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Platform Research Review: Integration with Human-
Complemented Platforms and Potential Avenues

Autor

Eduardo Lope Ruiz

Director

Juan Maícas

Máster Universitario en Dirección, Estrategia y Marketing. Facultad de Economía y Empresa

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Abstract

The aim of this dissertation is to perform a profound literature review on platform competition through a systematic analysis of the main tendencies, characteristics and topics that have been addressed historically. In order to do so, the literature review will examine aspects such as the types of platforms, the research interest around them, the main concerns and the key themes addressed throughout the past years. The present study also has the objective of examining the role of the newly proposed concept of “human-complemented platforms” through the example of Twitch, integrating this way the current digital context with the platform competition research themes. Afterwards, the predicted future of platform research is briefly studied, preceding the conclusion of this paper. The theoretical findings point towards the relevance of complementors (and content creators) in the platform ecosystem and, most importantly, towards the need for an efficient platform management that benefits all market participants.

Keywords: Platforms | Twitch | Digital | Complementors | Content creators

Resumen

El objetivo de este trabajo es realizar un profundo recorrido investigador de la literatura sobre las plataformas a través de un análisis sistemático de las principales tendencias, características y temas que han sido abordados históricamente. Para ello, la revisión de la literatura examinará aspectos como los tipos de plataformas, el interés de la investigación en torno a ellas, las principales preocupaciones y los temas clave abordados a lo largo de los años. El presente estudio también tiene el objetivo de examinar el papel del nuevo concepto propuesto de "plataformas complementadas por humanos" a través del ejemplo de Twitch, integrando de esta manera el contexto digital actual con los temas de investigación sobre plataformas. Posteriormente, se estudia brevemente el futuro previsto en el área de investigación de plataformas, previamente a la conclusión de este estudio. Los hallazgos teóricos apuntan hacia la relevancia de los complementadores (y creadores de contenido) en el ecosistema de la plataforma y, lo que es más importante, hacia la necesidad de una gestión eficiente de la plataforma que beneficie a todos los participantes del mercado.

Palabras clave: Plataformas | Twitch | Digital | Complementadores | Creadores de contenido

*“When digital transformation is done right, it’s like a caterpillar turning into a butterfly,
but when done wrong, all you have is a really fast caterpillar.”*

- George Westerman, MIT Sloan Initiative on the Digital Economy

1. Introduction

Platform research has been an interesting area of study for decades now (Katz & Shapiro, 1985; Farrell & Saloner, 1985; McIntyre & Srinivasan, 2017; Cennamo, 2021; Rietveld & Schilling, 2021; Cusumano, 2022). Nevertheless, new and current ways of approaching this topic are needed, in line with the new platform research opportunities that are being created.

Understanding platforms as those firms who govern transactions or interactions between two or more distinct user groups which are linked through an indirect network (Rietveld & Schilling, 2021), the origins of this concept can be traced back to 1985 (Katz & Shapiro, 1985; David, 1985; Farrell & Saloner, 1985). Since then, although called in many ways (platforms, two-sided markets, networks...) due to the scarce concept unification throughout research and the different disciplines that have examined the topic, platforms have been studied along very different industries such as telecommunications (Katz & Shapiro, 1985; Majumdar & Venkataraman, 1998), electronic payments (Kauffman et al., 2000; Akerberg & Gowrisankaran, 2006), video-cassette recorders (Cusumano et al., 1992), computer software and hardware (Brynjolfsson & Kemerer, 1996), air transport (Encaoua et al., 1996) and more recently, social networking (Li & Agarwal, 2017) and videogame consoles (Boudreau & Jeppesen, 2015). However, what is a platform exactly?

The greatest down-to-earth example when trying to explain the concept of platforms can be found in the notion of shopping malls. A shopping mall is a physical area that allows the entrance of other businesses (for example shops, cinemas, restaurants...), thus creating a network in which the positive externalities between customers and the several businesses present in the shopping mall improve (Evans & Schmalensee, 2016). When the area that allows the entrance of other businesses is not physical, but digital, platform businesses such

as Amazon arise. The fact that this subject matter comes from almost four decades ago can be seen as quite surprising considering what it is generally understood by platforms nowadays, as these “innovative, digital and disruptive” ecosystems (Kumaraswamy et al., 2018; De Reuver et al., 2018; Trabucchi & Buganza, 2020) where huge companies such as Google, Uber, Amazon, Airbnb, Sony PlayStation or Alibaba are just some of the most salient examples (Cusumano et al., 2020). Nevertheless, most of the research questions brought up at the time maintain their relevance nowadays.

Currently, most platforms lose money (billions of dollars in some cases¹), but the ones that dominate their markets can become incredibly successful². When performing an analysis, Cusumano, Yoffie and Gawer (2020) correctly identified 43 success stories but also noticed 209 platform companies that failed as a competitor or even disappeared. The main causes identified in this study are: under or over pricing, over subsidizing participants or entering markets too late. This is a reminder that platform companies, although they have a tremendous potential, are no guarantee of long-term success and can result in severe failures (Myspace, Nokia and BlackBerry saw how their wealth easily declined). The need for constant innovation will always be present, as new market factors cannibalizing older ones will always be a threat (some clear examples could be smartphones surpassing regular cellphones or smartphones surpassing PCs).

When comparing the largest 43 publicly listed digital platform companies from 1995 to 2015 with a control sample of 100 non platform companies, both data sets show the same

¹ The ride-sharing platform Uber lost 5.6 billion \$ from investments during the recovery of the pandemic (Browning, 2022).

² Some of the companies that have gained a solid position in the Fortune 500 list are platform businesses: Amazon (2nd), Alphabet (8th), Microsoft (14th), Intel (46th), IBM (49th) or Netflix (115th) (Databahn, 2022).

annual revenues, with platform companies achieving that number with half the employees. Besides this, platform businesses were twice as profitable, growing twice as fast and twice as valuable as the non-platform sample –mainly because they save in employees and assets that are outside the business– (Cusumano et al., 2020).

Regarding complementors (third party platform providers) in platform competition, previous research around them has been quite extensive. Phenomena such as their multi-homing roles in several platforms (Cennamo et al., 2018), the threat platforms may represent for them (Zhu, 2019), the selective promotion of certain complements for creating ecosystem value (Rietveld et al., 2019) or their heterogeneity (Rietveld., 2018) are just some of the topics that have been studied (further development in the next section). Throughout history, the industries studied in the platform competition research have had complementors in the shape of legal entities that produced goods or provided services. For example, the main characteristic from a platform such as Amazon is that it is able to connect businesses from around the globe with its clients (generally humans but also other businesses).

However, with platforms such as Twitch (or YouTube, TikTok...) we face a very different scenario, as their main complementors are humans (and not companies, although many businesses use this type of channels nowadays). These humans, through their livestreams (or videos, posts, depending on the technology) offer the platform and its users a complement as a product/service (whether it provides users with entertainment, interactions, information or even emotions). The most famous ones are nowadays called “influencers” or “content creators”. The research opportunities that arise from the digitalization of platforms, specifically from complementors, are huge. Thus, to study the role of digital human-complemented platforms can be extremely beneficial for the platform research community,

where several types of platforms have been analyzed in research (further development in the next section). Even platforms complemented by “content creators” (Arriagada & Ibáñez, 2020; Mazziotti, 2020; Bhargava, 2021; Rietveld & Schilling, 2021) or “influencers” (O’Meara, 2019; Glatt, 2021; Lin et al., 2022) have been recognized. These concepts play a key role in the newly introduced notion of human-complemented platforms.

Nevertheless, no difference has yet been made in research between non-human and human-complemented ones. This is why focusing on more recent hits such as Twitch (or Tik tok), where influencers or content creators are present, could be very beneficial to the unexplored category of human-complemented platforms. Due to the specific characteristics of the subject of study, it seems logical to integrate Twitch (which will be the main example of the study for simplification and clarity purposes) into the platform research community. By doing this, aspects such as the nature, dynamics and components of human-complemented platforms will finally be aligned with a concept that has been crucial for platform businesses since decades ago. A unification of the theme into the platform competition research is necessary, thus allowing specific topic questions from the past and for the future to be addressed through the eyes of a current digital context where human-complemented platforms stand out.

The aim of this study is to perform a literature review around platform research, analyzing the tendencies, characteristics and the main topics around platforms that have been addressed historically. At the same time, another objective of this paper is to examine the potential role of human-complemented platforms (new platform research concept introduced in this study) mainly through the example of Twitch, thus integrating it with the platform competition research. The following section proceeds with the corresponding literature

review, which will examine aspects such as the types of platforms, the research interest around them, the main concerns and the key themes addressed throughout history. Afterwards, the foreseeable future of platform research is briefly glanced, preceding the conclusion of this paper.

2. Literature review

2.1. Types of platforms

Nowadays, the most valuable brands around the world are platforms by nature. Currently, Apple (brand value of 947\$ billion), Google (819\$ billion), Amazon (705\$ billion), Microsoft (611\$ billion) and Tencent (214\$ billion) are the top five strongest brands in the world, and all of them can be considered as platforms. Other platform businesses such as Facebook (186\$ billion) or Alibaba (169\$) also enter the current top ten ranking (8th and 9th position, respectively) (Guerrieria, 2022).

Regarding the definition of platforms, several takes exist. Initially, Katz & Shapiro (1985) and Farrel & Saloner (1985) acknowledged the existence of “two-sided markets driven by network externalities”. Liebowitz & Margolis (1994) explained that there were “products or services whose value derived from an outside factor that created network effects”. A few years later, Meyer & Lehnerd (1997), based on automobile and electronic industries, used the platform term in order to refer to “an industry where a firm could build families of related products around common complements”. Gawer (2014), when thinking about Android app developers, later added that platforms were in fact “an ecosystem where complementors could join without the formal supplier contracts”. Similar to how the definition of a platform might vary depending on the context, the type of platform can as

well. The distinction that can be made between platforms is usually divided in three types: Innovation platforms, transaction platforms and hybrid platforms (Cusumano et al., 2020).

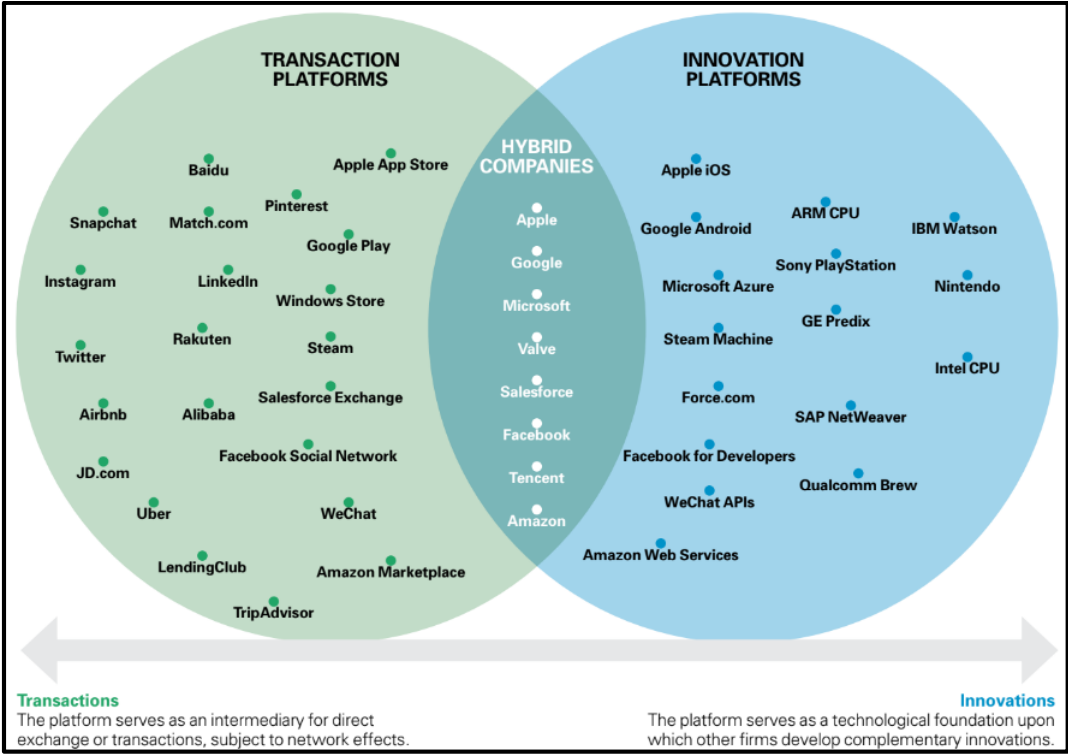
Innovation platforms help with the development of new or complementary products or services (for example, video console or smartphone apps) that are commonly made by third party companies. This is how they function: The higher number of complements and quality of them inside the platform, the higher the attractiveness of the platform for all market players. This first type of companies create and capture value by selling or renting a product or, if the platform is free, by selling advertisement services. Some examples of innovation platforms include Microsoft Windows, Google Android, Amazon Web Services or Apple iOS (Cusumano et al., 2020).

With regards to transaction platforms, they function as intermediaries between participants as if they were marketplaces. Once again, when the number of participants increases, the usefulness of the platform does too. How do they create value? By permitting exchanges that would be unlikely to occur if the platform was not available. And how do they capture that value? Mainly by collecting fees per transaction or charging for advertisement. In brief, they act as a market intermediary. Some great examples of transaction platforms are Uber, Airbnb, Google Search, Facebook or Amazon Marketplace (Cusumano et al., 2020).

Finally, hybrid companies are those that could be classified either as an innovation platform or as a transaction one. They are especially relevant due to the change they caused in the industry, as not so long ago mixing the first two types seemed impossible. Unifying buyers, customers, sellers or advertisers seemed very different from encouraging third party companies into creating complementary innovations. Nowadays, some innovation platforms

have integrated transaction models into their strategy (like for example Apple creating the App Store). The reverse strategic situation can also be perceived, as some transaction companies have launched their own interfaces, encouraging third parties into creating compatible apps or services and realizing that not all innovation should be internal (for example, Google buying Android, Uber allowing other companies to provide additional services to their ride-sharing activity or Airbnb doing the same thing with their room sharing platform). Nowadays, the most valuable companies follow a hybrid strategy (Cusumano et al., 2020). More examples are present in Figure 1.

Figure 1: Basic Platform Types



Source: Cusumano, Gawer & Yoffie (2020)

2.2. Research interest around platforms

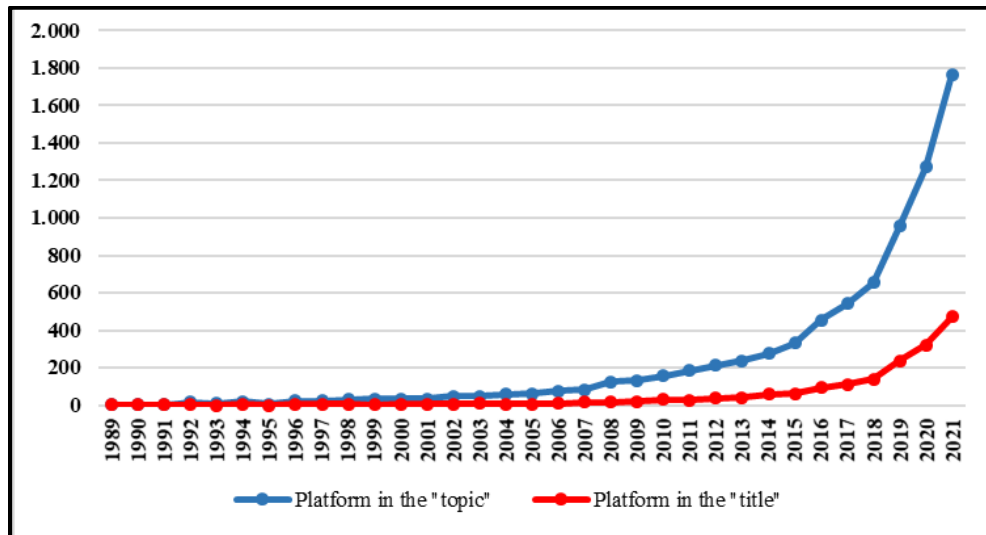
As previously mentioned, industry platforms have become an increasingly popular topic throughout the years, with scholars from numerous fields such as economics (Katz & Shapiro, 1985; Gawer & Henderson, 2007; Hagi, 2009), information systems (Parker & Van Alstyne, 2005; Bakos & Katsamakas, 2008; Huang et al., 2013), management and organization (Shankar & Bayus, 2003; Boudreau, 2012; Cennamo & Santalo, 2013), marketing (Gupta et al., 1999; Nair et al., 2004; Srinivasan et al., 2004) or innovation (Wu & Hisa, 2004; Yang & Han, 2021; Wang et al., 2022) that have long contributed to this growing area of research.

In fact, the growth it has accomplished is astonishing. In this study, an analysis has been performed inspired by the search of platform paper publication growth from 1989 to 2018 performed by Jia, Cusumano and Chen (2019), where they used Web of Science Core Collection as the search engine, using the Social Sciences Citation Index (SSCI). The search used “platform” as a keyword in three fields (economics, business and management). Taking the authors search as a reference, their data has been updated, obtaining the same figures as them and new ones for the most recent three years.

As it can be seen in Figure 2, the number of papers per year with the word “platform” in the topic was around 1760 in 2021 (vs 184 in 2011), which shows the recent and massive growth the topic has had in the last decade. When looking at papers per year with the word “platform” in its title, there were around 471 in 2021 (vs 28 in 2011), thus picturing the same situation. Regarding the times the word “platform” appears in the topic, four different slopes can be perceived in Figure 2. The first one goes from 1989 to 2007, showing a low-paced growth. Then, from 2008 to 2015, the slope inclination goes significantly upwards, but still

shows a moderate growth. From 2015 to 2018, the inclination of the slope grows even more, showing a clear diagonal position, meaning that the growth during those years started to be substantial. From 2018 on, the slope is closer to a vertical position than to a horizontal one, which proves that the importance of the topic during the last years has significantly boosted. This is a perfect reflection of the growing interest in the platform research, an area with a solid past but also a promising future.

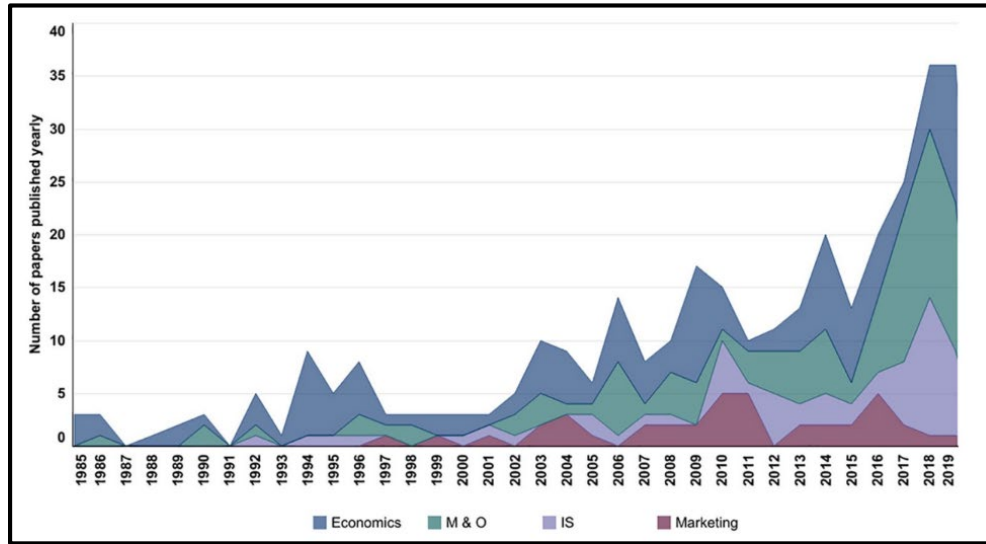
Figure 2: Growth of Published Paper Count per Publication Year (1989-2021)



Source: Own elaboration. Database: Web of Science

In another analysis performed by Rietveld and Schilling (2021) based on a sample of 333 articles, it is stated that platform competition has grown exponentially since the first platform papers back in 1985 (Katz & Shapiro, 1985; David, 1985; Farrell & Saloner, 1985). Since that time, the most prominent fields have been Economics, Management and Organization, and then, in a much further position, Information Systems and Marketing, in that order. This can be perceived in Figure 3.

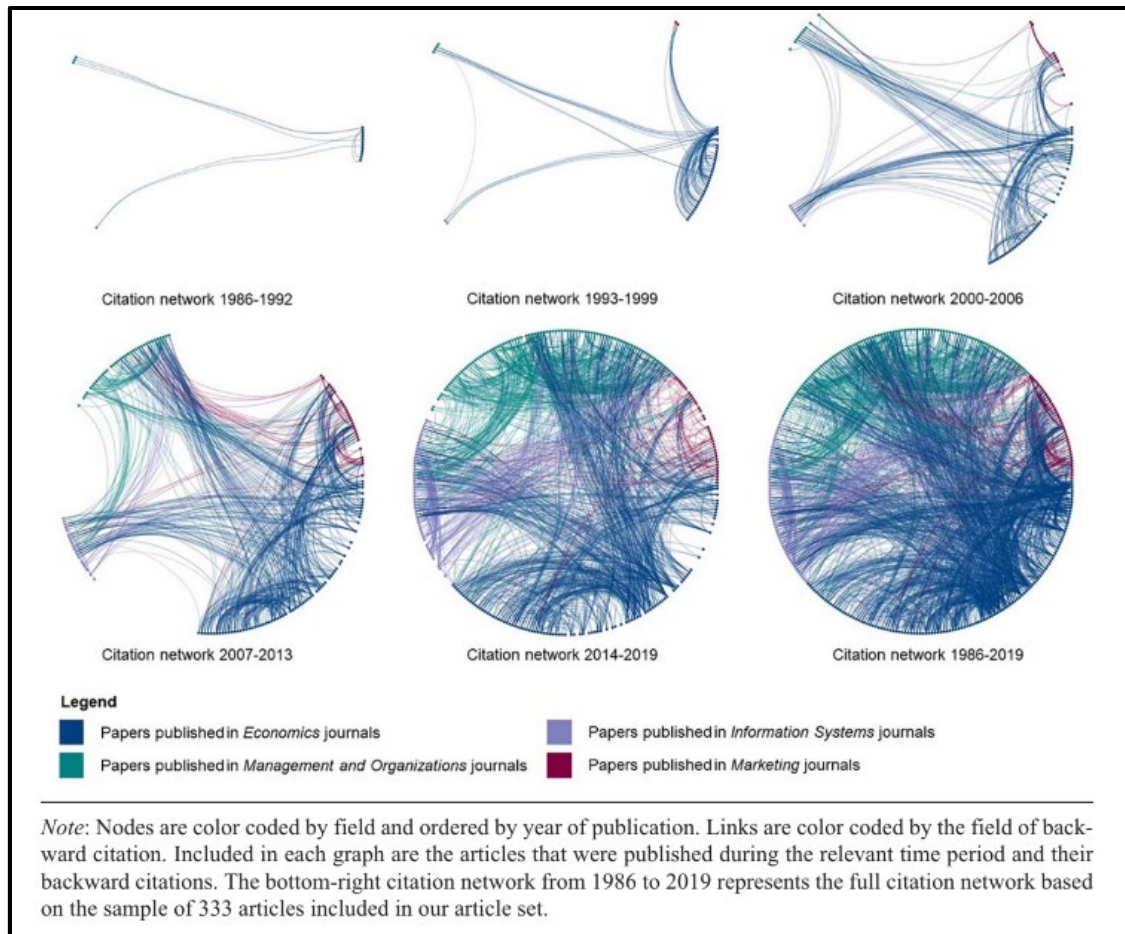
Figure 3: Number of Sample Articles on Platform Research, by Year and Field



Source: Rietveld and Schilling (2021)

Until the end of the 2000s, articles outside the area of economics mostly cited studies from economics. From articles in Management and Organization from 2000 to 2006, around 80% of the total backward citations belonged to the field of economics. In the same time frame, information systems articles reached the same percentage while Marketing ones got a 53%. As time went by, all fields started to become more inward-looking. From 2014 to 2019, economics gathered around 42% of all backward citations. Nevertheless, backward citations from articles in the same field done by studies in information systems, management and organizations, and marketing reached, respectively, 37%, 50% and 34%. These numbers show that, regarding platform research, scholars are constantly increasing the likelihood of citing studies from their own areas. For a total citation network representation, see Figure 4.

Figure 4: Citation Networks per Time Period, Color Coded by Field of Backward Citation



Source: Rietveld and Schilling (2021)

The type of study performed has also been analyzed by the two abovementioned authors, where it can be seen in Table 1 that theoretical modelling is the most used method in general and for Economics and Information Systems, whereas conceptual modelling is the preferred one for Management and Organization, with model and estimation being the favorite for the Marketing community. Nevertheless, the information systems discipline and the Management and Organization one also use empirical estimations. Regarding the marketing discipline, the second most used type of study is the model an estimation one.

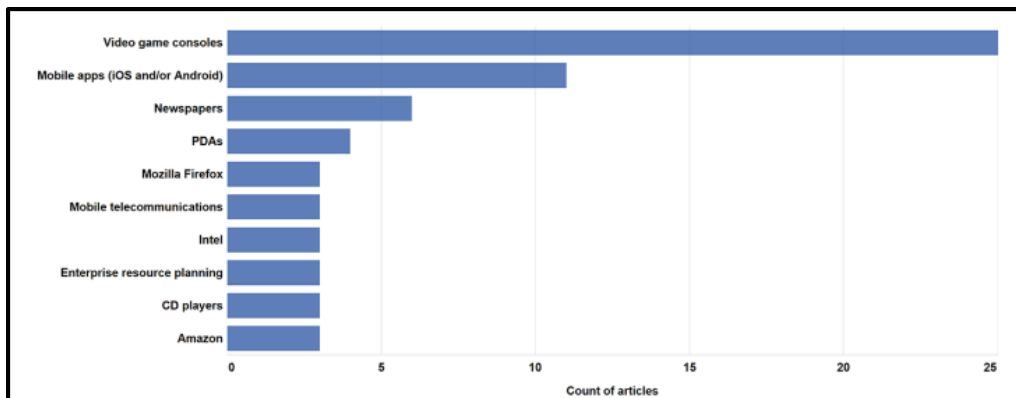
Table 1: Distribution of Methods Within Field (in percentages)

Field	Model	Empirical Estimation	Conceptual	Model and Estimation	Longitudinal Case Study	Multiple Case Study
Economics	69.47	9.92	6.87	11.45	2.29	
IS	42.37	37.29	6.78	3.39	5.08	5.08
M&O	10.58	31.73	42.31	1.92	5.77	7.69
Marketing	25.00	45.00	2.50	27.50		

Source: Rietveld and Schilling (2021)

Regarding the explored themes, the same authors performed another key analysis of the most common ones, where it can be seen in Figure 5 that the empirical setting of videogame consoles has been the most studied one, followed far away by mobile apps and newspapers. Their followers are personal digital assistants, browsers, mobile telecommunications, CD players and companies such as Intel or Amazon.

Figure 5: Top 10 Most Studied Empirical Settings in Platform Competition Research



Source: Rietveld and Schilling (2021)

2.3. Main concerns

The origins of the platform concept go back to the 80s, when many economists began writing about the phenomenon of two-sided markets and its implications. They also acknowledged the fact that these markets were driven by “network externalities” (Katz & Shapiro, 1985,1986; Farrel & Saloner, 1986). The idea can even be traced back even further, specifically in the context of communication services, where Rohlfs explained that utility increased when more people joined the system (Rohlfs, 1974; Schmalensee, 2011). These externalities led to scholars using the term “network effects” when referring to positive feedback inter-relations or loops. These increased returns would be experienced by users when the externality is found. Some authors even differentiated between network effects or externalities, with the latter not being necessarily beneficial. (Liebowitz & Margolis, 1994, 1998).

After economists, management researchers adopted the topic of multi-sided markets and network externalities at the start of the 1990s and slowly began to refer to the main technologies or products as “platforms” (Cusumano, 2010). This term was set based on the notion of “product platforms”, which referred to a concept used in the automobile and consumer electronic industries. There, a firm could create families of similar products around related components (Meyer & Lehnerd, 1997). Nevertheless, a key feature of industry platforms is the creation of “cross-side” or “indirect” effects, such as the ones between users and companies that act as a third party complementor. The opposite would be “same-side” or “direct” network effects, such as the ones between two users via social media or a messaging platform. The second crucial feature of platforms would be linked to the fact that complementors, when providing complements to an industry platform, are joining a certain

“ecosystem” (For example, by building applications for a PC or a smartphone without the usual supplier contracts) (Gawer, 2014; Gawer & Cusumano, 2014).

An ongoing problem in the platform research field has always been the concept unification. For example, since it was first used, researchers use the word “platform” differently. Gawer & Cusumano (2002), defined platform as a “system-like product or technology that increases in value with external complementary innovations”. This definition applies when complementary software applications are introduced into operating systems or internet browsers. During the last two decades, researchers and the media have both amplified the use of the term to refer to online marketplaces (Alibaba, Amazon, eBay), internet applications (Google search), social media (Facebook) or sharing economy services (Uber and Airbnb) (Cusumano, 2020). Knowing the wide range it has, why do they refer to all these different type of businesses as platforms? The definition proposed by Eisenmann, Parker & Van Alstyne (2006) could be a good answer to the previous question, as they stated that “products and services that put together groups of users in two-sided or indirect networks” are platforms. Although this definition might be missing the concept of network effects, it serves a simple reflection of these distinctive businesses called platforms, in which the bigger one side of the system, the more beneficial for the other sides.

A second problem regarding platforms has been linked to their classification, as scholars found it difficult to agree on how many different types of platforms exist. There are “invisible” software platforms such as operating systems (Evans et al., 2006) or even online marketplaces (Evans & Schmalensee, 2016), which are very different. There are also “intermediaries” that align together data, labor, machines or market actors (Parker et al., 2016). Some scholars have stated that platforms simply are “interfaces” that put together two

or more market players (McIntyre & Srinivasan, 2017). Platforms have also been categorized depending on their type of value creation (such as co-creation with partners from that ecosystem) (Fehrer et al., 2018) or according to their level of “openness” to third parties (the opposite situation would be the control by the platform owner) (Eisenmann et al., 2009; Boudreau, 2010). There are even authors that argue that six kinds of marketplaces can be found. These are: efficient product transaction platforms (for example, Beepi), digital product community platforms (Sellfy), product “aficionados” platforms (HobbyDB), on demand offline services platforms (StyleSeat), online services platforms (iTalki) and peer to peer offline services platforms (Airbnb) (Täuscher & Laudien, 2018). Nevertheless, one of the most common categorizations, proposed by Cusumano, Gawer & Yoffie (2019), has been made between innovation, transaction or hybrid platforms, already mentioned earlier in this paper. Another problem that has emerged during the years, the third one, relates to the scarcity of large sample analysis between platform businesses and non-platform businesses. This situation was also approached by the latter authors, as it can be perceived in the brief comparative analysis explained during the introduction of this paper.

Regarding the conversation on how to effectively manage performance, for a platform to have financial or market share success, several aspects come to play. For example, the network effects must be sufficiently strong in order to maintain all platform players interacting properly (Eisenmann et al., 2006). Second, it is not advisable that the market is too fragmented with specific niche competitors. Third, both users and third party complementors are recommended to stay within one platform (the contrary situation would

be using several platforms for similar purposes, which is called “multihoming”³). Finally, and similarly to any industry, the entry barriers associated with a specific platform business should be high (this way, the intensity of competition will be limited) (Parker et al., 2016; Cusumano et al., 2019).

Decisions made by entrepreneurs regarding platform strategy are also key regarding their influence on whether or not they succeed, and several examples reflect this situation. Steve Jobs did not give as much importance to third party complementors as Bill Gates did, with the former charging outside creators and the latter creating a free software development kit for third party companies to be compatible and join the platform network. Besides that, the scarcity of applications (plus no licensees and a high price) in the Apple Macintosh (born in 1984) is one of the reasons why Apple lost to Windows computers (1990) in market share (Cusumano, 2010; Yoffie & Cusumano, 2015). For Facebook, creator Mark Zuckerberg saw in advance that, in order to generate a social network around a large number of users, he first needed to establish a free access for users (first market player). Once the user installed base (quantity of users in the platform) was sufficient, he started charging advertisers (second market player) in order to appear on the platform. Finally, he allowed application developers (third market player) and content partners (fourth market player) to enter the platform freely. As a final example, Google released for free the Android smartphone operating system to smartphone makers (first market player) and the software development kit system for application developers (second market player), but charged a price to advertisers.

³ One example of “multihoming” could be when a user owns both Netflix and HBO to see movies/shows. For a Twitch user, it could be said that he “multihomes” if he, for example, also watches livestreamings in Youtube. In shopping platforms, it could occur when businesses (third party complementors) offer their products both in Amazon and Aliexpress.

2.4. Platform research themes and connection with human-complemented platforms

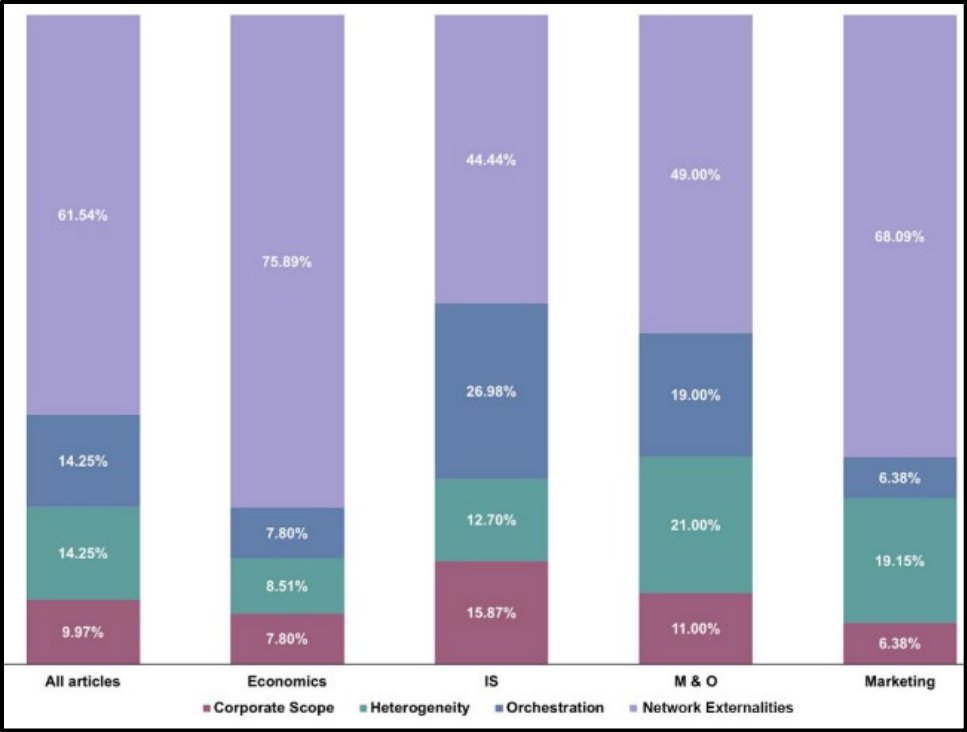
Rietveld & Schilling (2021), in their article “Platform Competition: A Systematic and Interdisciplinary Review of the Literature” perform a very complete overview around the history of this concept. No matter the discipline (management, organizations, information systems, economics or marketing), scholars have analyzed several aspects of platform competition. Some of them have examined the causes of network effects (Katz & Shapiro, 1985, 1986; Brynjolfsson & Kemerer, 1996), while others have focused on pricing strategies for these multi sided platforms (Rochet & Tirole, 2003; Hagiu, 2006; Roger & Vasconcelos, 2014; Cachon et al., 2017). Other themes include the effective governance of these platforms (Wareham et al., 2014; Gorwa, 2019), platform openness (Benlian et al., 2015; Parker & Van Alstyne, 2018), competing with complementors through vertical integration (Gawer & Henderson, 2007; Zhu, 2019) or the process of creating and maintaining value in the ecosystem (Ceccagnoli et al., 2012; Hein et al., 2020).

These are just a few of the many aspects about platform research that could be integrated into the world of human-complemented platforms such as Twitch. One of the main advantages of the abovementioned article is that it identifies four main themes of research throughout the existence of the platform competition topic, which are (1) how network externalities create “winner takes all” markets and its consequences on the structure of the specific market, coordination, and classic platform strategies such as price, quality, bundling or licensing; (2) corporate level strategy or how platform competition may lead to vertical integration or related diversification (when and how should a platform create its own complements and start to compete with its complementors?); (3) effects of heterogeneity on

key players such as the platform, complementors, and end users (meaning that, for example, the nature, characteristics or quality of a product can sometimes be more important than the installed base) and (4) platform governance, understood as the capacity to create and maintain value in a certain ecosystem, especially without damaging the rest of key players. With the objective of illustrating clearly the integration of human-complemented platforms with these four themes, Twitch will be used as the main example in their theory development.

Using the same sample of 333 platform articles, Rietveld & Schilling divided the four main themes around platform competition according to the four fields of study mentioned earlier in this paper. As it can be seen in Figure 6, regarding all articles, the most explored theme has been the one of network externalities (61.54%), followed by orchestration (14.25%), heterogeneity (14.25%) and corporate scope (9.97%). In the field of economics, when comparing it with all articles, the percentage of the first theme expands to 75.89%, having the figure from rest of themes reduced. For information systems, we see a comparative decrease in the study of network externalities (to 44.44%) but a significant increase in the theme of orchestration (to 26.98%). Regarding the management and organization discipline, the decrease in network externalities is also visible (to 49%), but an increase can be found in the rest of themes, with the heterogeneity one reaching its highest figure for all disciplines (21%). Finally, the marketing area of research has mainly focused once again on the most common theme (68%), with heterogeneity being the second most explored one (19%).

Figure 6: Distribution of Themes in Platform Competition Research, by Field



Source: Rietveld and Schilling (2021)

The article finally offers another profound analysis based on the future research questions around platform competition. Thus, it would be extremely beneficial to analyze the role of platforms such as Twitch in the platform competition community by examining the most important factors and questions from each of the four main themes in the history of the concept’s research (specially from the view of the platform’s human complementors). Furthermore, a similar exploration that aligns together Twitch and the proposed questions for the future research of the general topic and the main themes is also needed. By doing this, the sought deeper understanding of the key players and the dynamics human-complemented platforms such as Twitch have to offer to the platform community will be achieved.

Why Twitch?

In the digital era that is currently taking place, the emergence of new key factors or key players acts as a constant. Whether it is a new company, a product, a service, a person, a meme, a phrase or a movie, the rise of new phenomena or unexpected trends is a recurrent situation in everyone's life. In a similar way to what YouTube did more than a decade ago, one of the most recent hits (although it has been around since 2011) is the emergence of Twitch, the digital livestreaming platform owned by Amazon since 2014. This platform offers users the ability to broadcast, chat, and watch videos in real time. Even though the uses it offers are wider, it has developed a special popularity amongst gamers, for whom the platform was in January 2021 a market leader, hosting 91% of all videogame livestreaming (Agnihotri & Bhattacharya, 2022).

Regarding extant research around a human-complemented platform such as Twitch, information is still scarce, but some researchers from different disciplines have managed to analyze several interesting factors. For instance, some scholars have analyzed the nature of the platform itself, exploring aspects around the general ecosystem such as the role that users may have either as broadcaster or as viewer, the main games that are being played and broadcasted, the common features about those games (release dates, genres...), tournaments played or the relationship between channels and viewers (Deng et al., 2015). Other articles (although few) have actually analyzed deeper dynamics that the Twitch platform offers. One example is the study of the function of Twitch Bits, a first-party donation management service introduced in 2016. This is initially done by examining the platform as a sociotechnical architecture and a political economy and secondly, by debating how the first-party donation tool Twitch Bits has eventually, little by little, challenged the dominance of

the third-party tools that preceded it, thus theorizing the notion of platform capture (Partin, 2020). This lies close to the concept of “freemium”, referring to a business model, mostly common on the internet, where basic services are provided free of charge while more advanced features must be paid for (Niemand et al., 2019). Twitch is undoubtedly a freemium model, as it also offers, for example, the possibility of channel subscriptions or donations to streamers, which may allow the user to achieve certain benefits that unsubscribed users could never have.

Other scholars have more specifically focused on the relationship between the platform and the user by analyzing it through five dimensions: Sociality (community or individual use), audience (specific or general), moderation (strictly moderated or laissez-faire), content (user-generated or commercial) and scope (specialized or multi-feature) (Ask et al., 2019). A similar relation has been studied between the channels (or broadcasters) and the viewers, where marketing scholars have identified streamers attributes (friendship, interaction, and streamer skills) in order to understand the effects or influence they have on aspects such as consumer flow experience, psychological well-being, commitment, and loyalty toward their favorite streamer (Zhao et al., 2019; Kim & Kim, 2022). Even the pandemic had an effect on already digitalized environments as Twitch, which has already been analyzed in the computers discipline (Chae & Lee, 2022). Further aspects such as toxic behaviors on the platform or cross cultural comparisons have also been approached (Oh et al., 2020; Kim et al., 2022). Some studies even seem to question the existence of the platform or, at least, try to understand certain motivations, such as the ones users have in order to watch other people play videogames (Sjöblom & Hamari, 2017; Taylor, 2018; Hilvert-Bruce et al., 2018).

Thus, to integrate the role of a digital area such as the Twitch platform with the main four platform themes can be extremely beneficial to the newly proposed concept of human-complemented platforms. In this way, a recent cultural hit such as the Amazon livestreaming service can be examined as one of the most updated and disruptive examples of these type of platforms, which mainly connect humans with other humans in the current digital world.

2.4.1. Implications of network externalities

For network externalities, aspects such as the appearance of “tip-ping” or “lock-in” phenomena are basic to understand the nature of platforms (Katz & Shapiro, 1985, 1986; Farrell & Saloner, 1985; Arthur, 1989). One of the basic antecedents of these increasing return to adoption effects are the influences of learning curves (the quality or efficiency of production increases as the number of produced units increases) and network externalities themselves, which amongst other examples refer to the fact that users derive a higher value in a platform when more users are present in that platform.

In the case of human-complemented platforms such as Twitch, whether we are talking about viewers or live streamers, the antecedent holds. For example, a streamer will probably benefit from a higher number of viewers, as this could mean an increase in aspects such as subscriptions, donations, followers, popularity or interactions. This could even transcend into, for example, their social media accounts, where they could also gain that kind of recognition. Eventually, a higher number of viewers could benefit the live streamer in many aspects, both professionally and personally. In the case of viewers, they could surely benefit from a higher number of streamers available, as it would allow them to have a wider offer from where to pick. For example, the entertainment platform Netflix mainly attracts users due to its great variety of movies/shows (Lope, 2021). This would eventually bring more

users to the platform and hence, more live streamers willing to obtain the benefits the first ones provide. At the same time, advertisers may also benefit from a higher number of live streamers and will most certainly do so from a bigger number of viewers. With more live streamers available, businesses could have a wider range of options when deciding on which complementors (livestreamers/content creators in this case) to place their advertisements, which means a higher number of channels through which they can connect with the users. Regarding the latter, a higher number of them would mean for advertisers a larger advertisement reach, which could potentially turn into financial benefits (purchases) and non-financial ones (image or recognition). Without advertisers, a platform would find it difficult to survive financially, which would negatively affect both users and complementors. Thus, as it can be perceived, all actors of the market, including the platform business itself, benefit when any of the other sides grow.

In markets where network compatibility is crucial (phone networks, trains, computer operating systems) or in which the existence of complementary goods (or complementors) influences a product's value (series/movies on a streaming service distributed by studios, smartphone apps made by game developers), the network externalities of a product are extremely valuable (Katz & Shapiro, 1985; Choi, 1994). In the case of Twitch, network compatibility is needed in order to assure the correct attachment of complementary goods. In this situation, the main complementors are humans, as they are live streamers. Thus, despite that condition, it will be necessary to analyze their role as complementors in a platform based environment such as Twitch.

One of the first conclusions of this first theme is that the best technology does not always win. For example, an inferior technology adopted earlier can lead the market rather

than a superior technology introduced later (and even become eventually the superior one) (Katz & Shapiro, 1985, 1986; Arthur, 1989). One famous example that acts as a reflection of this situation is the QWERTY keyboard, which is the most used design in the world for keyboards despite the fact that some other keyboard designs are, in theory, more efficient (the Dvorak simplified keyboard, for example). This is especially relevant in reflecting that, in some cases, growing a strong installed base (number of active users in the platform) can be the key to the success of a certain business over its competitors, even if the technology of the latter is better. In the duel between YouTube and Twitch for livestreaming, who was the superior technology at the beginning? How has the situation evolved? What is the current picture? These questions are key to understand the emergence of Twitch and to foresee its future (and the one from its competitors).

In addition, when a big part of the worth of a technology arises from network externalities such as the installed base or the number of complementors, a recent technology will find it difficult to displace the old one even when the new technology's advantages over the old technology are loud and clear (Schilling, 1998; Suarez, 2004). Twitch has managed to outrun YouTube since some years ago in the area of livestreaming and most streamers do not use the Google service anymore. Not surprisingly, Twitch is now both the superior technology and the one that takes the most advantages from network externalities regarding livestreaming. What did Twitch offer at the beginning that YouTube did not? Is installed base more important than technological quality? Is Twitch in a "winner-take-all" situation? Is YouTube doing anything to mitigate these aspects? Will the Google company be able to offer something that Twitch does not?

For a platform, if the value created by the complementary products offered is significant, the platform's incentive to adopt a compatible interface for all third party complementors is extremely high (Matutes & Regibeau, 1988; Schilling, 1998). So, by incentivizing complementors into creating complements, consumers find a wider range of complementors to benefit from, while both the platform and the providers obtain specialization benefits (as they will be able to focus only in that part in which they are experts) (Schilling, 1998, 2000). The opposite situation would occur when a platform integrates vertically, which will be mentioned in the following section.

The concept of signaling is also very important, as it can allow a company to attract more complementors (or streamers), claiming that they have the biggest installed base, which may sometimes lead to illicit tactics such as, for example, false claims about the number of users or the market share (Dranove & Gandal, 2003; Schilling, 2003). In addition, how does Twitch manage its relationship with its complementors? How does the platform engage streamers into creating content? All the debate around network externalities led scholars to the investigation of certain strategies related to aspects such as pricing (Bensaid & Lesne, 1996; Hagi, 2006) or technology improvement (Choi, 1994; Economides, 1996). How does Twitch manage the pricing on channel subscriptions? And in donations to streamers? Do the dynamics related to these features vary with the type of streamer, content, hour of the day, day of the week, country...? What are or will be the main technology improvements of the platform? Twitch externalities offers a wide range of research possibilities that should not be ignored.

As mentioned during this section, a platform might use certain tactics in order to grow its installed base. For example, they might set extremely low prices even below cost with the

purpose of growing rapidly an installed base and recovering the losses soon after through other revenue sources (Cabral et al., 1999). The strategy regarding intellectual property can be also shaped by installed base, as a platform might, for example, freely license their technological knowledge in order to improve the availability of third party complementors and then, the installed base (Karhu et al., 2018). Tesla, for example, stated that they would not initiate any lawsuits against third party businesses that did not respect a Tesla patent related to electric car technology.

To sum up how network externalities work, there are two perfect examples, In the case of newspapers, there are readers and advertisers, both who cannot derive any value if the other one is missing. Advertisers need users in order to obtain value and users without advertisers would pay a much higher “platform” price (Seamans & Zhu, 2017). In the second example, video console producers usually charge low prices for the console in order to achieve a high installed base of users. This is how they attract videogame producers, which are then properly charged (Liu, 2010). In the case of human-complemented platforms such as Twitch (or TikTok, YouTube), understanding the relationship between the platform, content creators and advertisers and the network externalities that derive between them is key when integrating it with the platform research.

2.4.2. Corporate scope and platform ecosystem

The next era of research around platform competition, instead of studying the strategies used to attract users and complementors, mainly focused on investigating the changes in the nature of the own firm. The existence of the “platform ecosystem” concept was originated in the computers market, where many companies contribute with their specialization, due to the very high number of pieces needed for one single final product (Jacobides & Tae, 2015).

One of the most important factors regarding the corporate scope of a platform is the decision to produce certain components in-house and to obtain the rest from others (Jacobides et al., 2006; Young Kang & Suarez, 2022). In the case of Twitch, it seems quite difficult to integrate this perspective with the platform due to the impossibility of own-producing a human person. Nevertheless, the platform can make exclusivity agreements with certain streamers that secure their presence only in that platform, which is the closest it can get to in-house production in this case. Maybe in the future Twitch can develop environments such as an academy or club where streamers can join, further developing the exclusivity contracts and the in-house “production” of complements.

Sometimes, the decision to integrate vertically is made in order to prevent the growth of other competitors. For example, Microsoft (software company), sensed a possible threat when they realized that their compatible third party application, Netscape (browser), could perform many of the functions that Microsoft had (for example, accessing files). This is what caused Microsoft to launch Internet Explorer, given for free to all Microsoft buyers. The strategy meant the end of Netscape, as they could not counterattack (giving the product for free was not an option as they did not have extra revenue sources, contrary to Microsoft) (Windrum, 2004). When one platform “absorbs” another platform by mixing the other platform’s technology with their own, it is called “envelopment” (Eisenmann et al., 2011). Some companies (depending on the business context, environment and motives), such as Intel, have put a special emphasis in assuring third party complementors that they would not be “eaten” in case they entered the market (Gawer & Henderson, 2007).

The chicken or egg problem (Caillaud & Jullien, 2003; Rochet & Tirole, 2003) is another concept extremely linked to platform competition research. Here, managers need to

decide which market actor is more crucial to attract the other sides. This first side, commonly known as the “trigger” one, has to be free or quite easy to access. When usage of that same side starts to grow due to the easy access options, the other sides will start to expand if the utility is positive (positive network effect). For example, video game consoles must be launched with a varied set of great quality games available. Otherwise, they will probably not be bought (Rietveld & Lampel, 2014) Nevertheless, the real problem in these cases is to correctly identify the most important market side and produce positive network effects practically out of nowhere, which is not easy at all. This is when the “chicken or egg” problem arises (Caillaud & Jullien, 2003; Evans et al., 2006).

One of the proposed solutions for this problem is to concentrate a high value in one market side and then get other businesses to support the product/service/technology that can serve as a solution to a wider industry problem. For example, Google did it with the internet search toolbar. Gawer & Cusumano (2008) defined this strategy as “coring”, which is very usual once a platform emerges. However, a negative situation can occur when the platform sees itself in the situation to subsidize several market sides (for example, Uber had to do it when paying extra to drivers separate from their normal riding fees and keeping ride rates for users lower than the ones set by taxis), as in this case the platform would probably lose money (if a platform such as this grows, it can even mean higher losses). This occurs especially in the sharing economy platforms. For example, sharing rides, delivering food, walking pets or cleaning houses are not, outside of platforms, profitable businesses in the normal economy. Besides this, they are not digital businesses, as they have physical features that can be expensive to deliver and, in most cases, local. This is why an emerging platform (or anyone

for that matter) needs to use the digital technology in order to create scope and new scale economies to their activities and to all parties involved in the platform (Cusumano, 2019).

As in the case of video consoles, a platform such as Twitch must have a wide range of complements available in order to be attractive enough for users to use it. Each streamer arriving to the platform has meant an increase in the installed base of it, so it will be interesting to analyze the advantages that Twitch offered and currently offers in order for streamers to arrive and stay at the platform. What characteristics does Twitch value beyond the number of users when securing an agreement with a streamer? Due to the abovementioned impossibility (or improbability) of vertical integration, the Twitch platform should carefully manage its relationship with streamers, studying deeply with which ones they may benefit from a stronger link and with which ones they might not. Although horizontal mergers are another possibility in platform competition, especially for non-market leaders, (Chandra & Collard-Wexler, 2009; Jeziorski, 2014), Twitch, as a sector leader, does not seem to be close to one.

The corporate scope of a platform is a very interesting research area due to the several decisions that can be made within it. When should Twitch seek for agreements with third party complementors (streamers in this case)? When should they push away agreements? What incentives do streamers have? How is their performance measured? How should they be rewarded? These are just a few of the questions arising from the integration of Twitch into the corporate area of platform competition.

2.4.3. Platform, user and complement heterogeneity

Due to the appointed benefits given to network externalities and installed base during early research, a new wave started to analyze more heterogeneous concepts. Although platform

quality had been long considered as an important feature (Bental & Spiegel, 1995; Zhu & Iansiti, 2007; Hagi, 2009), new studies were needed in order to expand the knowledge on the heterogeneity of platforms, complements and users (Cottrell & Nault, 2004; Hagi, 2009). What are the unique features about Twitch that have led them where they are now? How do its complementors differ? What are the main topics approached by them? And its users? How can the quality of a content creator be measured? How is their interaction with users measured? Questions like these arise from the integration of Twitch (or similar human-complemented platforms such as TikTok) into the quality and heterogeneity debate.

Although installed base is quite significant for a platform, the heterogeneity of its features may act as their strongest advantage in some cases, as it might offer some options for certain users that competitors do not provide, thus offering a better product for a specific segment of the market. For example, Google Docs has managed to achieve a considerable installed base due to their offer of online editing, contrary to the most used one, Microsoft Word. Moreover, MacOs computers succeeded in publishing and educative markets while Windows products did it for the mass market. As it can be perceived from these examples, differentiation is another key to understand platform competition. Competitive dynamics between platforms have also been analyzed under this topic, especially the ones between platforms who follow different business strategies (Chen et al., 2016). How does Twitch differ from YouTube in terms of strategy? Does it follow one similar to other platform businesses? What are the main strategic characteristics that define the Twitch livestreaming platform? Platforms themselves are extremely interesting when analyzing business strategies.

Nevertheless, research has also gathered a lot of attention on the attributes and strategies of complementors. For example, many scholars have analyzed how “mainstream”

or “superstar” complements play a tremendous role in technology adoption (Binken & Stremersch, 2009; Hogendorn & Ka Yat Yuen, 2009). Due to the aforementioned human component of the streamers from Twitch, what defines the “superstar” complementors and how to measure their success? How do they influence viewers into using the platform? Other research has focused on the quality of complementors and its importance in technology adoption (Kim et al., 2014), so it would be interesting to analyze what defines the quality of human complementors (Twitch, Youtube, TikTok) and how to measure it.

The concept of “multihoming” is also very common for platform competition research, as some researchers have studied whether a complementor will decide to specialize in a platform or to multihome by doing it in several (Streamers can do it, for example, both in Twitch and YouTube) and how this can affect the complementors performance (Kapoor & Agarwal, 2017; Cennamo et al., 2018; Chen et al., 2022). For example, can the performance of a Twitch streamer be worsened if he does livestreamings both in Twitch and Youtube? Here, exclusivity agreements might play a crucial role.

Finally, heterogeneity among users has focused, for example, in “core users”, which refer to those great enthusiasts who are different to “usual users” in terms of preferences and thus, should be treated differently from a strategic point of view (Steiner et al., 2016). Furthermore, early users of a platform will tend to use a larger number of complements, and more novel complements, than new adopters of the platform. Several strategic key decisions for complementors that enter a platform at distinct stages of its life cycle arise from this situation. Moreover, it has been observed that long time adopters of a platform use a higher number and more novel complements than new adopters (Rietveld & Eggers, 2018). Maybe this is explained by the fact that new users, when entering a platform, are not yet completely

familiarized with it, so they start with “small and low-risk doses” by using the most common complementors. How does this translate to viewers and streamers? New users might start by watching the livestreams or videos from the most famous channels from “superstar” complementors (in Spain, whether it is through YouTube or Twitch, one example could be the famous content creator Ibai Llanos⁴), thus gaining knowledge of the platform technology. Finally, the level of strength of the ties between users of a certain network (thus creating “social groups”) is also crucial in platform competition (Suarez, 2005), as networks with a strong connection might exert an influence that can be extremely beneficial for the platform business (In Twitch for example it could be the community around viewers and players of certain videogames). These subgroups can influence technology adoption through their intensity if their installed base is high, even if the overall platform installed base is lower than the one from competitors (Lee et al., 2006) Studying the relative importance of social groups in a human-complemented network and how they vary depending on the platform proves to be an interesting research topic.

Many considerations arise regarding heterogeneity and human-complemented platforms. When does Twitch benefit from compatibility of streamers and when from differentiation? What encourages the heterogeneity of streamers and how does it affect the platform? How to measure streamers incentives? Do some of them compete in international markets? (For example, the Spanish streamer Ibai Llanos is also followed by many south Americans) Several questions around human-complemented platforms such as Twitch and its integration into platform competition research remain unanswered.

⁴ On June 25th, 2022, Ibai Llanos set the world record for the most concurrent views in a Twitch channel (over 3.3 million devices watching), thus surpassing the previous one, achieved by another Spanish streamer, TheGrefg (around 2.5 million devices) (Fernández, 2022).

2.4.4. Platform orchestration and governance

Last but not least, the governance dynamics of a certain platform and its ecosystem have recently had a notorious importance in the topic research (Song et al., 2018; Gorwa, 2019; Fenwick et al., 2019; Kretschmer et al., 2022; Kim et al., 2022; Chen et al., 2022). In the case that a platform ecosystem is organized around a powerful firm that owns the platform (Amazon owns Twitch), that firm has both motives and capacity to use its influence in order to increase the total value generated by the ecosystem and its own capture of value (Lan et al., 2019; Cennamo & Santaló, 2019; Hurni et al., 2022; Uzunca et al., 2022). However, if a platform business fails to achieve the creation of value for its ecosystem, it can most certainly damage it (Adner, 2006).

As abovementioned in previous themes, a platform might need to integrate vertically, so that aspect should be analyzed carefully in order not to damage the role of third-party complementors or cause their run-away from the platform (Gawer & Henderson, 2007; Lehtonen et al., 2022). It has been proved before that some orchestration strategies can bring complements to the ecosystem (Schilling, 1998; Gawer & Cusumano, 2008; Ghazawneh & Henfridsson, 2013; O'Mahony & Karp, 2022) or cause their platform exit (Pierce, 2009; Tiwana, 2015). Some key questions for the future of this theme are, for example, regarding the ability a platform might have when balancing negative moments between itself and its complementors, such as, for example, the level of openness vs control, the collaboration vs the competition and, consequently, the value creation for the ecosystem vs the value capture just for the platform.

It has also been studied that platforms may excessively exert their power over complementors, not allowing them to become potentially dangerous to the point that they

gain power and are able to subtract value from the platform (Brandenburger & Nalebuff, 2011; Rietveld et al., 2019) (reflected earlier in the Google and Netscape example). This can be done by, for example, not reflecting correctly the value generated in a platform network by certain complementors in order to prevent them from being and feeling more powerful (Brandenburger, 1995). Amazon, for example, has sometimes been accused of giving preference to their own products in its search engine or even using information about the most popular products on the site so that they could start producing them on their own (Mattioli, 2020; Kennedy, 2020). Platform governance strategies can influence many other aspects of their relationship with complementors. Some of them are prices (Dinerstein et al., 2018), quality investments (Cennamo et al., 2018), product market strategies (Rietveld et al., 2018), incentives or penalties for bad behavior (Geva, 2017) and complementor cooperation or knowledge/resource sharing (Huang et al., 2018; Zhang et al., 2022).

This can be somewhat frightening...What is the actual “bad side” of ecosystems governed by platforms? When do they shift from creating value to capturing value? What exactly leads to “bad governance”? What negative (or positive) consequences might it have for the ecosystem? These are just some of the questions that arise from analyzing platforms as a central point that can easily and heavily influence its surroundings.

When integrating the governance topic into Twitch, the platform should start by exhaustively study aspects such as, for example, what type of streamers they want to join (and stay in) the platform. Twitch needs to take care of its complementors (specially the “superstars”), so it would be extremely interesting to analyze which advantages the platform is capable of providing them beyond the monetary benefits (For example, YouTube gave tangible recognitions to content creators such as the “gold button” for surpassing one million

subscribers). Besides the behavior and the little details towards complementors, a platform should in the first place provide an architecture that benefits them, assuring that they can grow and prosper, thus taking care of the ones already in the platform and facilitating the attraction of others. Moreover, this should be done in a way where both the platform and the complementor obtain a significant utility with the relationship, avoiding situations in which one of them could be a threat to the other. More recent research has analyzed not only how a platform needs to evolve over time in order to prosper, but also how the governance strategies can evolve (Hannah & Eisenhardt, 2018; Rietveld et al., 2020).

Regarding the most popular complementors, a detailed measurement of their specific value capture should also be performed. In order to better compete with Twitch, should YouTube maybe focus its ecosystem strategy on providing benefits to streamers with less viewers, giving them growth opportunities so that eventually some of them will end up being extremely popular? Is the future directed towards the “ownership” of streamers as if they were, for example, football players? Will there be formation academies? Nowadays, in the video gaming industry, some streamers are part of a certain team, but being part of a livestreaming platform would be a very big step, although it would be closely related to exclusivity agreements. Strategic decisions regarding governance and orchestration give rise to many interesting debates, and livestreaming services (specially the market leader, Twitch) or human-complemented platforms in general prove to have a wide range of analysis. A summary of the full subsection is provided in Table 2.

Table 2: Key theme points through platform competition research

Theme of research	Key points for platforms	Key points for human-complemented platforms
<p>Theme 1: <i>Implications of Network Externalities</i></p>	<ul style="list-style-type: none"> - Importance of network effects - Best technology ≠ always win - Installed base management - Complementor compatibility - Platform specialization - Complementor specialization - Open or closed intellectual strategy? - Signaling tactics - Incentivize users and complementors 	<ul style="list-style-type: none"> - Network effects: Platform x users x content creators x advertisers - Content creator = complementor - Any superior technology? - Biggest installed base? - How to attract content creators? - How to attract users? - Pricing management (if any) - Technology improvements?
<p>Theme 2: <i>Corporate Scope and Platform Ecosystem</i></p>	<ul style="list-style-type: none"> - Platform nature changes - Own production vs complementors - Vertical integration - Any vertical threats? - Absorption of complementors? - Chicken or egg problem: Which side to subsidize first? - Coring solution strategy 	<ul style="list-style-type: none"> - Exclusivity agreements with content creators - Content creator support - From which content creators does the platform benefit? - How should they establish agreements with them? - How to measure their performance? And rewards?
<p>Theme 3: <i>Platform, User and Complement Heterogeneity</i></p>	<ul style="list-style-type: none"> - Platform, user and complement differentiation - Niche installed bases - Effective social subgroups management - Mainstream complementors and technology adoption influence - Multihoming. Does it affect performance? - Core users 	<ul style="list-style-type: none"> - How to measure complementor quality? Differentiation? And user interaction? Heterogeneity? - Measurement of “superstar” content creators. How do they influence users? - Management of user subgroups - Content creator multihoming. Effect on performance? - Do content creators compete internationally?
<p>Theme 4: <i>Platform Orchestration and Governance</i></p>	<ul style="list-style-type: none"> - Platform value creation vs value capture - Good governance vs bad governance - Damage of complementors - Opacity with complementors - Collaboration or competition? - Careful analysis of vertical integrations - Platform power abuse 	<ul style="list-style-type: none"> - Content creator rewards beyond monetary ones - Are growth opportunities provided? - Cooperation with content creators - Strategies regarding content creator treatment - “Ownership” of content creators?

Source: Own elaboration

Platform competition has always had many research opportunities. As mentioned earlier, it is known that research around human-complemented platforms would benefit from future analysis regardless of the discipline of study, although a deeper link with Management would be crucial. In accordance with this, Twitch actually acts as an opportunity to further develop the research around platform competition, more specifically around the abovementioned human-complemented platforms. After an overview of the main topics of platform research throughout its history and suggestions of some questions that might arise when trying to integrate it with human-complemented platforms (using the Amazon livestreaming platform as reference), it can be perceived that some areas remain unexplored.

3. The future of platform research

In the paper “The future of platforms”, Cusumano, Yoffie, & Gawer (2020) offer their perspective on what the future hot topics of platform research might be. While the previous years of platform knowledge have faced a huge growth, the future is expected to bring even more disruption. Recent trends and technologies such as big data, artificial intelligence, machine learning could all be applied in platform businesses and still have tremendous potential ahead of them.

Trend 1: The development of hybrid business models

The growing competition experienced by platform businesses and the potential of data and technological advances will turn these firms into both transaction and innovation platforms at the same time. In the regular economy, companies need to make great physical efforts in order to build their company models. For platforms, this effort has to be mostly digital, as

the growth can be more than adequate, with a smart combination of factors such as strategy, data and software.

In the case of Twitch, which is more of a transaction platform (its main purpose is to act as an intermediary between streamers and viewers, permitting exchanges such as interactions, donations, subscriptions... that would be unlikely to occur if the platform was not available), the development of a hybrid model seems far-fetched. However, innovation platforms help with the development of new or complementary products or services that are commonly made by third party complementors. Thus, maybe, in the future, it could be possible to introduce in the livestreaming platform certain elements that could be made by third party businesses (such as mini-games, music, quick survey services, food ordering spaces, tweeting spaces, etc). For example, the donations service was once managed by third party businesses, although it is currently owned by Twitch (Partin, 2020).

Trend 2: The expanse of innovation

As suggested before, innovation and technological advances will be a constant during the coming years (Bughin et al., 2017; Asadullah et al., 2018; Mucha & Seppala, 2020). These advances are allowing organizations to reach further with less investments, and new businesses that did not exist in the past will soon be created. Regarding artificial intelligence (AI), although this technology is still in the early stages of its life cycle, some platforms have started not only using, but also sharing it. Google, Apple, Microsoft, Amazon or IBM are not using the technology for themselves anymore, as they currently allow third party organizations to access these capabilities and grow from there. These advances should allow platform businesses to provide a wider range of applications.

For the Amazon livestreaming platform, the use of emerging technologies such as artificial intelligence or big data could mean an improvement of the user experience and hence, an improvement of the platform. This way, users could receive, for example, better channel suggestions ordered according to their preferences. From the point of view of complementors (streamers), if the company allowed them to use these technologies to a certain extent, they could, for example, see clearly which type of content is preferred by their users or which one provides them the highest utility (both to users and themselves).

Trend 3: The rise of industry concentration

In recent years, the number of platforms has increased significantly, which has made achieving a good market share a very difficult task for this type of businesses. Besides this, the idea of “multihoming” has not helped, as users could access several platforms for one same purpose (for example, this occurs with food delivering companies). However, it is expected in the coming years to have a smaller number of platforms which will have more power. Evidence from previous years supports the proposition made by the authors, as businesses such as Amazon, Apple, Alibaba, Tencent, Facebook, Microsoft, Google and Uber achieve market shares of around 50% in their respective businesses. Similar to how IBM became the “platform master” for computers, the abovementioned article predicts that the same will happen with future platforms.

Twitch is currently a market leader, much ahead of platforms such as YouTube Gaming or Facebook Gaming. Thus, there exists a possibility that, eventually, Twitch not only leads the market but owns it (the other livestreaming options would have to cease to exist). The situation of Twitch in the market in the first quarter of 2021 reflected a total of hours viewed market share of 72.3%, while Youtube Gaming had a 15.6% and Facebook Gaming a 12.1%

(González, 2021). This is a reflection of how, as in other platform sectors, the tendency goes towards the rise of industry concentration.

Trend 4: The growth of industry regulation

Under the premise that nice things happen when connecting people of the world, Mark Zuckerberg stated that businesses need to “move fast and break things”. Although this sounds a bit extreme, most platform owners agreed, feeling that their businesses were a channel through which they could connect humanity. Nevertheless, some platforms have been used for unethical purposes, with politics, terrorists, money launderers, spies, counterfeiters or drug dealers (between others) sneaking their ways into unethically benefiting from platforms.

This is why in the forthcoming years, the oversight of government institutions and the creation of new regulations are crucial for safe and healthy platform environments. Among others, the ethical considerations regarding complementors or workers in certain platform businesses must also be considered. Furthermore, the growing concern in the population regarding the environment should also be tackled, so platforms should also start considering their environmental impact, which could be approached with robust sustainability strategies.

For Twitch, the donations and subscriptions system has to be properly controlled in order to assure the correct use of monetary exchanges. Furthermore, a proper treatment of complementors/streamers should be guaranteed, avoiding any ethical or moral conflicts that might arise. Regarding the environment, Twitch focuses mainly on a young target audience, which have been observed as a sector of the population with a high environmental responsibility (Wu et al., 2020). Thus, and considering the reach Twitch has, it could be extremely beneficial for the company, the users and society if they decided to support certain

green initiatives. There are even environmental propositions made by professional brand designers that could be studied and later implemented by the Amazon platform in order to raise awareness of sustainable causes (Nati, 2022).

The article ends with an interesting notion of the disruptive nature of platforms. It is expected that, in the future, humans will own and buy fewer products, while more services will be contracted between each other, ensuring transparency and safety in all transactions. Older technologies will constantly be replaced by newer and better ones, but the disruption levels can go other ways. This means that disruption does not only come from above, but also from below (Apple disrupted the phone industry by a high quality offering since the beginning).

Furthermore, another way of disruption can be achieved through monetary investments, which sometimes can be just as powerful or more than new technologies or good ideas. The clearest example to reflect this situation is the platform Uber, which spent billions in order to strongly subsidize a business with a very low margin. Whether the ride sharing company finally survives or not, the huge disruption they have caused in the taxi business is undeniable. Nevertheless, the future of platforms is most certainly exciting, and it might evolve in many beneficial ways (for the platform, users, complementors and society) if the right opportunities are chased.

4. Conclusion

Platform research, although it focuses on a theme that is nowadays associated with digitalization and disruption, has been around since 1985, a time when mass digitalization was still long ahead. This is what makes it a topic with a rich past, an interesting present and

a promising future. Throughout the years, several industries have been studied and many platform dynamics have been observed, thus achieving great research contributions. Nevertheless, this is a theme that requires constant updates, due to the digital rapid-changing nature of platform businesses. As it was pointed out in the introduction of this paper, platform businesses, if managed right, are an extremely profitable business. However, if the business fails to keep up with the technological advances around it, the platform company might face a fatal end.

Regarding the types of platforms, there are several classifications, as it has been seen. Nevertheless, no proper recognition has been made to the nature of platforms that are mainly complemented by human beings. Since the beginning of platform research, most networks offered the primary possibility of connecting users (human beings) with companies (legal entities) or even aligning companies (legal entities) with other companies (legal entities). However, the relative recent growth of digitalization has allowed the emergence of platforms that connect users (human beings) with other users (human beings). Although it is true that this type of platforms have been here since some years ago (Facebook, Twitter, YouTube), the digital growth nowadays is rapid and unpredictable, so a closer look towards more recent platform hits should also be considered (for example, Twitch or TikTok).

The main four topics studied through platform research history maintain their relevance nowadays, and their most relevant questions can be almost entirely integrated with the most recent platform businesses. For network externalities, in the case of Twitch (or TikTok), several dynamics can be perceived between the platform, content creators, users and advertisers, where all of them benefit from the presence of the others. Regarding the ecosystem, aspects such as the relationship between a platform and its complementors have

been studied. For heterogeneity, research scholars focused on the key characteristics that differentiate a platform, which has also been possible to integrate in the world of Twitch. Finally, the studies around the governance of platforms started to look into possible conflicts that might arise between a platform and its complementors, which, whether managed wrongly or accordingly, is another theme that could be examined in the old and recent digital human-complemented platforms.

The future of platform research points towards very interesting areas, where the use of new technologies (the ones already known and others that are still to be developed) will surely be a constant. With the expansion of big data and artificial intelligence, new challenges will always arise. Not only business challenges, but also social, environmental, ethical and privacy ones. This is why the management of a platform needs to be not only effective for itself, but also for society in general. The solution lies in thinking about where we are now and where it seems we are headed to. Once this situation is known, the development of existing platforms and the creation of new ones during the next years should be targeted towards the improvement of the general welfare. Besides that, new regulations that are in line with the current digital context dominated by this type of businesses should also be set. As long as avoiding platform malpractices (such as extreme power abuse over complementors, but also users, workers, governments, advertisers, the environment...) is always in consideration, we will be headed towards a promising future in the platform world.

As depicted at the beginning of this paper, we should not seek for a fast moving caterpillar. We must aim for the butterfly.

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