

The rise of platform economy: a framework to describe multisided platforms

Marco Ardolino *, Nicola Saccani*, Marco Perona*

**Department of Mechanical and Industrial Engineering, University of Brescia, Via Branze, 38, 25123 - Brescia – Italy (m.ardolino@unibs.it, nicola.saccani@unibs.it, marco.perona@unibs.it)*

Abstract: Several companies are facing challenges caused by increased competition and globalization. Thus, many businesses have started to exploit external competences and resources providing a place (generally virtual) in which different group of users are linked. This trend has led to the diffusion of businesses grounded upon multisided platforms (MSP) which have opened the new era of the so-called “platform economy”. For example, Uber® is the most important taxi company in the world although it doesn’t own any taxi, Facebook® provides thousands of applications and games developed by external developers, Airbnb® is one of the greatest accommodation provider but it doesn’t own any estate, Alibaba® is among the most quoted retailers, but it does not have any warehouse. This paper deals with the conceptualization of the phenomenon in object. The objective of the paper is threefold: 1) shed light on the main characteristics of MSPs (in particular those one grounded upon digital and internet technologies) and development of a definition in order to define the boundaries of the research; 2) identification of a typology aimed at categorizing the different businesses based on MSPs depending on the kind of interactions enabled and functions performed; 3) development of a framework aimed at describing the configuration variables of a business related to the platform economy.

Keywords: Platform economy; Multisided platforms; Digital and Internet Technologies; Descriptive framework

1. Introduction

Several companies are facing challenges caused by increased competition and globalization. Thus, many businesses have started to exploit external competences and resources providing a place (generally virtual) in which different group of users are linked. For example, Uber is the most important taxi company in the world although it doesn’t own any taxi, Facebook provides thousands of applications and games developed by external developers, Airbnb is one of the greatest accommodation provider but it doesn’t own any estate, Alibaba is among the most quoted retailers, but it does not have any warehouse.

The success of these companies is due to a particular operating model in which a third party enables interactions between two or more group of users. This trend has led to the diffusion of the so-called “platform economy”, getting ideas from the concept of “platform” developed in classic product development (Piezunka, 2011). Similarly, the value of this businesses strongly depends on the contribution of other external users, which can belong to different sides, and for this reason, in literature, they go under the name (among others) of “multisided platform” (MSP). It concerns the presence of two or more groups of users, connected in different ways by a platform (Rochet and Tirole 2006, Armstrong 2006, Hagiu and Wright 2015, Li 2015). Even though the phenomenon of platform economy is quite recent and enabled by the recent improvements and exploitation of digital and internet technologies, multisided platforms existed also before the era of Internet. Fairs, newspapers,

bars, employment agencies, dating agencies and real estate agencies are examples of multisided platforms (Armstrong, 2006; Gazè and Vaubourg, 2011). Anyway this paper focuses on MSPs based on digital and Internet technologies. The objective of the paper is threefold: 1) shed light on the main characteristics of MSPs (in particular those one grounded upon digital and internet technologies) and development of a definition in order to define the boundaries of the research; 2) identification of a typology aimed at categorizing the different businesses based on MSPs depending on the kind of interactions enabled and functions performed; 3) development of a framework aimed at describing the configuration variables of a business related to the platform economy. The rest of the paper is organised as follows: Section 2 shows the main characteristics of MSPs (grounded upon digital and internet technologies) with some insights related to different typologies and taxonomies presented in literature. Section 3 deals with the main contributions of this paper, that is the presentation of a descriptive framework for businesses in the platform economy consisting in a new typology developed by authors and a model with a list of configuration variables. Finally, section 4 draws conclusions and points out limitations and avenues of future research.

2. Results from literature review

2.1 Methodology

Literature review was carried out after a preliminary literature analysis of six seminal papers about the phenomenon in object. Consequently, a structured keyword search was performed in the Scopus® database. The terms used for the research have been: “Two-sided platform”; “Multisided platform”; “Platform business model”; “Two-sided market”; “Multi-sided market”; “Multi-sided network”; “Two-sided network”. 555 papers resulted from the queries. Only journal papers have been considered in order to guarantee the quality of the literature review (335 papers selected). After the selection process and an abstract content based analysis, the 335 papers have been sized down to 112 (Seuring and Gold 2012).

2.2 Characteristics and definitions of a MSP

The phenomenon of platform economy has been developed after the increasing diffusion of businesses characterised by the presence of businesses grounded upon a platform aimed at facilitating the interactions between two (or more) distinct groups of users (Rochet and Tirole 2006, Armstrong 2006, Evans and Schmanensee 2008, Hagiu and Wright 2015). These businesses are described in literature with different terms such as “multisided markets”, “multisided networks” and “multisided platforms” or simply “platform”. In the following we will use the single term “platform” referring to the element which enables the interactions among the different group of users, while “multisided platform” to consider the economic model enabled by a product, service, firm or technology with all the related relationships. Moreover, with “platform economy” we mean the business phenomenon which is effecting the worldwide economy through the diffusion of several businesses organized as multisided platforms. As a consequence of the complexity of the matter, the literature provides no agreed description of what a multisided platform is. However, the analysis of the definitions provided by scholars leads to the identification of some specific elements that characterizes a multisided platform. All the definitions provided by scholars agree that multisided platforms aim at facilitating and enabling interaction between different groups of users. Moreover, literature that platforms are characterized by the presence of network externalities, that is the utility of using a product (in our case the platform) is related to the number of other users using it. Another feature peculiar to multisided platforms refers to the fact that the volume of transactions is affected by the pricing structure and not only by the overall level of the fees charged by the platform (Rochet and Tirole, 2006). In other words, it doesn't matter the “price level”, defined as the total price charged by the platform to the sides, but the “price structure”, that is the decomposition or allocation of the total price between the different sides. The discussion about the characteristics identified by the literature to define and describe a MSP shows the lack of an agreed definition and the literature review

carried out highlights some gaps related to both definitional and denotational issues (Li, 2015). Based on the contributions in literature, in this paper we provide a definition of multisided platform in order to define clear boundaries that have guided our analysis upon this specific phenomenon. 1) Multisided platform is a business which expects the presence of a virtual or physical place (the “platform”) which enables and facilitates the interactions between two or more different group of users (sides). 2) The different sides are characterized by interdependent relationships because of the presence of indirect and bilateral positive network effects. 3) A MSP implies that the actor who manages the platform (the “platform manager”) may potentially track the interaction events between the users

This definition excludes businesses that sometimes are cited in literature as multisided platforms. For examples we are excluding platforms such as newspapers, and also TV broadcasting channels, which are targeted to readers/viewers and contain spaces sold to advertisers (Chen and Xie 2007).

2.3 Platform Types and Taxonomies

Multisided platforms involve different types of businesses and they are widespread across many different industries. The first industry object of analysis has been that of credit card where there are two distinct sides, cardholders and merchants (Rochet and Tirole 2006, Armstrong 2006). Several authors have tried to draw a clear line in different sectors to highlight the main differences between traditional businesses and MSP businesses (Hagiu and Wright 2015, Sangeet et al. 2016). Typical industry sectors characterized by the presence MSPs are online marketplace (Hagiu and Wright. 2015) of products (Amazon®, E-bay®, Alibaba®), services (Airbnb®, Booking®, HomeAway®) and mobile software applications (App Store®, Google play®). The examples provided above represent some of the most cited industries and companies in literature. Multisided platforms are diffused in disparate industries which are very different among each other and this may justify the difficulties in finding a clear definition of multisided platform (see previous section). Indeed, scholars focus on identifying methods to categorize different types of multisided platforms. Hagiu and Wright (2015) analyse which are the economic tradeoffs that lead the organizations to position themselves closer to or further away from a MSP model and which are the differences respect to three traditional alternatives: vertically integrated firms, resellers or input suppliers. In addition, Filistrucchi et al. (2013) distinguish between two-sided non-transaction and transaction markets. Even though the main characteristic of a platform is to exploit external resources and competences, Hagiu and Spulber (2013) single out the presence of MSPs which supply also first-party contents, besides contents provided by external sides of the platform. Campbell-Kelly et al. (2015) identify different business models focusing on the specific context of mobile operating systems trying to bring out the main differences concerning the openness of the source-code and the vertical integration with

handset makers. Eisenmann (2008) develops a 2X2 matrix which sorts MSPs depending on the number of platform providers (who mediate users' interactions and serve as their primary point of contact with the platform) and platform sponsors (who hold rights to modify the platform's technology and determine who may participate in the network as a provider or user).

All the typologies and taxonomies, mentioned previously, try to categorize platform businesses based on specific aspects. There are few contributions aimed at identify different types of platform based on the kind of relationship and function performed, exceptions made for Evans and Schmanlensee (2008). These authors classify platforms in four types. The first type is "exchange" and it is aimed at facilitating transaction of goods or services between buyers and sellers. The second type is "advertiser-supported media" aimed at bringing advertisers and audiences together. The third type is "transaction system" bringing together merchants and customers and the fourth type is "hardware/software platform" aimed at bringing together software developers and installed base users. In our opinion this categorization could be refined and improved in order to enlarge the number of businesses considered. For this reason, we have developed a new typology in order to include also other businesses which present the characteristics of multisided platform, but they are not actually included in the above-mentioned typology.

2.4 Digital and Internet Technologies in MSP

The diffusion and improvements in ICT and digital technologies is having a disrupting effect in several business areas, improving efficiency and effectiveness of many processes. Indeed, digitization is changing the way services can be delivered, leading to the diffusion of new businesses characterized by innovative business models. Internet-based services are accessible to more people in the world than ever. For instance, the diffusion of smartphone applications, usually grounded on cloud technologies, enable ubiquitous channels and customers to experience digital services (Fano & Gershman 2002). Hagiú and Spulber (2013) state that Internet and mobile communication revolution have enabled information distribution systems of exceptional efficiency and vast markets for content. The digital technology as a crucial element in the recent spread of MSPs is evident. Examples include social networking platforms such as Facebook® which link networks of users with the providers of various services and applications, marketplaces such as Amazon® or eBay®, which bring together buyers and sellers, and search engine platforms such as Google®, which connect advertisers and web users (Bakos and Katsamakos, 2008). Digital and internet technologies have also enabled the creation of entirely new industries such as couponing (Groupon®, Privalia®), home sharing (Airbnb®), car pooling (BlaBlaCar®), social eating (Gnammo®), gig economy (Fazland®) and many others.

The relevance of digital and internet technologies is evident in platform economy, but a comprehensive view on technology impacts is still missing in literature. In

fact, literature only provides little insights about this topic. As an example, with technology improvements, platforms are becoming even more prevalent than traditional businesses but they don't investigate on the specific features and functions enabled by technologies. Vogelsang (2010) focuses on social networks, search engines and internet auctioneers showing that these kind of two-sided internet markets exhibit special characteristics: 1) they are growing very fast in terms of customer base and 2) the leading companies reach high valuations of investors when they are not yet profitable. Bhargava and Choudhary (2004) instead highlight the role of technologies in capturing, aggregating and exploiting information about participating parties of an intermediary

3. A framework to describe Multisided Platforms

The previous sections have shown the main insights about the main characteristics of businesses related to the platform economy. The functioning of a MSP is very complex because it is characterised by the presence of different actors and peculiar relationships between them (Sriram et al. 2015). Most of the contributions analysed in literature study the phenomenon of platforms dealing with analytical models concerning pricing issues and strategies. However, in addition to pricing considerations, platform development and design is a key strategic aspect. The likely configuration variables of a multisided platforms are under-investigated in literature. In our opinion MSP is a peculiar model which is different from traditional businesses. Sangeet et al. (2016) highlight the differences between platforms and "pipes". In pipes value is produced upstream and consumed downstream. Unlike pipes, platforms do not just create and push stuff out. They allow users to create and consume value. Some authors try to use already-developed framework to describe the main characteristics of a MSP (Muzellec et al. 2015). Nevertheless, these models do not consider some aspects that are peculiar in multisided platforms like for example user engagement, level of control by the platform and the characteristics of each side. It is evident that a platform need a specific model to be described. In the following sections we propose a descriptive framework aimed at understanding and describing the main configuration variables of a platform. The framework is made of two parts. The first part consists of a typology which categorizes platforms in four different types based on the functions and interactions enabled by the platform (cfr. Section 2.3). The second part consists of a list of configuration variables which describe the functioning of a platform considering different issues that are emblematic of the platform economy.

3.1 A new typology to categorize MSP

In section 2.3 we have shown the most important results of studies concerning how to distinguish platforms businesses in different categories. Considering that the aim of the framework presented in this paper is to

describe how the platform’s functions and which are the interactions enabled, we developed a typology aimed at distinguishing the platform in different categories based on the kind of interaction enabled and the functions performed by the platform manager. To develop this kind of typology, we have started from the typology identified by Evans and Schmanlensee (2008), already presented in section 2.3 with an appropriate refinement in order to achieve the above-mentioned objective. Firstly, it seems that this typology doesn’t consider those kinds of platforms in which there is not a clear exchange of a product/service between the sides of platforms (e.g. online dating websites, job-seeking websites, rating websites). Secondly, the typology developed by the authors considers also advertiser-supported platforms. Based on the definition of multisided platform provided in section 2.2, this kind of businesses are not included in our study, so our typology does not include this kind of platform. Thirdly, the “transaction systems” type identified, actually includes only credit cards. Since the credit card enables an exchange of money with a good or service, they can be included in the category of “exchange platforms”. Finally, the category of “hardware/software platforms”, may be potentially extended integrating all those platforms that not only enable an exchange, but also provide tools to develop (or physically make) the contents by one of the sides of the platform. Based on these issues, we propose a new revisited typology:

- **MATCHMAKING:** Matchmaking platform enables the matching of requests by (generally) two sides. The interaction enabled by the platform is something different from an exchange of a product or service in return for something else (there is not the transaction of a content). In other words, the main objective of the platform is to enable the match of users based on own expectations. Some examples are dating platforms and job-seeking platforms.
- **EXTERNAL EXCHANGE:** External exchange platform enables the matching of requests by (generally) two sides. The interaction enabled expects a transaction (that is an exchange of a product or service in return for something else). The transaction is carried out outside the platform (in other words, the platform can’t check whether a transaction is carried out or not). Some examples are classified websites and lead generator platforms.
- **EXCHANGE:** Exchange platform facilitates a transaction between the users, that is an exchange of a product or a service in return for something else; all the activities related to the transaction (contact, information about the product/service, payment, ...) is managed through the platform (the platform can check whether a transaction is carried out or not). Some examples are product marketplaces.
- **MAKER:** Maker platform facilitates interactions providing the appropriate tools or instrument to “make” the contents (products or services) which are used by the consumer side thanks to an appropriate interface that allows to access to the platform. Therefore, the contents made and provided can be

used and/or integrated on the platform. Some examples are video-games platforms and desktop OS platforms.

3.2 Configuration variables

In parallel with the typology presented in the previous section, we have developed also a model consisting of a list of the likely configuration variables which characterize a multisided platform grounded upon digital and internet technologies. The different variables are grouped in 7 categories, namely: integration & control (IC); engagement (EN), interactions and relationships (IR), pricing (PR), architecture (AR), competition (CO), advertisement (AD).

In Table 1 all the variables and description is shown

Table 1: Configuration variables of the framework

Variable	Description
Exclusive agreements (IC)	Exclusive agreements with some users of the different sides.
Contents provided by platform manager (IC)	Contents (products or services) provided by the platform manager (if the platform does not act only as a mediator between the different sides).
Platform control (IC)	The control arranged by the platform manager on products/services provided through the platform.
Freedom to access (EN)	Restriction level to the functions of the platform (e.g. sometimes it is possible to check some information about products/services provided through the platform without a formal subscription).
Requirement to access (EN)	Depending on the type of platform and on the industry, the necessary requirements to access (or to be accepted) as a user of the platform.
Interaction description (IR)	Which is the interaction enabled by the platform and carried out by the sides.
Interaction fee (PR)	Presence of a fee related to an interaction between users and how it is eventually calculated
Subscription fee (PR)	Presence of a fee related to the subscription to the platform and how it is eventually calculated
Premium fee (PR)	Presence of a fee related to the premium functions/services and how it is eventually calculated
Platform openness (AR)	The level of openness of the technological platform (e.g. is it possible to modify the functions provided by the core part of the platform and how?)
Platform infrastructure (AR)	Which is the nature of the platform (virtual/physical)? Both? N.B. In our study we focus in particular on virtual ones
External competition (CO)	How many and which are the competitors of the platform - Are there other platforms in the same business.
Internal competition (CO)	Is there somehow competition between the users in the platform and how the competition is set between users and how the competition is stimulated/controlled by the platform.
Boundaries between sides (EN)	The level of boundaries between the sides. This variable depends on the type of the platform, the industry sector in which the platform is applied and the nature of the sides.
Engagement incentives and	This variable aims at understanding if there are any externalities which make the platform more valuable

direct externalities (EN)	for an external user based on the number of already present users in the same side. It also analyzes the presence of mechanisms incentivizing users already present in the platform in inviting external users to join the platform.
Multihoming (CO)	The potentiality to use also other platforms.
Advertisement (AD)	Intensity level of advertisement as a source of revenue for the platform.
Versioning and updating (AR)	How often the platform is improved by the platform manager and in which way.
Enhancing functions and services (IR)	Which are the additional functions/services that are not directly involved in the enablement of the interaction, but they act as function which could enhance/make more efficient the interactions.

4. Conclusions

This paper addressed the recent phenomenon related to the diffusion of multisided platforms. A literature review has been carried out in order to investigate the main characteristics of MSPs. Building on the results of the literature review, we provide a definition of MSP in order to draw clear boundaries and avoid inconsistencies in future studies. Furthermore, given the different industry sectors in which MSPs are present, we have developed a typology focused on the different likely interactions that could be arranged in a multisided platform between the different sides. Finally, we have developed a model which consists of all the suitable configuration variables to describe a multisided platform. As with any research, our study is not without limitations as the framework developed aimed at describing the configuration of a MSP has not been validated by the application on real business cases. For this reason, considering future research trends, we are going to apply the presented framework on different types of business case studies based on the typology presented in this paper. Moreover, future research may identify the likely set of values that each configuration variable can assume for each of the four considered business typologies.

References

- Armstrong, M. (2006). Competition in two-sided markets. *RAND Journal of Economics*. Vol.37. Iss.3. pp.668-691
- Bakos, Y. and Katsamakas, E. (2008). Design and ownership of two-sided networks: Implications for internet platforms. *Journal of Management Information Systems* Vol.25. Iss. 2. pp. 171-202
- Bhargava, H.K. and Choudhary, V. (2004). Economics of an information intermediary with aggregation benefits. *Information Systems Research*. Vol.15. Iss.1. pp.22-36
- Campbell-Kelly, M. Garcia-Swartz, D. Lam, R. and Yang, Y. (2015). Economic and business perspectives on smartphones as multi-sided platforms. *Telecommunications Policy*. Vol.39. pp.717-734
- Chen, Y. and Xie, J. (2007). Cross-market network effect with asymmetric customer loyalty: Implications for competitive advantage. *Marketing Science*. Vol.26. Iss. 1. pp.52-66
- Eisenmann, T. (2008). Managing Proprietary and Shared platforms. *California management review*. Vol.50. Iss. 4
- Evans, D. and Schmalensee, R. (2008). Markets with two-sided platforms, *Issues in Competition Law and Policy*.
- Fano, A. and Gershman, A. (2002). The future of business services in the age of ubiquitous computing. *Communication of the ACM* Vol.45. Iss. 12. pp.83-87
- Filistrucchi, L. Geradin, D. Van Damme, E. and Affeldt, P. (2014). Market definition in two-sided markets: Theory and practice. *Journal of Competition Law and Economics*. Vol.10. Iss.2. pp.293-339
- Gazé, P., Vaubourg, A.-G. (2011). Electronic platforms and two-sided markets: A side-switching analysis. *Journal of High Technology Management Research*. Vol.22. Iss.2. pp.158-165
- Hagiu, A. and Spulber, D. 2013. First-party content and coordination in two-sided markets. *Management Science* Vol.59. Iss.4. pp.933-949
- Li, J. (2015). Is online media a two-sided market? *Computer Law and Security Review*. Vol.31. Iss. 1. pp.99-111
- Muzellec, L. Ronteau, S. and Lambkin, M. 2015. Two-sided Internet platforms: A business model lifecycle perspective. *Industrial Marketing Management* Vol.45 pp.139-150
- Piezunka, H. (2011). Technological platforms: An assessment of the primary types of technological platforms, their strategic issues and their linkages to organizational theory. *Journal für Betriebswirtschaft*. Vol.2011. Iss.61. pp.179-226
- Rochet, J.C. and Tirole, J. (2006). Two-sided markets: A progress report. *RAND Journal of Economics*. Vol.37. Iss.3. pp.645-667
- Sangeet, P.C. Van Alstyne, M. and Parker, G. (2016). *Platform Revolution: How Networked Markets Are Transforming the Economy--And How to Make Them Work for You*
- Seuring, S. and Gold, S. (2012). Conducting content-analysis based literature reviews in supply chain management. *Supply Chain Management: An International Journal* Vol.17. Iss. 5. pp.544-555
- Sriram, S. Puneet, M. Bravo, M.E. Chu, J. Ma, L. Song, M. Shriver, S. and Subramanian, U. (2015). Platforms: a multiplicity of research opportunities. *Marketing Letters*. Vol.26. Iss.2. pp.141-152
- Vogelsang, M. (2010). Dynamics of two-sided internet markets. *International Economics and Economic Policy* Vol.7. Iss.1. pp.129-145