
Platform Business and Network Strategy †

Junic Kim *

Abstract

This review organises the fragmented management literature on platform business according to a conceptual map and a meta-theoretical scheme. Since the early 2000s, numerous researchers have examined platform business and two-sided networks with platform business and strategy being an important business innovation model for many industries, creating value primarily by enabling direct interactions. Platforms such as Google or Amazon contain a common set of rules and components in most user transactions. Thirty-two core papers and books on Strategic Management Journal, Industrial Economics and Operation Management-related disciplines are reviewed, with further observations on how cumulative research streams on the platform are carried out independently from each academic perspective. The first of the two arguments in this paper is that because interactive relationships bridge the platform and stakeholders such as end-users and developers, it is crucial for platform companies to be aware of their relationship with stakeholders in order to support and sustainably provide content to their platform. The second is that integrative perspectives are essential due to the low number of interdisciplinary investigations conducted thus far. The paper's final section deals with implications for theory and practice, concluding that integrative studies and interactive relationship studies should be the main research streams in future platform research.

Keywords

platform business, two-sided networks, network effect, multi-sided platform

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* PhD Candidate, Manchester Institute of Innovation Research (MIOIR), Manchester Business School, University of Manchester, junic.kim@postgrad.mbs.ac.uk

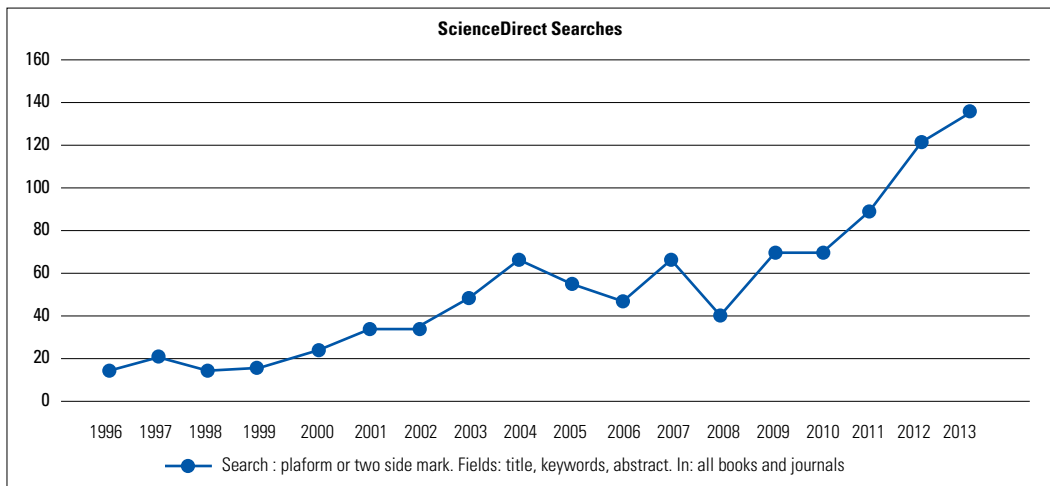
1. INTRODUCTION

Platform business and strategy constitute an important business innovation model for various industries, creating value primarily by enabling direct interactions between two or more distinct types of affiliated customers, the latter of which is referred to as a multi-sided platform (Evans, Hagiu, & Schmalensee, 2006). Platforms are a new potent organizational strategy for innovation and business transactions in a number of industries. For these reasons, the most successful contemporary companies operate under this new business model—one predicated on collaboration, emerging technologies, externally driven innovation, and vibrant ecosystems, which we call a platform (Simon, 2011). Particularly in IT and mobile industries, the platform business has become the best strategy for ensuring a sustainable revenue source. There are many significant cases such as how Apple and Google became the most valuable technology companies in the world after implementing platform strategies. Facebook's platform has over 1.3 billion monthly active users, surpassing the number of people living in India, the world's second most populous country; analysts expect that it will surpass the population of China by 2015. Amazon's platform business provides a new way of scaling business that brings value to all parties—this is the true meaning of shared value and a business ecosystem. Furthermore, the Amazon ecosystem is composed of numerous companies whose futures rest on Amazon developing the right business structure. Its business model strategy has made Amazon the biggest online market player in the world. Unlike linear business models, platform business models based on two-sided networks have significantly more complicated and multilateral profit structures. The platform business is a business structure strategy for easily gathering a variety of revenue sources from stakeholders, and is thereby a good business model to create profit.

For these reasons, the platform business has become an increasingly scrutinised topic in business and management literature over the past ten-years (see FIGURE 1). This interest may be attributable to recognition that platform strategy is a key business model for corporate innovation. Platform innovation in particular drives enterprise growth dramatically (Meyer & Mugge, 2001) and provides a superior business model and vibrant ecosystem as well as sustainable revenue for companies. The emergence of platforms, whether used inside firms, across supply chains, or as building blocks that act as engines of innovation that redefine industrial architectures, is a novel phenomenon affecting most industries today from products to services (Gawer, 2011).

¹ Research Date: 1ST Jan. 2014 by Statistic Brain

FIGURE 1. Number of Journal Papers and Books on the Platform Business over the Years as Searched for on Science Direct



Source: ScienceDirect

The phenomena captured by the concept of platform business are indeed complex, because platforms are becoming more and more pervasive. However, while the volume of platform business research has continuously increased, no reputable literature reviews have been produced thus far. The time has come to take a step back and establish how each disciplinary perspective examines the platform or the two-sided market. Furthermore, as research on platform business in management studies involves both macro- and micro-level forces as well as both deterministic and voluntaristic orientations, an integrating review of management literature is also needed in literature reviews of platform business. Consequently, the primary purpose of this paper is to focus on an integrating review of the management literature on platform business and innovation strategy.

In order to achieve the success of research goal, I first define the term “platform” and discuss why this concept is critical. Secondly, I provide an overview of the literature and the relevant journals on platform business, thereby highlighting the concepts of platform and platform-based innovation in order to clarify the differences that exist in the various academic perspectives. Thirdly, I introduce a methodology for selecting literatures within my review, as well as the rationale for my choice of a suitable framework. Thus, I review the literature in each area and the associated economic and strategic concepts. Finally, I conclude with a discussion of the main research implications of this paper.

2. BACKGROUND: RESEARCH INTO PLATFORM IN BUSINESS STUDIES

James Moore first proposed the strategic planning concept of a “business ecosystem” (Moore, 1993), a notion now widely adopted especially in the high-tech industry. He defined a business ecosystem as “an economic community supported by a foundation of interacting organizations and individuals—the organisms of the business world” (Moore, 1996). This signifies that companies need to be proactive in developing mutually beneficial relationships with stakeholders such as suppliers,

demanders, and even competitors. In addition, the platform plays a crucial role in building a business ecosystem. An early study by Iansiti and Levien (2004) shows that the platform is the “package” through which keystones share value with their ecosystems, and this is one reason why several scholars have recently focused on platform business and strategy for innovation. Corporations dominate the market and create new business models by building such a platform. Furthermore, information technology makes these platform business and innovation even more vital. New IT-based innovations have been widely introduced into service productions and processes. The pace of development of new IT continues to be phenomenal. The capabilities of, for example, positioning systems, mobile communications networks, and embedded and ubiquitous computing are forecasted to grow continuously for years to come (Miles, 2005; 2007). Over recent decades, several studies into the platform business and platform innovation have sought to understand the way innovation manifests in numerous industries. Today, we are better able to distinguish them in the computing, mobile and in the certainly all high-tech sectors.

2.1. What Is a Platform Business, and What Is an Ecosystem?

Platforms provide an essential or “core” function to an encompassing system of use. It is the set of components and rules employed in common in most user transactions (Boudreau & Hagiu, 2009). “Component” refers to software, hardware, and service modules, along with an architecture that specifies how these units work together (Henderson & Clark, 1990). “Rules” include standards, protocols, and policies, all used to organise the activities of network participants (Baldwin & Clark, 2000). They are subject to “network effects,” which tend to dynamically reinforce early-gained advantages such as an installed base of users or the existence of complementary products (Eisenmann et al., 2006). These platforms typically emerge in the context of modular industries (Baldwin & Woodard, 2009) or industry ecosystems (Iansiti & Levien, 2004).

2.2. Research on Platforms

Various definitions of a platforms exist but this paper follows that of Eisenmann, Parker, and Van Alstyne (2008). A platform contains the set of rules and components in common in most user transactions. It is comprised of users whose transactions generate direct as well as indirect network effects, along with one or more intermediaries that promote users’ transactions more (Eisenmann et al., 2006; Evans & Schmalensee, 2007; Rochet & Tirole, 2003).

From an economic standpoint, a platform is composed of two theoretical concepts: two-sided networks and network effects. Two-sided networks are economic platforms with two distinct user groups that offer each other network benefits. Two-sided networks are likely to be found in many industries (especially in IT industry) sharing space with product and service offerings. In two-sided networks, the network effect emerges from the same-side and cross-side network effects. These are the effects that one user of products or services has on the value of that to other users. When a network effect is present, the value of a product or service depends on the number of people using it (Shapiro & Varian, 1998).

2.2.1. Two-sided Networks

Two-sided networks, also known as two-sided markets, are economic platforms with multiple dis-

tinct actors/stakeholders that provide each other with network benefits. It is a meeting place for two/or more sets of agents who interact through an intermediary or a platform. Two-sided networks can be found in numerous industries, existing alongside traditional product and service offerings. However, two-sided networks differ from other simple markets in traditional and fundamental value chains. In the traditional linear model, value moves from left to right: to the left of the company is cost, and to the right is revenue (Eisenmann et al., 2006). In contrast, cost and revenue are both to the left and to the right in two-sided networks because the platform has a distinct group of users on each side. Large Internet companies, such as Google, Amazon, and eBay are good examples. These platform companies incur costs in serving multiple groups and collect revenue from a variety of sides. In terms of two-sided networks' pricing strategies, various Economics studies have described the pricing structure in these networks as having relative prices charged to every side. Not only revenue but also products and services bring together groups of users in two-sided networks. Under the infrastructure and rules in two-sided networks, the platform provider facilitates the two/or more groups' transactions such as consumers' credit cards or merchants' authorization terminals, as well as providing service in areas such as e-commerce sites.

2.2.2. Network Effect

As an economic and business term, the Network Effect, also referred to as network externality or demand-side economies of scale, is the effect one stakeholder has on the value of a particular product to other people. In simpler terms, it is a demand economy of scale, and implies at least some level of interaction. When the network effect is present, the value of a product or service is dependent on the number of others using it (Shapiro & Varian, 1998). The network effect was studied in the context of the use of long-distance telephoning in the 1970s. It is widely recognized as a critical aspect of industrial organization in IT industries and is widespread in various fields including mobiles, microchips, telecommunication, PCs, semiconductors, e-commerce, and electronic marketplaces. Empirical evidence for the network effect has been found in product categories as diverse as spreadsheets (Brynjolfsson & Kemerer, 1996), databases (Gandal, 1995), and DVD players (Dranove & Gandal, 2003).

This concept in two-sided networks is further discussed by Parker & Van Alstyne (Eisenmann et al., 2006; Parker & Van Alstyne, 2005; Van Alstyne & Parker, 2000) to explain behaviour in IT-based markets. In addition, Rochet and Tirole (2003) and Armstrong (2006) offer clear overviews. Hardware and software platforms, programmes, PC and mobile operating systems, e-commerce, credit cards, and matching services display this kind of network effect. In several cases, one may consider indirect network effects as being a one-directional version of two-sided network effects.

3. METHOD OF REVIEW

In order to facilitate a coherent review, I have restricted my selection of papers to those published in leading academic journals specialising in management and strategic business. Various periodicals were ultimately selected: *Harvard Business Review*, *Sloan Management Review*, *Academy of Management Review*, *Journal of Product Innovation Management*, *Strategic Management Journal*, *The*

RAND Journal of Economics, Journal of Industrial Economics, Research Policy, Management Science, and highly cited books. Research began with a search for scholarly works and books² on platform business and innovation. In order to find as many relevant publications as possible, I methodically devised a broad range of keywords for this search. I derived keywords by extensively reading related literature and by consulting experts in the chosen topic area. The final list of keywords used in the search included: “Platform”, “Two-sided Networks/or Market”, “Modularity”, “Network Effects/or Externalities”, “Business Ecosystem” and “Technological Ecosystems”³. Major journals on strategic business and management were searched and checked with the ISI database to ensure no highly-cited or important work were missed in this area.

To analyse and categorise the selected articles, (a) a conceptual map of the literature and (b) a meta-theoretical scheme originally proposed by Astley and Van de Ven (1983) for organizing management theories were utilized. The conceptual map develops an overview from different disciplinary and interdisciplinary perspectives of the research on platforms as well as market and pricing strategies. Through the conceptual map of the literature, I show the overall research and the trends in platform business. Due to the character of the platform business, each academic tends to work separately, and therefore the research is categorised into three different academic disciplines⁴: 1) Operations Management, 2) Industrial Economics, and 3) Business Strategy, thereby enabling an explanation of each study’s distinct features and the subject of each academic discipline. I also describe the interdisciplinary research which has recently been conducted so as to show the overall platform business research structure and stream. In addition, the meta-theoretical scheme is used to systematically analyse the 3) Business Strategy category because platform research is actively carried out in this academic area. The reason why I have chosen a meta-theoretical scheme is because it is uniquely suited for the analysis of the platform business in management studies, because it accommodates (1) macro and micro levels of analysis, (2) strategic selection, and (3) the collective actions of the platform provider, supply and demand side. All of these are not only relevant to the platform business but are also the factors prominent in the development of the literature that have led to the current status of platform business research.

4. OVERVIEW OF THE LITERATURE

Platforms are generally subject to positive feedback loops through network effect in use (Katz & Shapiro, 1985) and increasing returns in supply (Arthur, 1996), which tend to maximise the advan-

² To make the research work more comparable, I focused on published journal articles and highly cited books together.

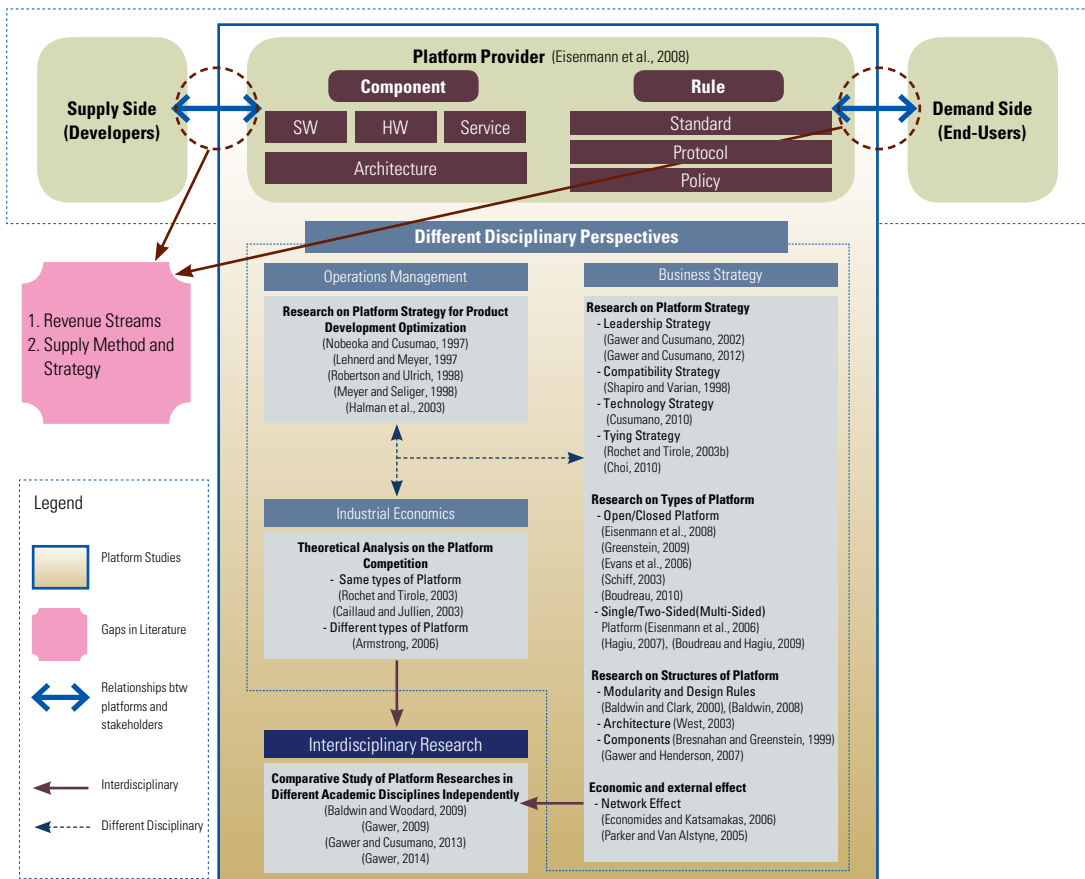
³ Due to a variety of usage, keyword, “Platform” was too ambiguous and yielded many irrelevant articles such as “train platform”, so, in the searching process, I also used “two-sided networks/or markets” with the “AND” option to exclude irrelevant articles. I compared the searching results by including and excluding “two-sided networks/or markets” as a required keyword for several years, and results were the same.

⁴ In the perspective of Operation Management, research mainly focuses on product development optimization in the manufacturing industry. In the Industrial Economics approach, it examines the competition in either same or different types of platforms. In the perspective of Business Strategy, it particularly involves strategy, typology, business model, and structures.

tages to companies. In their article in the *Sloan Management Review*, Cusumano and Gawer stated that “the more people who use platform products, the more incentives there are for complement producers to introduce more complementary products, causing a virtuous cycle” (Cusumano & Gawer, 2002).

Because the term platform has been used in various approaches from different disciplinary perspectives, there are different research approaches and definitions, such as two-sided or multi-sided market (Eisenmann et al., 2006; Rochet & Tirole, 2003) or invisible engines (Evans et al., 2006). Therefore, the research arrangement is needed in order to ascertain how each disciplinary perspective examines the platform or two-sided market. The conceptual map presented herein has key topics that are built upon two main research themes, different disciplinary perspectives and interdisciplinary researches. To achieve a better understanding of the presented conceptual map, I explain the research structures and features of each academic perspective. In FIGURE 2 below, the platform is located in the middle and each stakeholder, content provider and contents user stands beside the platform.

FIGURE 2. Conceptual Map of the Literature and Key Subjects



Source : Author's elaboration

4.1. Different Disciplinary Studies

There are various definitions of platform but in this paper I have adopted the definition of platform by TR Eisenmann et al. (2008), which consists of a set of rules and components. Standards ensure compatibility among components, protocols (information exchange), policies (user behaviours), and contracts for the responsibilities of stakeholders. Most platform (or two-sided market) literature focuses on platform capability itself. These studies can largely be categorised under different disciplinary perspectives and interdisciplinary research. In different disciplinary perspectives, Operations Management, and Industrial Economics, and Business Strategy all have different views and approaches as regards platform studies.

4.1.1. Operations Management

Platform research originally started from within Operations Management in order to optimize product development, particularly in manufacturing industries. An investigation into the topic by Robertson and Ulrich (1998) asserts that companies which have successful platform planning are able to achieve benefits in numerous areas. They argue that the platform has a greater ability to tailor products to the needs of different market segments or customers. To illustrate their argument, Robertson and Ulrich conducted an empirical study of Kodak and Fuji. In 1987, Fuji introduced the Quick Snap 35mm single-use camera in the U.S. market, growing by more than 50 percent per year until 1994. However, Kodak regained their market share back from Fuji by using a platform business strategy. After 1994, Kodak dominated more than 70 percent of the U.S. market. Research indicates that the success of Kodak's response resulted in part from its strategy of utilising a distinctive platform model. Kodak redesigned its business model and introduced three additional business models, all having common components and common production process steps. Because Kodak designed its four products to share components and process steps, it was able to develop its products faster and more cheaply. The platform business model appealed to different customer segments and enabled Kodak to have twice as many products as Fuji, thereby allowing it to capture precious retail space and garner substantial market share (Robertson & Ulrich, 1998). The platform business model is a critical success factor for Operations Management. Through sharing components and production processes across platform products, corporations are able to increase the productivity and flexibility in their manufacturing. Nobeoka and Cusumano (1997) indicate that automobile firms which adopt a platform business strategy gain market shares of 5.1 percent per year, while firms using a single-business model lose 2.2 percent of their market share per year. As regards the platform of manufacturing industries, assembly processes are developed for the specific product models. Robertson and Ulrich (1998) and Nobeoka and Cusumano (1997) define the platform as a set of assets for product sharing. A further study on the topic by Meyer and Seliger (1998) defines a platform as being "a product platform as a set of subsystems and interfaces that form a common structure from which a stream of derivative products can be efficiently developed and produced." An additional important investigation (Halman, Hofer, & Van Vuuren, 2003) indicates that, because of the effect of a product family, a collection of products that share the same assets, production, and process engineering can be made more efficient and competitive. Hence, these benefits apply to new products developed from the platform and to updated products and it serves to reduce manufacturing costs. With the platform system, companies can reduce the incremental cost of addressing the specific needs of a market segment as well as reducing development cost and time.

4.1.2 Industrial Economics

In the Industrial Economics approaches, the key issue is the theoretical analysis of the platform competition. A significant body of theoretical and empirical literature rapidly emerged, and the platform (or two-sided market) has become a very active area of research in Industrial Economics. The two-sided platforms that we know today as the economic and business focus were first clearly identified in pioneering work by Rochet and Tirole, whose work began circulating in 2002. They analyse platforms in two-sided markets with network externalities, using the specific economics of a payment card association through the cooperative determination of an interchange fee. In this research, in order to explain a platform through network externality occurrence from both sides of the market on board, Rochet and Tirole construct a framework in which banks and merchants grab the market and consumers and merchants decide rationally whether to use a credit card. Using this framework, the researchers explain the factors affecting merchant resistance, compared with cooperative and for-profit business models, and take the first step in the analysis of system competition (Rochet & Tirole, 2002). An additional study on the topic by Rochet and Tirole (2006) constructs a model integrating usage and membership externalities, combining two different variations of the literature emphasizing either form of externality; it gained new results regarding the mix of membership and usage charges when price setting or bargaining determine payments between end-users. The study achieved this by using the pure-usage-externality model of Rochet and Tirole (2003) as well as the pure-membership-externality model of Armstrong (2006). They dealt with competition issues among the same typology of platforms and made competing platform modelling (Rochet & Tirole, 2003; 2006).

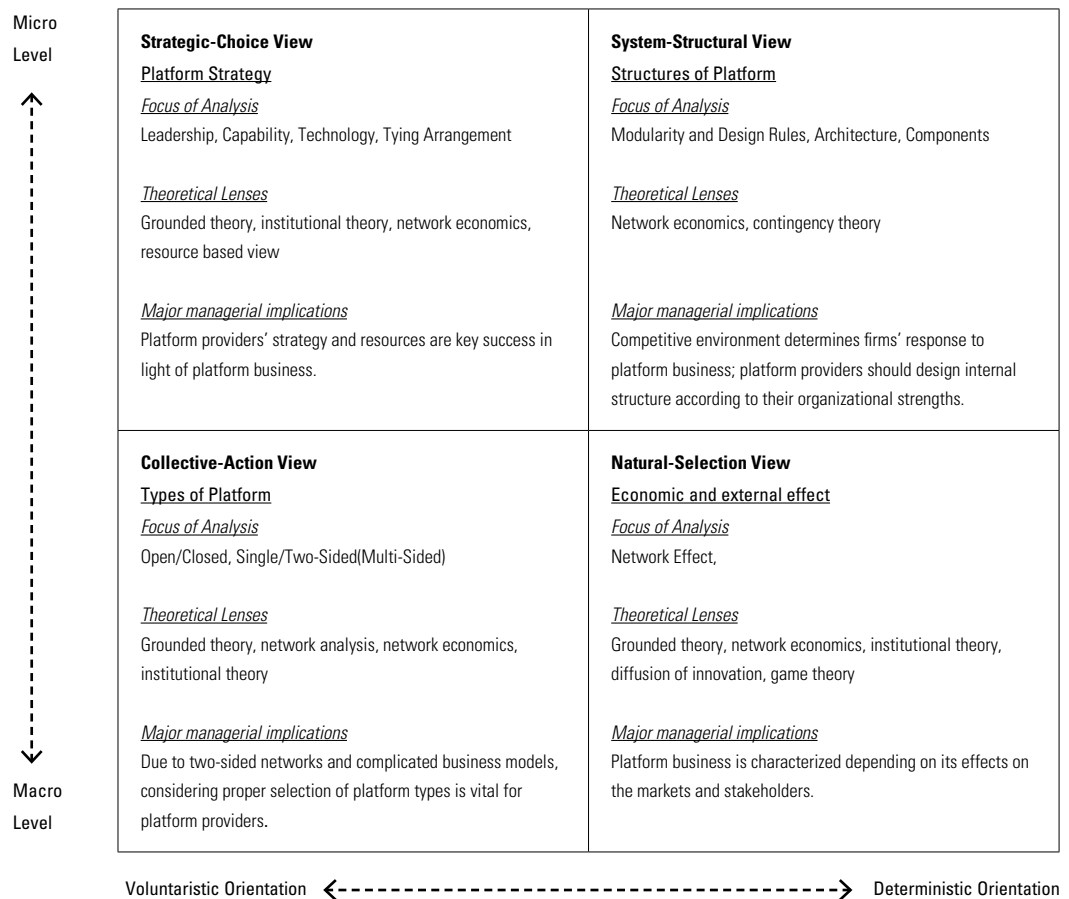
However, in contrast with Rochet and Tirole who focused on theoretical analysis, Armstrong researched platform competition modelling among different types of platforms. By using the Hotelling location model, Armstrong asserts that there are qualitative differences between the two platforms (Armstrong, 2006). He explains how the multi-home affects the actions of platform providers by comparing the case of two groups: one group choosing single-home with the case of another group choosing multi-home. In his article, Armstrong presents three models, a monopoly platform, a model of competing platforms (two-sided single-homing), and a model of competitive bottlenecks. A monopoly platform can be applied to only limited examples of two-sided markets, although there do exist a few applications. Two-sided single-homing involves competing platforms, but it assumes for exogenous reasons that each actor chooses to join or use a single platform. Armstrong theoretically analyses that, while one group continues to deal with a single platform (to single-home), another group wishes to deal with each platform (to multi-home) through the model of competitive bottlenecks which is the most realistic model. Most of these investigations from an Industrial Economics perspective have analysed how platforms can solve the “chicken and egg” problem related to the two-sided market, and they have focused on the conditions determining which side is subsidised and the extent of said subsidy.

4.1.3. Business Strategy

In the Business Strategy approaches, investigations from various perspectives are very much a work in progress. Under a meta-theoretical scheme originally proposed by Astley and Van de Ven (1983), they can be classified into four major divisions: research into platform strategy by strategic-

choice view, types of platform by collective-action view, structures of platform by system-structural and economic view, and the external effect by natural-selection view. The typology and structure of the platform are key research fields in platform analysis, and Parker and various researchers also focus on economic effect, especially network effect (Economides & Katsamakas, 2006; Parker & Van Alstyne, 2005).

FIGURE 3. Meta-theoretical Scheme for Business Strategy Perspectives



Source: Author's elaboration based on Astley & Van de Ven (1983)

Strategic Choice View (Micro-Level, Voluntaristic Orientation); Research on Platform into Strategy

In the research into platform strategy, theorists of the strategic choice view argue that platform providers' strategy and resources are the keys to success in the context of platform businesses. Cusumano and Gawer (2002) focus on leadership strategy, while Shapiro and Varian (1998) speculate about the importance of compatibility for platform strategy. In 2010, a further study on the topic by Cusumano (2010) asserts that companies in the IT business are often most successful when their

products become industry-wide platforms, implying that a technology strategy for platforms is crucial. A tying arrangement strategy makes “more consumers move to multi-home and produces exclusive contents available, which is beneficial to both consumers and platform providers.” Choi (2010) analyses the effects of tying arrangements on market competition in two-sided networks with multi-homing; that is, stakeholders can participate in multiple platforms so as to garner maximum network effects.

Collective Action View (Macro Level, Voluntaristic Orientation); Research into the Types of Platforms

In the collective action view, the literature investigates the types of platform. Many scholars at business schools have examined the features of platforms based on the typology of platform, whether it is the open/closed platform and single/two-sided (multi-side) platform. Open platform is especially easily found in the IT industry. It describes a platform that is based on open standards that are published and fully revealing of its sources, such as external application programming interfaces (API) that allow the use of the platform functions. Using these sources, a third party may integrate with the platform to add functionality, thereby permitting rapid dynamic capabilities (Boudreau, 2010; Eisenmann et al., 2008; Evans et al., 2006; Greenstein, 2009; Schiff, 2003). The opposite of this is a closed platform.

Two-sided or multi-sided platforms, which offer different solutions to different categories of users, bring together two or more interdependent groups of customers. This form has recently risen to economic and business prominence in many industries. Like the open platform, the two-sided platform has significantly increased opportunities for building larger, more valuable and powerful platforms because of information technology (Boudreau & Hagiu, 2009; Eisenmann et al., 2006; Hagiu, 2007). The opposite is a single platform.

System Structural View (Micro-level, Deterministic Orientation); Research into the Structures of Platforms

Research from the system structural perspective has focused on how platform provider firms adapt to technological structures and rules, in particular in terms of the internal organisation. The competitive environment determines firms’ response to platform business, so platform providers should design internal structure for their organizational strengths. Studies in this view have shed light on three types of structure: (1) modularity and design rules, (2) architecture, and (3) components. Modularity is a concept which has proved useful in a large number of fields that deal with complex systems and units that are structurally independent.

Baldwin and Clark developed a powerful theory of modularity and design. They assert that “the industry has experienced previously unimaginable levels of innovation and growth because it embraced the concept of modularity, building complex products from smaller subsystems that can be designed independently yet function together as a whole” (Baldwin & Clark, 2000; Baldwin & Clark, 2003). Computing platforms provide an integrated architecture of hardware and software technology standards as a basis for developing complementary assets (West, 2003). The most successful platforms were owned by proprietary platform providers who controlled platform evolution

and appropriated associated rewards through a well-organised architecture. Bresnahan and Greenstein (1999) argue that platforms have interchangeable components so that many platform users can share the benefits of the same technical advances and the different hardware and software components available in the marketplace.

Natural Selection View (Macro-level, Deterministic Orientation); Economic and External Effects

Researchers studying platform business from a Business School perspective assert that the strategic effects of platform providers are determined by environmental characteristics. Therefore, a platform business is characterized according to its effects on the markets and stakeholders. Network effect is a particularly critical theory in two-sided networks. Various authors have used the network effect to explain platform business, in terms of two-sided network effects (Armstrong, 2006; Cailaud & Jullien, 2003; Rochet & Tirole, 2003) and indirect network effects (Katz & Shapiro, 1985; Liebowitz & Margolis, 1994).

Economides and Katsamakas (2006) show how cross-side network effects emerge and argue for an equivalence between a specification that assumes complementarities and a specification that assumes explicit network effects across the two sides of the market. Eisenmann et al. (2006) argue that designing matched product pairs and discounting one relative to independent goods changes the shape of demand in markets joined by network effects.

4.2. Interdisciplinary Research

In recent years, in order to complement these individual studies, various platform strategy researchers have shifted to conducting interdisciplinary research studies (Baldwin & Woodard, 2009; Gawer, 2011). The most recent study (Gawer, 2011) provides a multidisciplinary account of the different phenomena of platforms. It is the outcome of crucial research regarding the perception of problems with existing platform studies. Each academic researcher has different perspectives and definition of platforms, which makes for greatly differing understandings. However, Gawer (2011) did not suggest alternative approach or methods.

5. DISCUSSION AND ANALYSIS

This review of platform business studies categorizes the fragmentation of this literature, a fragmentation that is in part because of the differences in perspective of researchers within each industry. The differences in perspective and the specific industry's approach are reflected in the flow of logic, the specific concepts invoked, and sometimes even the research methods adopted in different streams. As the platform is not a simple linear business model but rather consists of two/multi-sided networks with stakeholders, the findings are summarised into three major streams; 1) Operations Management, 2) Industrial Economics, and 3) Business Strategy. In addition, many academic researchers in recent years have focused on a range of platform business areas, with particular attention paid to decision-making, designing, and diagnosing processes via platform technology and development capability. Therefore, within the research category of business strategy, I provide a

brief evaluation of the literature along four themes: (1) platform strategy; (2) types of platform; (3) structures of platform; and (4) economic and external effects.

5.1. Literature Analysis

Various significant studies are analysed and described as illustrative of the method that will be used to code the literature. The table below identifies four different approaches to organizing a variety of activities involved in the main phases of platform business studies. The four perspectives from selected literature have produced little controversy in terms of the main stages of the innovation process and the sequence of the activities suggested. In order to provide more clarification as regards the contribution of each of the perspectives, the table was divided into four sequential columns featuring the different academic approaches, which are Operations Management, Industrial Economics, Business Strategy, and Interdisciplinary Research. The sample chosen are empirical papers that have adopted different methodological approaches towards platform studies, yet share a common trait in their use of two-sided market theory. Of particular interest in this analysis is the combination

TABLE 1. Literature Analysis Table

	Robertson and Ulrich, 1998	Rochet and Tirole, 2003	Eisenmann et al., 2006	Gawer and Cusumano, 2013
Platform Definition	Platform is a “collection” of assets	Platform has both sides of the market on board	Products and services that bring together groups of users in two-sided networks are platforms	Platform is “one component or subsystem” of an evolving technological system
Perspective	<u>Operations Management</u> Research into platform strategy for product development optimization	<u>Industrial Economics</u> Theoretical analysis of platform competition	<u>Business Strategy</u> Research into types of platform strategy	<u>Interdisciplinary Research</u> Comparative study of platform studies in different academic disciplines
Method	Empirical study: Case study of Fuji and Kodak Qualitative method	Empirical study: Credit card interchange fees in payment card system Quantitative method	Empirical study: Analysis of pricing right, winner-take-all competition, and envelopment	Empirical study: Case study of Intel Qualitative method
Theoretical Lens	Two-sided market theory, Network effect	Two-sided market theory	Two-sided market theory, Dynamic capabilities theory, (winner-take-all dynamics)	Two-sided market theory, Network effect theory
Contribution	Demonstrated that effective planning for product platforms allows a company to deliver distinctive products to the market while conserving development and production resources	Demonstrated that the proposal for a cost-based regulation of interchange fees relies on an erroneous, vertically organized model of the payment card industry	Outlined a variety of platforms’ dynamic capabilities and changed business models.	Discussed how externally-focused industry platforms affected innovation. Also attempted to explain the interdisciplinary research approach.

Source: Author’s elaboration

of methods and epistemic positions that determined the different types of contribution.

The selected studies are sources that provide background information in terms of the different aspects of each perspective. In the Operations Management perspective, Robertson and Ulrich (1998) demonstrated through the Fuji and Kodak case that effective planning for product platforms allows a company to deliver distinctive products to the market. Rochet and Tirole (2003) focused on a theoretical analysis on the platform competition. With an empirical study of credit cards, they analysed the interchange fees in payment card systems. Eisenmann, Parker and Van Alstyne (2006) detailed a variety of platforms' dynamic capabilities and changed business models. They analysed the notions of correct pricing, winner-take-all competition, and envelopment from a business strategy perspective. Gawer and Cusumano (2013) highlighted the problem of dispersed research approaches and attempted to explain the interdisciplinary research approach.

6. FUTURE DIRECTIONS

Based on the discussion chapter, I propose that interactive relationship studies among platforms, contents providers, and integrative studies (or studies that incorporate multiple perspectives) should be encouraged in order to consolidate the competitive power of the platform itself on the basis of information technology.

6.1. Interactive Relationship Studies between Platform and Contents Providers

As the interactive relationship plays a role as a bridge between platform and stakeholders such as end-users and developers, it is crucial for platform companies to be aware of their relationship with stakeholders in order to sustainably support and provide the contents sustainably to their platform. Very few studies mention or focus on platform relationships (TABLE 2). Of the total number of thirty-two selected literature on the conceptual map, not one study fully focused on interactive relationships with only two investigations by Eisenmann et al. (2006) and David Sparks Evans et al. (2006) slightly mentioning them. Eisenmann et al. (2006) stated that the key decision in designing platform's business models is "pricing" to platform provider and users. In their bestseller book, invisible engine, Evans, Hagju and Schmalensee (2006) emphasise that main contents like killer apps played important roles for the platforms and such contents help set up the positive network effects which make platform business grow. As the platform consists of two/multi-sided networks with stakeholders, not only studies on platform ability, strategy, and character, but also interactive relationship studies between platform providers and stakeholders, such as end-users and developers are required and vital. Hence, the research focus needs to be extended from the platform development approach to the interactive relationship approach between platform and contents providers.

TABLE 2. Platform Studies⁵ and Interactive Relationship Studies

Literatures on the conceptual map	Number
Total number of literatures on the conceptual map	32
Focused on platform ability, strategy, and character itself	32
Focused on interactive relationships	0
Focused on platform ability, strategy, and character in the main, and mentioning interactive relationships	2

Source: Author's elaboration

6.2. Integrative Studies⁶

Integrative perspectives are required because of the low number of interdisciplinary investigations thus far conducted. We can easily find platforms in several industries, such as all high-tech industries, manufacturing industries, automotive technologies, genomic technologies, and credit card companies. Because of the various types of platform that exist in different industries, many individual researchers have made remarkable progress each in his or her own field over the past ten years (Gawer, 2011). Even though some scholars (e.g. Baldwin, Cusumano, Gawer and Woodard) support the importance of interdisciplinary research into platform business, nonetheless very few such studies exist. Interdisciplinary research may contribute towards a better understanding of the multifaceted phenomena of platforms; therefore, more research shall be carried out to obtain more conclusive and specific information.

7. SUMMARY AND CONCLUSION

Over the past ten years, a growing body of literature has examined platform business research. These studies have adopted different research perspectives and approaches, and this is partially responsible for the fragmentation and lack of integration within the literature. Firstly I have attempted to define the concept of the platform and two-sided networks which remains still controversial topic in the literature, and I have arranged the literature based on the different academic approaches and research types. In addition, I have identified the literature gaps and future directions for platform research. Aside from literature reviews, this paper has also analysed the various platform research streams over the past ten years and has categorised the studies according to their academic and research features through the conceptual map and meta-theoretical scheme. The conceptual map shows research streams from different academic perspectives and organise the features of existing research literature. Through the meta-theoretical scheme, I have more specifically identified 'Business Strategy' as the major academic field for platform business. Some have examined the evolution of the environmental context or macro level phenomena whereas others have used the firm as the unit of analysis. Similarly, some have adopted a deterministic orientation and others have been interested in a voluntaristic orientation. In the literature analysis, main differences and features of the literature were suggested, with the collective action and strategic choice perspectives from different academic approaches. In addition, studies that address collective level actions have suffered from a lack of theoretical grounding.

The crucial observation is that regarding platform research, each scholar worked separately up to the present time; however, further research increasingly shall invoke multiple perspectives. Thus, although much has already been accomplished, many promising opportunities lie ahead. For future research in this research area to be systematic and combine different research performances, there

⁵ Literatures focusing on platform ability, strategy, and character

⁶ Studies incorporating multiple perspective

is a need to incorporate multiple perspectives and the interactive relationship between platform providers and stakeholders. In the future, integrative studies and interactive relationship studies should be the main research streams in the area of platform research. Moreover, it is possible to utilise the platform model that is multi-sided business model not only for business but also for government policy. Platform strategy is expected to play an important role for government's open public data and the policy-making environment, both of which are significant issues today.

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