenerating bikes from landfills.
- The second part of the fleet, the variable one, is composed by bicycles shared by citizens after a conformity check. The owners of the shared bikes will be compensated with a variable fee.

### Smart Lock:

The smart lock is the technology that allows the ecosystem to work. It should be universally applicable to every bike. It allows the bike to be attached to a fixed structure like poles, trees or racks.

The lock also has a GPS and Bluetooth system, allowing the bikes linked to it to be geolocative and unlocked thanks to a common smartphone. The evident green colour of the smart lock allows an easy individualization of the bike and gives visibility and notoriety to the whole service.

The lock itself will be locked in a fixed way with a single bike creating a univocal connection between the bike and the lock.
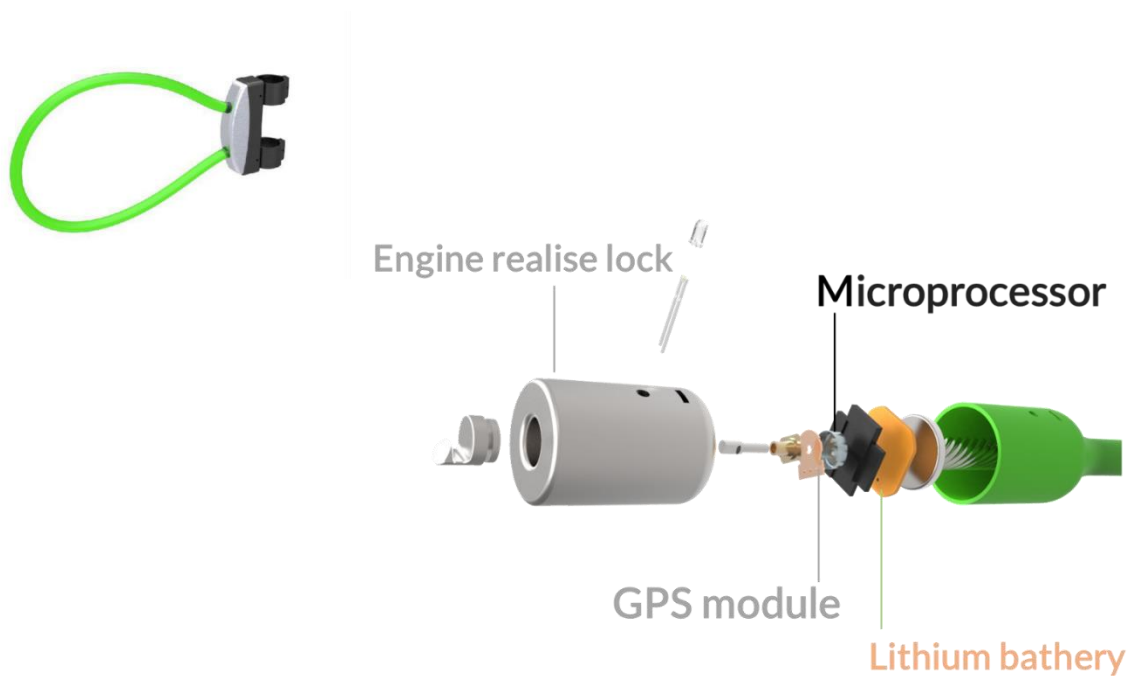


*Figure 20- Smartlock main components*

**Mobile App:**

The HOC platform requires the creation of a profile for each user and each bike with the possibility to insert some personal information for both like a photo and its history. The main goal behind that is the creation of an interactive ecosystem that makes the final user more responsible and proactive. On the app, users will see all the available bikes on a map in their area and the unlock procedure will happen after the bike identification, all within the mobile app. In order to avoid and monitor possible damage, there will be a request for the user both at the beginning and the end of the trip. HOC will use gamification to incentivize some activities of the user like to provide feedback on the bikes' status or relocate a bike in a specific place in order to facilitate maintenance service.

*Figure 21- Mobile app: User profile and Map*

**Maintenance ("HOChi")**

The maintenance operation can be provided (if asked by the municipality) by HOC's employees who have technical competencies or trained thanks to HOC tutorials.

Since maintenance (which is the most critical activity of our service) does not follow a precise rule, HOC will talk with municipalities to find the maintenance solution that fits better for them. The main reason behind that choice is that each municipality could have a different size or need.

## 5.3. Main analysis

HOC, in order to be successful and scale, settled on the goal to start from the Italian market. Of course, this market doesn't have the dimension of the Asian or American market, but seeing as in Italy, a lot of people are using bikes as a mode of transportation and the huge number of municipalities present within the Italian territory, we believe that this will be a good starting point.

## Market Analysis

Let's analyse more in depth the size and potential of this market:

As a starting point, we chose the Italian population with a wide segment of people aged between 15 and 64 (around 38 million). According to the national coefficient of modal share, 3,8% of this population has a high propensity to bike adoption.

The geographical focus includes mainly middle size municipalities, from 50k to 400k inhabitants.

The choice is basically driven by the actual absence of free floating bikesharing's service in those zones. An interesting data is the CAGR growth of the Global bikesharing Market of 21%, between 2018 and 2022. (Technavio, one of the most influential market research and advisory firms in the world).The launching phase will be characterized by a focus on Millennials, targeted as early adopters of the service.

They will be responsible for the company's capacity to reach a critical mass both in term of user and fleet

## Competitive Analysis

Now that we've defined the size of the Italian market, we'll focus on the competition within that market. We will use this scenario universally since the competition and dynamics that are present in Italy reflect the world's situation.

We can split the competitive environment into three macro categories:

1. Bikes owned by citizens (common bikes)
2. Shared bikes with a fixed station or with a dock station
3. Shared bikes that are free floating or dockless

## Owned Bike:

The private bike remains a valuable solution to cover short distances within the city, but it still has a risk of theft and isn't always there when or where you need it to be.

Despite the fact that Italy covers the largest production share of bikes within the European market (around 18%), this information does not reflect the national sales that stay around 8%.

In Italy, the adoption of bikes is estimated around 3.6% compared to the European average of over 8%. On one hand, this information shows that there is a country within Europe such as the Netherlands where the adoption of bicycles as a mode of transportation is far more

spread than in Italy. On the other hand, we can identify a huge quantity of bikes that are not being used. An analysis developed within the project shows how on a survey of around 500 people, more than half declared the possession of an unused bike.

## Bike-sharing with fixed station

Docked bike-sharing systems provide fixed parking for the bikes spread around the city, usually in specific points of arrival or destination for commuters. The adoption of this specific mode of transportation is usually only allowed in a specific moment in time and is done through a card that must be inserted into a totem (smart column) within the parking area.

In Italy, the main players are: Bicincittà, Clear Channel and Ecospazio. This specific business model works by selling the management activities to the municipalities and sometimes also the maintenance, marketing and promotion of the business (for example with Bicincittà).

Another source of revenue can be found in the example of Clear Channel where the adoption of a fixed station is used as an advertising spot. The main problem of this service is that in order to be efficient and responsive, an incredibly large number of stations are required to be installed.

## Free floating bike-sharing

This system requires bicycles with their presence all over the territory and with GPS, Bluetooth and anti-theft.

This mode of transportation can be used thanks to a mobile app that allows the geo-localization and payment. The main players within the Italian sector are Mobike and Ofo. The latter is having a lot of trouble in the Italian market. They are no longer operating in most Italian cities and they've had to cut a lot of people out of their jobs. For this reason, our focus will be on the first one that is also the worldwide market leader. In Italy, Mobike operates through Evlonet, according to a deal similar to franchising. While with municipalities (Mobike's main stakeholder) they work through partnerships asking for licenses to operate in the territory. Looking at what Mobike's executive declared, the revenue model is mainly based on B2C with small advertising activities run through the mobile application. A common strategy adopted in the city is the "penetration" strategy. They enter with a low price that during time, gradually increases. Differently from what the main bike

sharing companies in the world are doing, Mobike is also launching a service in medium size towns. Today, Mobike is present in Milano, Torino, Firenze, Pesaro, Mantova, Bergamo, Reggio Emilia, Bologna.

Mobike is moving and taking different decisions compared to other players in the market, mostly due to the fact that it has almost infinite productive and financial resources.

Still, they need to reach a huge critical mass in order to make their business profitable.

Below, I propose the value curve that underlines the main differences already underlined above.
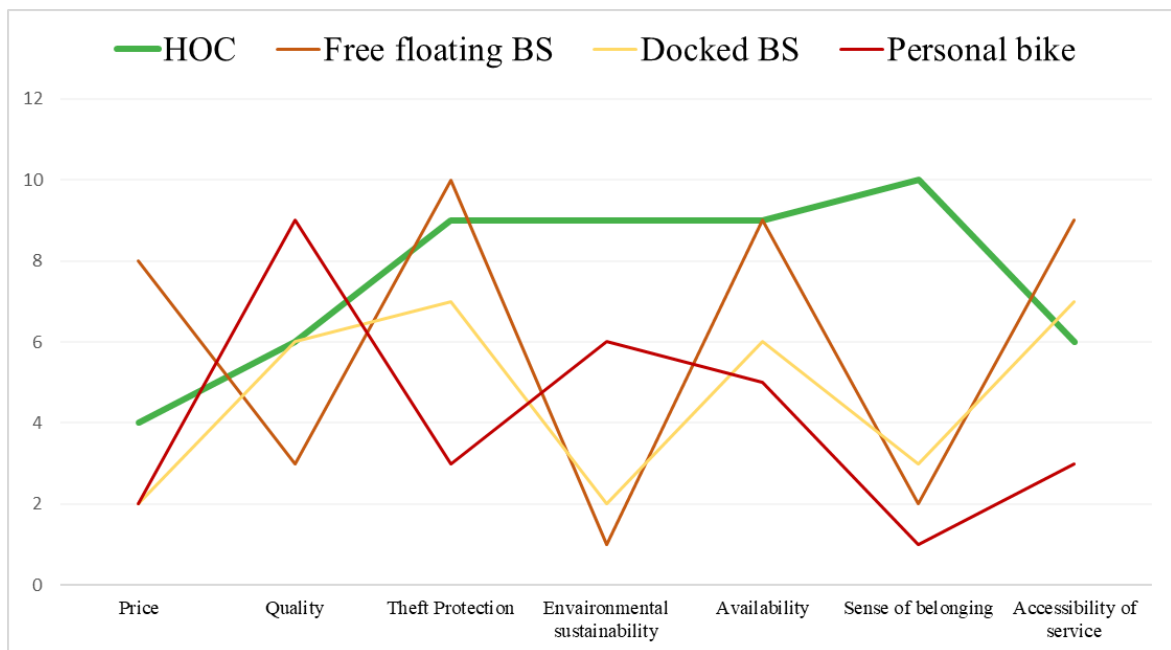


*Table 6- Value curve: competitive analysis*

**Business Model Canvas**

The HOC model is something completely different than what is already in the market right now.

To provide a clear view on how HOC will be built and how the business model will work, we will show the canvas below.

Analysing more in detail the Business Model Canvas can be seen the main value offered by HOC: a peer to peer bike sharing system where users share their unused bikes within a community. Thanks to those idle resource HOC will provide a competitive price and to the providing side of the platform HOC will give the possibility to gain some money from their bikes and contribute to the mobility of its municipality. This service as previously fully

analysed will be offer towards citizens of Small-Mid size municipalities with a focus on the millennial generation. Critical to the success of the community creation will be the relationship that HOC is going to build with each single customer. Must be a strong and meaningful relation with each single member of the platform; the main driver adopted by HOC to reinforce this relationship will be the construction of a unique and relevant customer experience. This aligned community will be possible thanks to the huge marketing effort estimated by HOC. Since the main target are millennials will be privileged digital channel with a focus on social media and seo and sem activities. Will be also organized specific local event to have a physical contact with HOC early adopters. Another powerful communication channel is going to be the smart lock itself, that thanks to the appealing green colour will create huge hype during the launching phase.

Shifting on the other side of the Canvas there is one partner necessary to the success of the project: the municipalities. The collaboration with municipalities its crucial, they can support the promotion of the service and even more important provide the initial fleet required to reach the critical mass. Today the team must focus on the prototyping of the smart lock, but when the service will reach is operativity the activities' attention will shift towards training and maintenance. Those two activities are strictly related, the efficiency of one lead to the effectiveness of the other. All the reasoning done till now wouldn't be possible if those idle resources will not be provided by the community. This key resource guides the whole validation process.

Revenues' HOC structure is simple, almost the only source here is the consumption fee. After the competitive analysis has been establish a fair price of 0,5€ for a 30 minutes ride. This information its supported by the survey that showed us how the price perception in small-mid municipalities is around 0,8€. As, have been said many time, HOC's scalability capacity is mainly possible due to the flexibility of the cost structure. It's enough to say how the main cost of the service is the fee payment towards the bike's provider. HOC will be just an intermediary that make the service possible and keep a percentage of the consumption fee.

Has been provided here just a picture of what HOC could be, many of those point will be more in deep analysed within the following chapter.

## Key Partners

Bikes provider that enter the community.

- Municipalities.
- Part components Suppliers
- Smart Lock producer.
- Bikes' Mechanical

## Key activities

Prototype and develop smart-lock and app. Bikes' validation and maintenance. Training of Hochi

## Key resources

initial fleet composition and bikes shared by the community. Replacement Bikes' part. Server and Infrastructure. App developer (front end, back end)

## Value proposition

Peer to peer bike sharing system where people share their unused bikes to a community. Sharing ecosystem through a mobile app and a smartlock. Competitive price. Citizen support. Possible new income generated by the sharing of a personal bike.

## Customer relationship

Dynamic relationship with every single user thanks to the creation of a community.

## Channels

Online promotion (website, social media). Offline promotion Visibility provided by locker. Municipalities support for local event

## Customer segments

Target: citizens of middle size municipalities, provider and final user. Both sex

- Age 15-64.
- Need: short-haul trip. Environmental contribution.
- Social responsibility. Economic benefit.

## Cost Structure

cost of app development and Smart lock production. Payments direct to bikes provider  Hochi salary  Cost of replacement parts Marketing cost

## Revenue streams

Fee consumption.  Economic incentive provided by municipalities

*Figure 22- Business model canvas*

The business model provided has the ability to solve the issues that other bike-sharing players are facing today. Thanks to the platform, it will even overcome the biggest challenge: scalability.

## 5.4.    HOC: a new bike sharing perspective

HOC is a start-up project that tries to solve all of the bike-sharing issues that up until today, despite the high financial resources that companies such as Mobike and Lime has, they weren't able to solve.

The three big challenges mentioned above are theft & vandalism, sustainable production and scalability.

Obviously, these are not the only challenges that the project will face. There are all the other platform issues such as the chicken and egg dilemma and many more that we'll find an answer to supported by the previous literature.

Before going deeper into all of these considerations, I want to make it clear that HOC is still a project and all the considerations that follow both qualitative and quantitative will be supported mainly by literature, theoretically-demonstrated concepts, and both quantitative and qualitative data collected during the first year (surveys, P&l statement, business plan, interviews, mentors considerations).

### Vandalism and theft's Solution

The first bike-sharing challenge (vandalism and theft) is, from a historical point of view, the starting issue that bike sharing has faced.

The first service in Amsterdam was unsuccessful precisely because of this issue. Despite many years having passed since the first attempt, the challenge still remains unsolved.

Many companies believed that thanks to anti-theft alarms and a recognition system (profiling), that the problem could be solved or at least reduced, but looking at all these images it is clear that it is not.

The pillar behind HOC's solution to this issue is the creation of a solid and strong community.

The main goal is to make citizens more responsible towards the service, realizing that destroying or vandalizing an HOC bike means damaging their own community.

Obviously, to use the word community is easy. The true challenge is to create one and to build a group of people that share common principles and a clear unique vision.

HOC will invest most of its effort in this direction, leveraging mainly on gamification, organising sustainability challenges, prizes and notoriety to users that have the most wunderkind behaviour.

HOC wants to make citizens more responsible, not only by becoming a solid and valuable solution for sustainable mobility within the city, but mainly by making it clear that the bikes they are using are not common bikes produced by big corporations. HOC will make it clear that the bikes they are using are Luca, Antonio, Valeria's bike, since HOC's bike fleet will mostly be composed of real people's bikes.



*Figure 23- Mobile app: Gamification aspects*

This message will be clear since each bike will be profiled, and the "ex" owner of the bike will also tell its story.

The focus and effort of the HOC team will be towards this community goal. We will also organize special events with municipalities in order to send this message in the most transparent and relevant way.

Despite all of these considerations, we know that the world is not like that. Even with a strong community, there will always be people that will behave in inappropriate behaviours.

For these people, the solution will be the smart lock that will always be attached to a fixed position, limiting all the bad actions that could be done while the bike is parked.

**Sustainability: From mass productivity to zero production using idle resources**

The second challenge (sustainability) is the one that gave birth to the idea behind HOC.

During the hackathon, we were brainstorming for a solution on how to cover the first and last mile of transportation. After seeing the photo, we thought of a way to recycle all those bicycles.

The solution rapidly came: zero production.

HOC will recycle bikes that are unused and not produce new bikes since there are already too many of them.

HOC's main strength is the adoption of idle resources: the bikes that most people have in their garage that are unused or the ones that municipalities have collected during the years that are just sitting in some warehouse.

Further quantitative considerations over the production differences in terms of cost and impact will be given in the following chapter.

We asked 20 bike mechanics around Italy if it was possible to reuse and recycle bikes, giving them a long, new life. They confirmed that it is in fact possible.

A strong chain needs to be built that exchanges bicycles parts and creates and trains strong competencies for the "HOChi" (people locally trained and supported for all the maintenance activities).

These two challenges are relevant but the most ambitious one is the third challenge.

## 5.5.    The goal of a hyper scalable business model

The real goal and the core of my dissertation is to obtain a paradigm shift from infrastructure providers to matchmakers for the bike-sharing industry.

For this reason, all the information collected will be used to support this affirmation.

The previously analysed data collected will serve to support all the following observations.

In order to understand how HOC solves the main platform challenges to reaching a hyper scalable business model, we need to analyse the value that the platform provides.

Adopting the Parker and Van Alestyne value analysis, we can see how HOC, as the most common platform, presents cross side network effect.

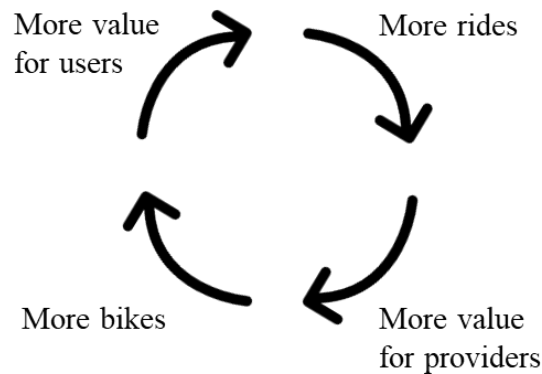The users find the service more valuable when more bikes are on the platform.



*Figure 24- Value loop*

The citizens will provide their bikes only if they can earn good money so the service must be highly adopted. There is cross-side interest since the final users want an efficient service that can cover all the routes in the whole city and the bikes' providers are looking for many users.

## Solution to the Chicken and egg dilemma

Now that we understand that HOC is a platform with a similar business model to Airbnb or Uber, the question is: how it can solve the chicken and egg dilemma?

Quoting literature, it can be said that HOC will follow the single side strategy focusing only on the final user side and opening up to the provider's side only after it has reached a critical mass of users.

As Hagiu, Boston university professor analysed, in platform business models, one of the two sides should receive an incentive (subsidized).

To subsidize, HOC will use the Paypal approach of giving money that can be used just for the service itself. The critical mass will be reached thanks to a fixed fleet directly provided by HOC with the support of municipalities and regeneration of disposal bikes. In this way, the first user base will be built and more and more people will look forward to entering the platform.

Once the platform will be open to all the providers (common citizens with bikes in their garage or even bike mechanics with unused bikes) the fleet will change its composition from 100% HOC bikes to a moment in which that percentage will be lower than 20%. Of course, the optimal/utopian composition of the fleet should be composed only by citizens' bikes.

By doing this, all of the fixed fleet can be used to expand into a new city, so the fixed asset does not increase with the market and it's not a capital-intensive business.

Despite the fact that it's obvious that HOC is not passing the scalability or growth phase depending on which lifecycle framework we are looking at; we will analyse how this new business model will solve the third challenge.

**The paradigm shifts**

It's clear that HOC shifts the bike sharing business from an infrastructure provider to a matchmaker. At the base of the shift is the bike itself.

Before, the base of the bike-sharing industry was a tool (an infrastructure) that was highly capital-intensive. Now, thanks to the locker, it is no more an asset of the bike-sharing company, but it becomes a resource shared by one side of the platform. At the base of this shift are the bikes that represent the idle resource that makes this business model possible.

There are two parts that make this paradigm shift possible: technology and community.

The first one is clearly the smart lock. It is not something completely new or that leverages on innovative technologies such as Blockchain or AI. It is something that can easily be found on Amazon and the true innovation is the change of meaning behind that product. Now it becomes a tool for sharing, and no longer something used to protect personal property.

This first change allows HOC to be potentially scalable from an economic point of view.

If we compare the capital dependency of the two different solutions, it is clear.

Taking as an average the production of smart bikes and comparing it to the cost of the smart lock, it is clear that the dimension is completely different.

The cost of the first generation mobike's Bike is around 20 times of the 299 RMB deposit, company CEO Davis Wang once told local media. With that information we can assume that the cost is nearly 874 USD (6,000 RMB) when the service was first launched

There are many articles that reported that the firm has been able to reduce the production cost to less than 2,000 RMB (300 USD), even producing their low-quality version Mobike Lite with a cost around 500 RMB (70 USD). I deliberately choose Mobike for comparison since is the market leader and its bikes represent an average quality standard for bike sharing. We deliberately avoid picking a bike sharing company such as Ofo, despite the much lower cost per bike 300 RMB, since it is an unsuccessful company that almost declared bankruptcy.

This high cost once more allows us to understand how this business is difficultly sustainable and almost impossible to scale efficiently.

As professor of Peking university: David Gillis once said: "They rent for one yuan every half hour, and they expect that they might be rented four times a day for a half hour, which amounts to four yuan per day," he tells Quartz. "If you take four yuan per day and you take that into the 3,000 yuan, you've got a long time before you've recovered the cost of a bike".

The smart lock instead has a completely different cost dimension, as you can see from the tab below the tot final cost estimated for a smart lock is of 17.2 euros.

This cost is even not considering the scale economies that could be reached producing a higher number of locker but just the individual components cost. So, we can say that is an overestimate of the true possible price.

We are not saying that once a critical mass is reached that the bike sharing business will have a completely different cost, but for sure the structure will change.

The fixed cost structure of common players that couldn't allow the service to grow rapidly and with low economic resources is no longer present.

Now, bike sharing is flexible. Despite the fixed fleet that will help at the beginning of the service, we can open in a new city to market in no time without acquisition of investing incredibly high financial resources. Just like we described Airbnb as the biggest hotel company without a single property or Uber the biggest taxi company without a single car, HOC could become the biggest bike-sharing company without a single bike.

The second big part is the creation of a strong and connected community.

This is going to be the true and only competitive advantage. We mentioned that the only hard skill that is impossible to copy and that makes a business truly scalable and successful is the user base.

If we look at businesses like Airbnb and Facebook, they have nothing that can't be copied, but the true hard-to-trade skill today is the user base.

The HOC community will be built around the common goal of a truly sustainable mobility, giving the possibility to each citizen to support this transition and also earning some additional money.

For that reason, the user experience is fundamental. The mobile application must be extremely catchy and the gamification must be present everywhere within the experience.

Today, sustainability is becoming more and more relevant for corporations, cities and people. This common goal is the key to a successful community and it's the biggest challenge that companies today are facing.

Obviously, all the data provided to support the scalability consideration up until now has been qualitative. Let's take a look at some quantitative data that shows why HOC's business model is truly scalable, starting with a survey sent to a sample of 500 potential customers that live in mid-size municipalities.

This gives us confirmation about our first hypothesis about the presence of a huge amount of idle resources (unused bikes) in Italy. More than 50% of the sample declares to have an unused bike.

This information is not the only data collected by the survey, but it is surely the most significant for this purpose of this paper.

The information collected around the survey allows HOC to define the optimal price and size of the municipalities to enter first. Below are one of the many results of the survey.

The second (more quantitative) data that supports HOC's scalability capacity is the financial analysis executed during the Eptagon Lab acceleration program.

This financial analysis has been made along with a CFO (chief financial officer) of one of Italy's biggest start-ups.

Here we see how the cost structure is more like a matchmaker (like Uber) than an infrastructure provider (like Mobike).

Obviously because of the different sizes, we couldn't compare HOC's financial statement with a bike sharing giant such as Mobike, but we could still underline the different structures.

The first relevant information is the small capex investment estimated by HOC. Despite the fact that for new start-ups, the first-year investment is relevant, it can be seen in HOC's financial statement that the opex is significantly bigger from the very beginning. The only capex cost, around 10% of Opex, is mainly composed of the first fixed fleet composition. Following those cost considerations, the most impactful cost is the fee given to the bike provider.

The people who will provide the bikes will gain 20% of the price that final user will pay to rent them. All of the calculations and hypotheses allows us to predict that once the optimal level has been reached, the annual revenue generated by a single bike for the citizen will be

of almost 90 euros. The other big differences have already been mentioned above between the locker cost and the smartbike.

As we can see below, if we check the slope of the P&L lines of the two companies, not in terms of absolute number, and focusing on the EBITDA, there are not many differences.

The market and volume is the same so it's normal to believe that in the best case scenario, this data fits with the market leader.

Observing the P&L of the first three years estimated by HOC there are two interesting data. The first one is how the business is positive almost since the very beginning mainly thanks to its variable cost structure that do not require high investment or financial resources.

The second interesting information is the Ebitda. Despite it could look as a small number is already a significance data on the economic sustainability of the business model.

Unfortunately, it wasn't possible to find the same economical information of the other bikesharing companies since they are really careful to show those data.
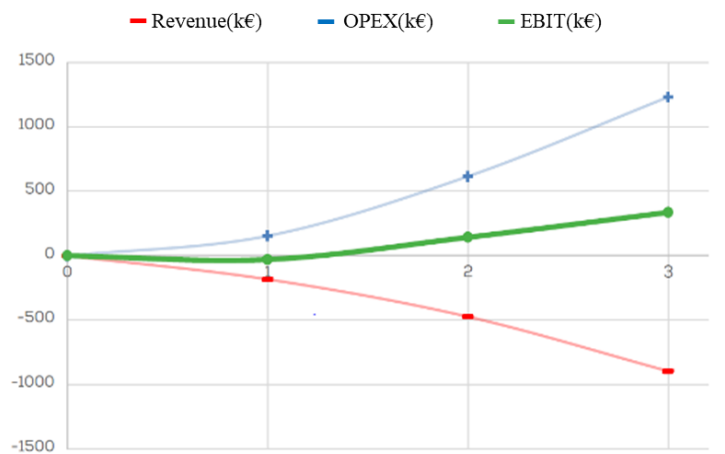


*Figure 25- P&L: HOC three years*

The main reason behind that is the high companies' valuation compare to the many issue that are facing.

Jeffrey Towson is an investor who once worked for Prince Alwaleed and a professor at Beijing University. He can't believe the amount of money the companies have received and recently dissected the problems. Just to mentione the biggest that he deeply analysed:

The absence of network effect in bike sharing, "they are not like facebook or Uber, which improve as more users or driver join the platform. Towson points out how Mobike or Ofo when reach or conquer a nother 1000 customers they need to buy or produce more bikes. Economies of scale siimpli don't work in bike sharing.

Platform unprofitability or that carry razor-thin margin since prices of the service are low. "Mobike and Ofo, the two largest companies, charge between 0.5 yuan to 1 yuan (7 cents to 14 cents) for 30 minutes. And those bikes can be expensive. Mobike's premium bikes reportedly cost 3,000 yuan ($435) to produce last year. It says the cost has since fallen. But if you assume each bike is used five to eight times a day, which is unlikely, as many end up far away from popular destinations, it takes more than a year to recoup costs" (Towson affirmation)

Competition always keep pilling in. There are not many ways to differentiate the bike sharing service.

Even when China's 30 or so bike-sharing competitors are whittled down to a few, scale doesn't pay off then either. That's because, again, there's no asset-sharing going on. People aren't listing their bikes to be used like homes on Airbnb. The bikes are bought and kept up by the companies.

The true reason why HOC is more scalable in comparison to the traditional bike-sharing providers is that HOC develops a completely different platform business model.

As it can be seen in Andong Yan's (Professor of Southern Carolina University) article "A case study of Chinese sharing market", in order to keep the cost structure efficient, Mobike must saturate its production capacity at a much higher level than the real demand.

This phenomenon is not present in HOC's system. Thanks to the cross-side network effect, the supply will follow the demand. More and more people will look for a bike and consequently more citizens will be incentivized to offer their bike to the platform. The same dynamic can also lead to some negative network effect, but the fixed fleet will try to overcome this risk. It will have a fixed supply for the stability of the demand and supply that varies for the more unstable demand.

Comparing the cost structure of HOC, Mobike and a famous matchmaker, we can see how Mobike's structure is characterized by high fixed costs and a late break-even point, while HOC's structure is more like Airbnb's structure where the cost grows linearly with the demand increase and the revenues grow exponentially.
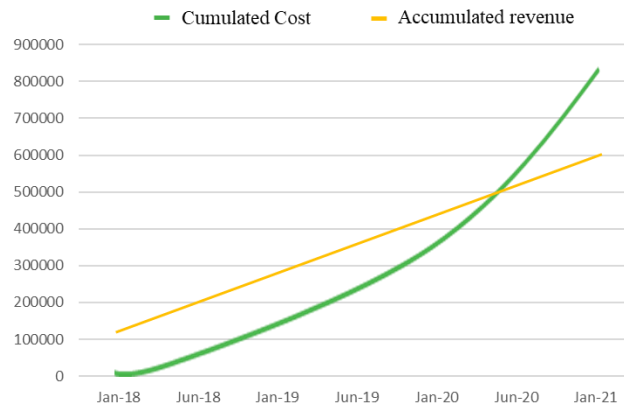
*Table 7-HOC Bep analysis*

This linear increase is not a characteristic of a scalable business model but of a hyper-scalable one.

In fact, Mobike's structure is certainly scalable but if we talk about hyper scalability, a matchmaker's disruptive power is on a completely different level.

Looking at the global brain structure, it can be said that HOC presents all three existing blocks.

The first one is the technology that is represented by the smart lock. It is not a revolutionary technology but as previously stated, in order to reach hyper scalability, it is not a fundamental pillar but more of an aspect. For HOC, the true technological disruption is not linked with the smart lock itself, but with the capability to use a relatively common product and to change its significance with few technological components.

The second one is the block user base or free distribution. For HOC, this means the community. For bike sharing, it is almost impossible to imagine a free distribution such as in other industries, but the cost will also be split to the bike provider, allowing the service to be affordable for almost everybody. The creation of this aspect is a hard-to-trade skill and it will be the main goal of the project.

The third pillar that characterizes the real power behind hyper-scalability is the so called "dead capital".

HOC will leverage on idle resources like bikes in garages or in municipality warehouses that present ownership inefficiencies. As we said, the ownership itself reduces the usage of a product. HOC's approach that can be seen here is the service innovation approach.

All of this information allows us to say that HOC's business model could reach hyper scalability in the future.

# 6. DISCUSSION

As mentioned above the core of this research project is to define if a high capital-intensive company can reach hyper-scalability leveraging on the power of the platform. The whole discussion chapter will focus on the generalization and identification of a clear design process starting from HOC's project.

## 6.1. A paradigm shift from Infrastructure provider to Matchmaker

We'll start analysing how companies can become hyper scalable by focusing on the building blocks of the global brain. Thanks to a clear identification of a hyper scalable business model, we're able to say that HOC, a bike sharing project, will be able to reach hyper scalability. (Heylighen,2008)

We'll now analyse the main reasons that lead an infrastructure provider to become much more similar to a matchmaker. It must be explained how a common infrastructure provider can reach hyper scalability by leveraging on the power of the platform itself. Here we'll define a new business model that represents a hybrid of the two (matchmakers and infrastructure providers) (Mohout, 2012).
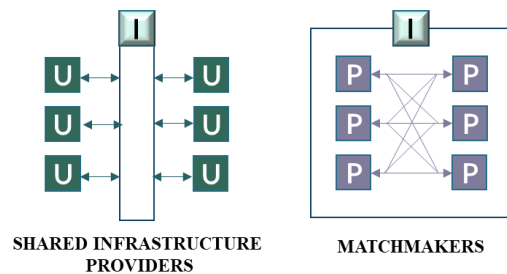
*Figure 26- Shared Infrastructure Providers and Matchmakers Architecture*

Thanks to the assets that are already available, the chicken and egg dilemma will be solved by making the platform more efficient. Once the dilemma has been solved, we will focus on the creation of a strong user base that, due to the support of new ways to approach technology as sharing enabler, will allow the community to provide/share its own infrastructure.

Literature on platform and scalability allows us to identify a relevant trend within the platform's business model: escaping from the spiral of dead (Christensen, et al., 2003). Many tech giants are becoming more capital-intensive companies. This new hybrid model will allow large capital-intensive companies to reduce their asset dependency. (Kastalli, et al.,2013)

Focusing on the platform chapter, the chicken and egg dilemma is identified as the biggest challenge to create a successful platform. (Lett, et al., 2015). Instead, the lecture over scalability allows us to understand what it truly means to be scalable by observing how all the asset-based companies in their best-case scenario are only able to reach linear scalability. (The performance of the company grows linearly with the number of business model components. In this scenario, the effectiveness of scaling is 100%). (Nielsen, et al.,2017) After, we analysed the possibility of being able to reach hyper scalability. To understand how this scalability goal can be reached, we took the brain model and its three building blocks as a parameter. (Mohout, 2012).

This analysis, along with the understanding of the startup project, will allow HOC to bring a business model change that leads to hyper scalability through Architectural Innovation. (Henderson, et al., 1990). This theoretical model is based on a three-step process that transforms an asset-based company into a matchmaker.

## 6.2. Three Step Design Process

Let's go deeper on the three most relevant phases that characterize the new business model design and represents a paradigm shift of the current scenario.

1   Creation of an asset that will bring one side of the platform on board
2   Development of a user base that shares the same vision of the business project itself
3   Identification of an idle resource enabled by the power of technology

I believe that this three-step design roadmap, already adopted to develop HOC's business model, will allow asset-based companies to compete with tech giants that are disrupting the world.

Thanks to this pattern, a paradigm shift in the opposite direction will happen. It will no longer just be matchmakers such as Airbnb or Uber that will invest in assets and infrastructure in order to become more capital intensive companies, but the companies that are already depending on assets will also be able to leverage on the true power of platforms to disrupt the market. (Godelink,2014)

Moreover, there is an even higher probability of success by these companies since the biggest challenge of a platform business model, the chicken and egg dilemma, will be solved by the infrastructure itself. (Caillaud et al.2003)

Now, each single phase of the design process will be analysed in detail.

### 1) **Asset as a Lever**

The core of this first phase is the resolution of the chicken and egg dilemma.

The real question here is how can infrastructure providers solve a challenge that many platform businesses models have not been able to solve? (Hagiu, et al.2011) This literature provides us many examples on how this challenge has been solved (PayPal solution) and at the end, 8 successful strategies to tackle this issue is presented. (Eisenmann et al.,2006)

Analysing all of them, combined with HOC's proposition, it's clear how an asset company can easily adopt the single side strategy. Creating a business around products or services that benefit a single set of users; later, convert the business into a platform business by attracting a second set of users who want to engage in an interaction with the first set.

The implementation of this strategy is much easier than what could be thought… the solution is the infrastructure itself. For these companies, assets are their main resource and competitive advantage.

Obviously, we are not talking about hard-to-trade (Henderson, et al. 1990) and impossible to copy but in order to create the same asset base, competitors still need a lot of resources.

What managers should do in this first phase is to focus on just one side of the platform. To bring in that side of the platform, companies need a minimum level of efficiency of service and they can do that by providing the asset themselves. HOC's result shows us that it can usually be defined by the minimum critical mass that needs to be reached in order to offer an efficient service.

As we said in the literature part, there are many companies that tackle and overcome the dilemma by adopting completely different strategies. The single side in this specific scenario is going to be the most successful one since the main difficulty here is the development of the asset itself. Since we are talking about capital intensive companies with huge financial capabilities and resources, this specific challenge can easily be managed.

The biggest reason for high probability is that the capability to reach the critical mass of one side will make the service more and more desirable for the other side.
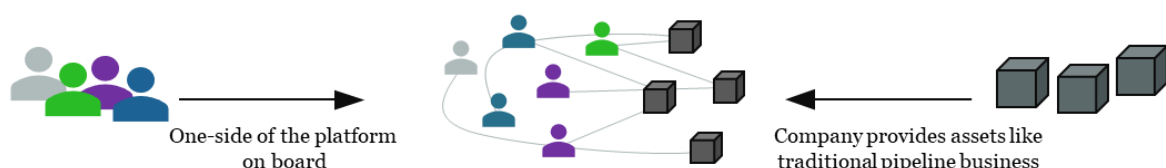


*Figure 27- First step design*

This way, the network effect of the side that needs to come on board will be both direct and cross and the company can easily subsidize that size. (Hagiu, et al., 2011)

Thanks to this strategy, the service already has a minimum level of efficiency and a clear value proposition for one side of the platform.

This strategy leverages on the power of these capital-intensive companies in order to solve the biggest platform dilemma. The best thing about this new approach is that what was once the main reason for the impossibility to scale efficiently becomes the core of the hyper scalable business model.

These companies can use this fixed asset to scale even faster than platform companies usually do.

The assets can be the spark behind the construction of a platform business and once the fire has a life of its own, that spark can be used to expand to different cities and countries.

As we have resumed in the graph, this will allow companies to spread their business model even faster and most likely with a higher probability of success. (Feinleib,2009)

This first phase is the easiest and most standard one to implement. Here, companies do not need to change the way they are approaching the market. Asset-based companies are already adopting this approach. The main difference here is that they need to generate a minimum level of service efficiency.

This is just the first lever to start getting one side on board. The optimality of the service will not depend on their assets nor on their resources.

## 2) User base engagement

The word community is overused, but what does it truly mean? And which are the main factors that allows for its creation?

This is a crucial phase of the new process. The creation of a community makes the difference between the success and the failure of the project.

Looking at the Cambridge dictionary, the first definition of community is: "The people living in one particular area or people who are considered as a unit because of their common interests, social group, or nationality"

The real meaning behind this definition is sharing. A community shares something: an interest, an area or a vision. The more powerful and meaningful this "something" is, the more unified the people within the community will be.

So the true challenge here is to find a vision or a shared goal that is cared for by all the people within your platform.
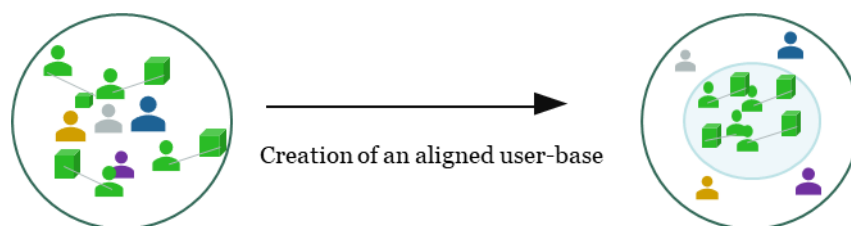


*Figure 28- Second step design*

Looking at HOC's example, there are two powerful leverages: the benefit for their own city, municipality and ecosystem and care for the planet.

Obviously, these two factors will not always be present, but in most of the new business model approaches there is recycling or optimization of idle, underused resources. This probably leads to the circular economy dynamic or the more sustainable business solutions. The takeaway here is sustainability.

As we see today, caring for our planet is getting more and more relevant to each individual or corporate entity. Today, there's a lot of data that confirms this specific trend, but I'll deliberately focus on one.

According to Futerra's new survey, (an international sustainability strategy and creative agency with offices in London, New York and Stockholm) 96% of people feel their own actions, such as donating, recycling or buying ethically, can make a difference. And over half believe that they personally can make a *big* difference.

The fact that over half of the people want to make a difference is, in my opinion, really powerful data. This desire can be the key factor to creating a strong community.

This engagement is the only way to create community feedback loops: the main value behind a platform ecosystem. Today, innovation is no longer restricted to producers, but the user is increasingly able and willing to engage in distributed and collaborative innovation. (Baldwin, et al., 2011) (Osterwlder, et al.,2010)

The creation of a user base that is highly engaged is the key to reach hyper scalability and to bring the other side of the platform on board. By observing one of the three building blocks, the user base, we realize how fundamental the step of the free distribution lever can be. Obviously, the service will not be free, but the goal here is to spread so much of the infrastructure cost that it appears to be almost free. (Bernstein, et al.,2012)

Thanks to this, the value created by the platform can be captured by imposing transaction fees. This way, as analysed within the platform chapter, it's a powerful way of monetizing without hampering the growth of network effects. (Hagiu,2006)

In this step, companies consolidate the hard-to-trade skills (the user base) that are different and increasingly more difficult to copy in comparison to incumbent, hard-to-trade skills (organizational architecture). They will be much more similar to the matchmakers that inspired my research.

Observing HOC's example, it is clear that this desire or common vision alone cannot lead to a prosperous user base. It must be done with enormous marketing and design effort. The user experience has to be extremely relevant and people must be engaging. (Design of scalable business models)

The most powerful tool to create a relevant experience is through gamification, the application of typical elements of game playing (e.g. point scoring, competition with others, rules of play) to other areas of activity, typically as an online marketing technique to encourage engagement with a product or service.
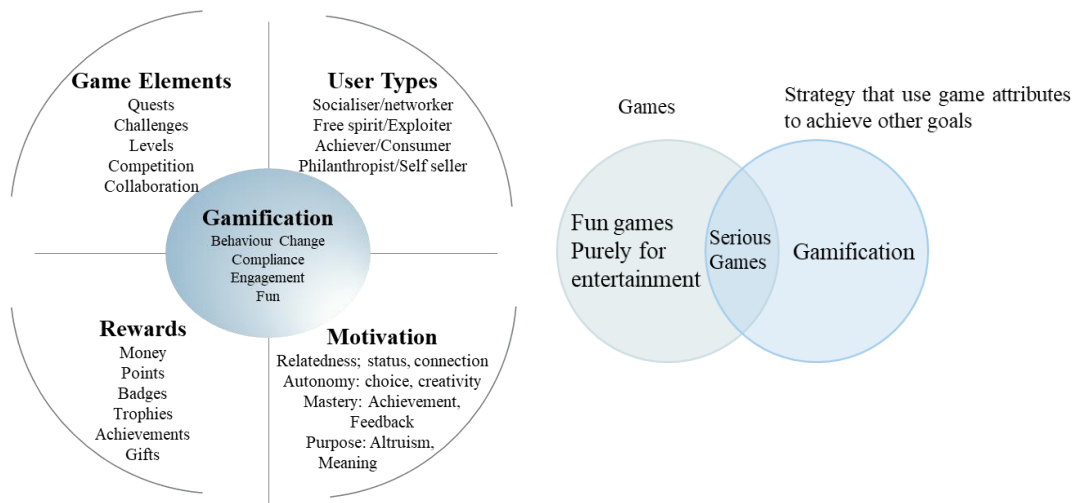


*Figure 29- Gamification meaning*

The graphs above clearly represent the main features and components of gamification and the true meaning of the word.

This approach is certainly a relevant lever to engage people, but every single business could easily identify different strategies to attract and connect people.

The development of a solid and aligned user base will lead to the success of the design strategy.

Until a relevant and cohesive community is built, the third design phase cannot begin.

### 3) Enabling of Idle resources

The third phase represents the business model revolution and the paradigm shift from an asset-based company to a matchmaker. The execution of this phase allows companies to become truly hyper scalable.

We can identify two specific moments: the identification of idle resources (dead capital) and the enabling of those resources thanks to technology.

As we mentioned above, the most relevant building blocks to reach hyper scalability is the presence of dead capital. The identification of ownership inefficiencies is necessary to build a platform with a hyper scalable business model. (Sriram et al.,2014)

To identify these inefficiencies, a service innovation approach must be followed, shifting product companies into service companies. This approach allows for the creation of hyper scalable organizations that focus on leveraging someone else's assets and creating a market for it.

This third phase consists in the clear definition of these assets that will no longer be provided by the company itself, but by the community. This moment is the reason why the user base engagement is so crucial. If members of the community do not become providers of the service, the paradigm shift will not occur.

Here is where the second block of hyper scalability will be built: intangible assets.

Obviously, engagement is not enough. An effective value proposition must be created for that side also. This value is mainly driven by the cross-side network effect that will be generated and by the critical mass reached on the other side. (Kastalli, et al.,2013)

This step leads to hyper scalability since the company will become less and less capital intensive and the fixed structure needed at the beginning to reach the critical mass can be moved to open into a new market.

Looking at HOC's estimation, the asset dependency will be a slow but constant shift until the moment in which all the assets will be provided, shared by the community itself.

Here, a key factor that is almost impossible to generalize is the technology.

Like in the global brain structure, technology is an enabling block. In the scalability chapter, technology has been identified as a first critical factor that leads to hyper scalability. (Goertzel,2002)

The real challenge here is not to be able to develop completely new technology, but to combine or change the meaning of technology that already exists.

This technology identification depends on specific idle resources, but the main takeaway here is the capability to look at technology with a different perspective.

HOC's example is clear: a common smart lock previously used to protect and secure personal property becomes a tool for sharing.

This three-step design process is the main takeaway of my whole research project.

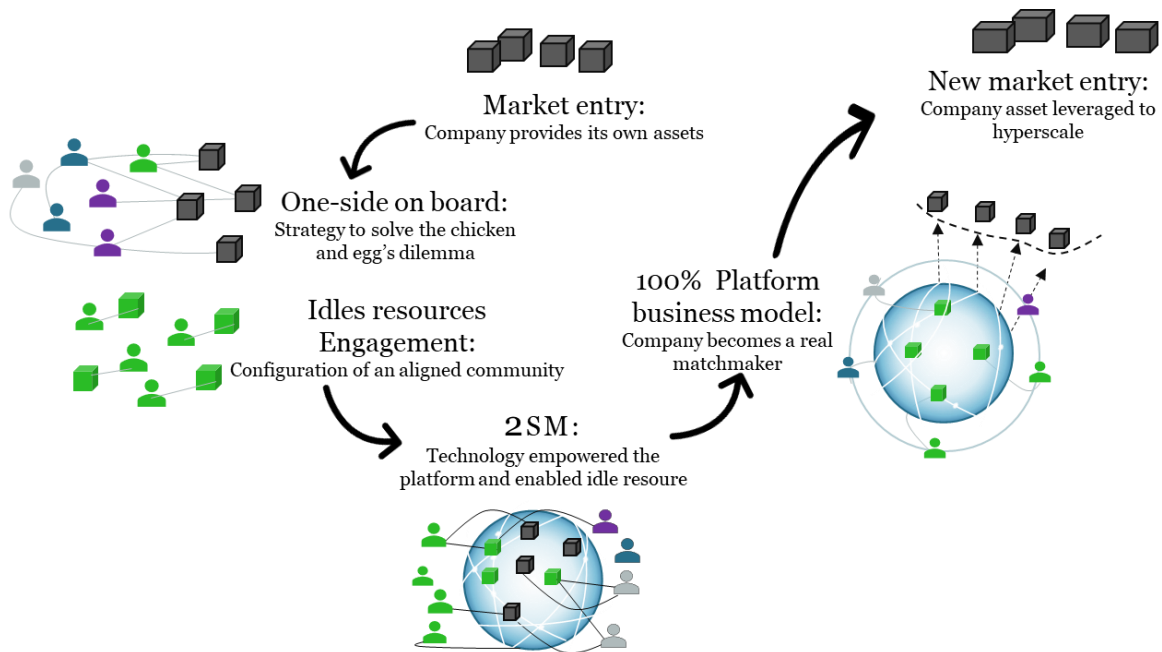Below, a clear and graphic resume of the whole design process is shown.



*Figure 30- Design Model Configuration*

This model underlines how the power of the platform can also be unlocked by asset-based companies that build hyper scalable business models. (Nielsen, et al.,2015)

By observing the start-up lifecycle, we can see how the design process requires different actions during each phase of the framework. To analyse the different moments of the solution, we will adopt the five phases of start-up development.

*The Start-up Phase*: This phase represents the moment in which the company leverages on its own assets in order to create a minimum level of efficiency (the first step of the design process). It's a difficult moment since there are high financial requirements during this phase and it's probably a cash burnout phase where it will not be easy to define the correct cash requirements.

*The Growth Phase:* This phase corresponds to the second and last step of the design process where the company must focus on customer management. This moment focuses on the consolidation of the user base and the shift from company assets to idle community resources.

*The Establishment Phase:* During this phase, the shift will almost be completed. There shouldn't be any company assets but just the utilization of dead capital. The user base is solid and the service starts to be predictable.

*The Expansion Phase:* The company starts shifting its own asset base towards new markets in order to open new markets and restart the process. This phase should be characterized by hyper scalable growth and enlarging the business at an incredible rate.

*The Maturity and Possible Exit Phase:* This moment has not been analysed and developed within my research project.

I truly hope this solution will bring new points of view to both academic and management for platform business models to create more and more hybrid companies.

Obviously, this is still a research project and there are no verified results that clearly confirm all these considerations. Despite that, HOC's project analysis brings quantitative and qualitative data that confirms how a paradigm shift can occur and how this solution is feasible.

# 7. CONCLUSION

The three-step business model design obviously does not have a static configuration. What should be done from now on is monitoring the market and seeing if companies such as HOC are emerging.

To conclude, there are three relevant takeaways for managers brought up by this dissertation. The first one is an interesting solution on how to solve the chicken and egg dilemma.

Here, there has been a relevant perspective change where assets are no longer used like in a traditional pipeline business model but more as a lever to attract one side of a 2SM business model. This is not the only solution to solving the challenge, since each business could succeed with a completely different strategy. The focus here is the capacity to shift the point of view, shifting the traditional business model towards a platform business model. Now, managers should start asking themselves if their customers could become just one side of the platform and how it could be open to the other side.

The second and probably most relevant message that this research project bring towards management people is the core behind hyper scalability: the user base.

A strongly connected user base is a hard-to-trade skill in today's economy; the only and true competitive advantage that gives a business the potentiality to become hyper-scalable. This thesis provides relevant examples of how a strong, connected user base has always been linked to hyper-scalability, from the global brain model to many Airbnb/Uber examples. The user base has always been the key.

This is something that far too often, managers forget. The users, people that share the same vision, are the key to success today more than ever. People do not buy products or services or give their support because of some unique features that no one has on the market. People are looking for the "why". The relevance of the user base can be found within the golden circle approach of starting all business considerations with the purpose. We are living in an era that has practically has no impossible-to-copy competitive advantage, thanks to digitalisation.

If we look at the most successful companies of today, you cannot find a single hard-to-trade skill within their business model. The only real and long-lasting asset is their user base.

The third takeaway of this research is mostly a design approach to spot ownership inefficiencies.

Within this thesis, we frequently analysed how a service innovation approach can be a lever for hyper-scalability. The key words here are: idle resources. Managers should not only be able to identify them but also understand if, thanks to technology, they can be enabled. This capability is something that cannot be easily implemented and there are no tools that allow us to easily spot them. Managers must always analyse the market with dynamism and search for the same pattern expressed within this dissertation.

These three takeaways are not the only concepts that must be remembered since a possible impactful paradigm shift has been identified.

Since today, we've analysed how matchmakers (zero-asset companies) are investing more and more money into assets in order to become a more capital-intensive company. There is the spiral of dead fear at the center of this decision. These tech giants are destroying the value of assets by incentivizing zero-productivity dynamics and less and less investment by competition. An example is the hyper efficient chopping machine that destroys trees at a faster rate than their capability to regenerate.

The most impactful takeaway is the possibility to build hybrid organizations that are not only infrastructure providers and not only matchmakers. These hybrid organizations will leverage the power behind platforms in order to reach hyper-scalability and keep some characteristics of an asset-based company. This configuration could be the solution that moves the paradigm shift in the opposite direction.

This three-step design roadmap, already adopted to develop HOC's business model, will allow asset companies to compete with the companies that were disrupting their market and put an end to the spiral of dead.

We must not forget that despite the data provided, HOC is still a project. The research is based only on a single case and the data collected during HOC's short life. All the considerations done up until now have been done on a single industry (bike-sharing) and represents a picture of a specific moment in time within a specific area (Italy).

For that reason, the results cannot be generalized; managers and academic should keep their eyes on the market looking for companies that are going in the same direction. Probably, it is still early for a paradigm shift of that dimension but I'm confident that this hybrid business model will be the only way for companies to be both successful and sustainable.

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