Complementarities in Platform Ecosystems: A Study of Coevolution of Made-in-Korea Digital Entertainment Phenomenon

Research in Progress

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Abstract

Business ecosystems are pushed by competition to develop complementarities that increase their chances of survival. However, scholars continue to cite the lack of understanding in coevolution as a complementarity mechanisms of businesses, especially in the digital platform ecosystems. In this research-in-progress paper, we explore the development of complementarities, found in the coevolution of entities in digital platform ecosystems. Through initial case studies of globally developed Korean entertainment and culture industry, we discover a possible categorization of different types of coevolution in the digital platform ecosystem; namely '*digital transformation*' – business coevolving with its environment, '*platformization*' – core platform coevolving with its complementors, and '*reconfiguration*'- core ecosystem coevolving with its sub-ecosystems. Based on the findings, we suggest that there is a need to extend the definition of platform ecosystems to also incorporate the sub-ecosystems' coevolutionary interaction. A new conceptual framework is presented with future plans to develop both the work and the model.

Keywords: Coevolution, digital platform ecosystems, complementarity.

1 INTRODUCTION

Complementarity, often described as a strategy for organizational change, is a state in which doing two or more business units together yields synergetic outcomes compared to when they operate separately (Milgrom and Roberts 1995). This notion of complementarity has been identified in recent IS scholars studying the dynamics of business ecosystems, such that Adner and Kapoor (2010) highlights the importance of complementarity in an innovation ecosystem while Hannah and Eisenhardt (2018) suggests an enabling role of complementarities in nascent ecosystems. In the latter example, findings suggest that strategically selecting the area to achieve complementarity (e.g. supplying, marketing, funding, deploying, etc.) is highly important especially in nascent ecosystem such as the solar panel industry in the US. Increasingly, business ecosystems are exposed to fierce competition (Hannah and Eisenhardt 2018) and are pushed to achieve complementarity (Jacobides et al. 2018) so as to maximize their productivity and hence increase their chances of survival (Stead and Stead 2013).

In the emergent platforms and ecosystem literature, complementarity, to the best of our knowledge, is only understood through the lens of modularity (Jacobides et al. 2018). Scholars define platforms as "an extensible codebase with many third party complementary modules utilizing and adding value" (De Reuver et al. 2018). Because third party modules play an important part in the digital platforms, the owners of the platform continuously tune their modular structure (Adner and Kapoor 2010) to better achieve complementarity. However, scholars including Tiwana et al. (2010) recently argue for more work in the notion of complementarities and modularity to better understand the *coevolution* of businesses and platforms in ecosystems. This is because coevolution is an important notion of platforms and ecosystem change, as entities in an ecosystem evolve in tandem by exerting selection pressures on each other (Zhang and Wang 2018), such that mutualistic coevolutionary activities among different entities enhance the performance of each entity. However, scholars including Tiwana et al. (2010) highlights gaps in existing body of literature in research on complementarity, which is a tenet to understanding the coevolution and ultimately the sustainability of platform ecosystems.

Against the above backdrop and to address this gap in the dynamics of complementarity in platform ecosystems, we conduct a case study of the evolution of Korean culture from a regional to a global phenomenon, largely enabled by digital platforms and ecosystems in facilitating promotion, distribution and consumption of forms of Korean culture inspired entertainment. We ask the question 'How does digital platform ecosystems achieve complementarity through coevolution?' to the various stakeholders in the digital platform ecosystem of Korean digital contents and entertainment industry. We find their worldwide extended ecosystem, mainly built around various digitized content, and the dynamic stakeholder interactions within to be a suitable case for our research.

Our preliminary findings suggest that the digital platform ecosystems coevolve in various layers and different phases; digital transformation, (digital) platformization, and reconfiguration. We also find that the platform ecosystem literature so far is more focused on the 'platform' itself rather than the 'ecosystem'. Our results suggest that there is a need to expand our efforts on defining and understanding of 'platform ecosystem' to better incorporate the ecosystem aspects.

The remainder of this paper is as follows. First we discuss the literatures on platformization of digital goods and coevolution of platform ecosystems. After our method & case description we present our preliminary findings and conclude with a discussion & conclusion with plans of future research.

2 LITERATURE REVIEW

In this section we discuss digital goods shifting their traditional market to be on platforms and how the lens of coevolution is used across various ecosystems.

2.1 Platformization of digital goods

Digital goods are a stream of binary data having economic value (Quah 2003). Products such as music streaming service, game, e-books, movies on DVD, and business SWs are all under this category. As they are intangible and are mostly knowledge-based (Atasoy and Morewedge 2017), innovative content mixing and sharing activities were common even before platforms emerged (Flath et al. 2017). However, with the emergence of digital platforms, these activities further accelerated both in speed and volume.

To understand the mechanisms of the acceleration, there is a need to revisit the characteristics of platforms and digital platforms. Platforms are understood to be either multi-sided markets or a hub supporting complementary activities (De Reuver et al. 2018). In either cases, the existence of the platform allows various stakeholders to meet and collaborate on a common ground.

While platforms share this commonality, digital platforms unlike non-digital platforms have a different focus. The economics of the non-digital platform ecosystem are based on multi-sided markets. On the other hand, digital platforms extend on the multi-sided market to also consider the modules and subsystems extending their functionalities (De Reuver et al. 2018). Therefore on digital platforms, the relevant members and stakeholders become more interdependent to each other's function and resources.

These characteristics of the digital platform and the support it provides is critical to digital goods. (Bockstedt and Goh 2014; Flath et al. 2017). Bockstedt and Goh (2014) find that digital goods in digital platforms can better customize themselves to meet customer needs. The platform also functions as an access point for these digital goods to be shared among wider range of consumers (Tan et al. 2015). At the same time the platform also develops to diversify their modular functionalities supporting the diversification of the digital good (Bockstedt and Goh 2014). In a sense, digital goods and the digital platform together may be seen to increase each other's complementarity through their reciprocal expansion.

2.2 Coevolution lens for ecosystem complementarity

Coevolution, having its roots in biology and ecology, is also utilized by some business ecosystem scholars. Although not much research exists in the context of digital platform ecosystems (Tiwana et al. 2010), there are works looking into the mechanisms of interactions between firms in the ecosystem (Boudreau 2010; West and Wood 2014; Zhu and Liu 2018)

Coevolution of a business ecosystem can be observed in both competitive and cooperative situations. In an emerging economy members are exposed to a high level of competition during technology standardization and securing ones dominance in the ecosystem(Grodal et al. 2015). In the course of doing so they are induced to reciprocate on the selections of each other (Dong et al. 2016). Some scholars see this cycle as a positive stimulus accelerating innovations. Others suggest that this will result in fast resource consumption leading to a fast extinction of the ecosystem (Barnett 2016). On the other hand, research also finds that ecosystems coevolve cooperatively with the surrounding environments. Dieleman and Sachs (2008) shed light in the process of an ecosystem cooperating with their external institutions to coevolve. Clancy et al. (2016) highlight that cooperation of the mother company and its subsidiaries is necessary to synchronize the subsidiary's link in two different networks; the local network that it has and the network of the mother company in which the it is also included. In this case, the coevolution would result in aligning the two separated networks increasing productivity and complementarity of the whole network.

While coevolution is, as above, observed as an impactful phenomenon, the work of Montealegre et al. (2014) exerts additional effort in using it a theoretical lens. In their work, they dedicate a section to collect and classify different characteristics of coevolution (see p.581) and how they are used as a theoretical approach in relevant research. In their review, they suggest that platform ecosystems are exposed dynamics such as multilevel effects (Huygens et al. 2001) and the relationships are nonlinear (Vessy & Ward 2013). Therefore, coevolution would be a suitable theoretical lens to use for this case. By focusing on how coevolution in a reciprocal nature impact the structure of the ecosystem itself over time, the research contributes further to understanding coevolution in the context of ecosystems.

3 METHOD AND CASE DESCRIPTION

We select a case study approach for a number of reasons. First, case study methods are used for its purpose to support exploratory research (Siggelkow 2007). The objective of this study is to reveal the underlying process and answer questions of 'How' regarding interactions that lead to coevolution. Therefore we find this method useful for our research. Second, the ecosystem by nature highly complex, multifaceted (Koch and Schultze 2011) and multilateral (Adner 2017). We find that using the case study method would better guide us to establish our understanding while there is only little previous research to refer to (Klein and Myers 1999).

Among the various stakeholders in the creative content industry in Korea, we conducted several interviews with those in the k-pop and the gaming platform ecosystem. The market analysis report by Korea Creative Conent Agency (KOCCA) in 2019 indicates that the size of the k-pop market is estimated to be about $6.2Billion with BTS, an idol group, contributing to the platforms' world- wide expansion. They also report a market size of $13Billion for the gaming industry. In both cases, the stakeholders actively engage in the distribution, production, redistribution, reproduction of the content (Choi and Maliangkay 2014) through their relative platform. To illustrate, while stakeholder's first engagement with the content is through the main platform ecosystem, they actively create, engage, and expand with complementing activities. For example in the k-pop industry, the main platform produces and

distributes the original music. Various stakeholders with different interests such as fan bases all around the world would then create and manage the complements of the original music (e.g. fan made videos, lyric translations etc.). Their interactions result in increasing the overall value of the ecosystem as well as the size of the ecosystem. For this research, we scheduled to interview roughly 30 different stakeholders in this field. (Table 1) provides details of a sample of eight stakeholders we interviewed with so far.

No	Interviewee position	Organization	Interview topics
1	CEO	LOEN (Content creator,)	Strategies of digitization & complementary management
2	Vice CEO	LOEN (Content creator)	
3	CFO	LOEN (Content creator)	
4	Department head	SM Entertainment	Technology adaptation & complementary management
5	Administration Manager	BTS. Fanbase administration	Organizing complementors & growth
6	Business Manager	NEXON	Stakeholder interaction & complementary management
7	Game Service Manager (QA)	NEXON	
8	Overseas Operations Manager	NEXON	

Table 1. Sample List of interviewees

4 PRELIMINARY FINDINGS

Based on our study of made-in-Korea digital entertainment global phenomenon, our preliminary findings suggest that coevolution occurs extensively across the digital platform ecosystems. We specify three different categories. Digital transformation – platformization – and reconfiguration. While digital transformation is quite well explained in other literatures (Legner et al. 2017), we find platformization and reconfiguration to be relatively new, calling the need for additional research in the future.

4.1 Digital transformation – coevolution of the core business and the environment

Before the 'age of streaming' (Smith and Telang 2016), K-pop was usually distributed in forms of CD. Major record distributers were key partners for maintaining the stability of the platform ecosystem. However, executives in LOEN, a record company, recall that "[early in the 2000's] The physical albums market reduced . . . also largely due to piracy on S (platform name removed for anonymity) … It was more for survival that we built K-pop. We had to produce high quality of video production in a short time, while CDs (Compact Discs) became collector items. The requirements to succeed became different". The challenge they faced, together with the advances of technology and infrastructure, eventually led LOEN to evolve into a digital platform that services music streaming. They are the owner of 'Melon', one of the largest music streaming platforms in Korea. The successful restructure of a core business to become a platform can be interpreted as a result of the ecosystem coevolving with their exogenous environment. This phenomenon depicts may also be categorized to 'reconfiguration'. However, we understand it as a digital transformation for we believe that consumer perception towards piracy, a social factor, played an important role in the core ecosystem's coevolutionary selection.

4.2 Platformization – coevolution of the core platform and the complementors

While the coevolution of core business and its environment results in a digital platform transformation of the ecosystem, we also find that the core platforms are keen on supporting the growth of the complementors (i.e. firms or other groups creating additional value on top of what the core platform provides) Not only do they provide technical grounds, but they also provide incentives and hold events that would boost the interactions, yielding positive synergies between the core platform and the sub-ecosystem. Taking a step further, we also find that the core company is willing to support the platfomization of these positive sub-ecosystems.

During an interview with the project managers of the game C, produced and serviced by Nexon, the interviewees said that "As C is a 10-year-old game we feel the need of something new to outrun our competitors. Unfortunately, most of the possible contents were exhausted over time. To address such challenges, we developed a studio mode that allows users to develop their own maps for the game. We focused on making it as easy as possible for both creation and application. We thought that lowering the entry barriers was the key for players to actively engage." They also note that "While we held various events to encourage participation during the trial period, we also found that the quality of the user made was way above our expectations … We actually saw many users investing greatly to create high-quality maps". They also said, "We are also considering to support a market place for users to buy/sell their

creation to each other. Ultimately, it we think it will encourage users to play the original mode of the game than zombies [zombie mode]".

However, the QA manager of game MS, also serviced by Nexon, commented that "While we would also like to boost the sub-ecosystem platformization, we are not free from the disputes that may occur with the copyright laws. Even if it was done by a user, the game company would still be held responsible for any misconduct. I think this is one of the many factors that block us from further supporting the sub-ecosystem"

4.3 Reconfiguration - coevolution of the core ecosystem and the sub-ecosystems

When the core platform invested on platformization of sub-ecosystems, the complementors also contributed to the process of coevolution which lead to the reconfiguration of the ecosystem. The administration of AusArmy (BTS fan base) confirms that "There are also a lot of fans who take original content and put subtitles, and that allows a bigger spread…Recently, Naver has released the V LIVE App, and now when they have a V LIVE broadcast, after a few minutes or hours, the video gets re-uploaded with subtitles. Recently, they [agencies] have been using the fans' subtitles, so they are actually reaching out to fans from different countries who can translate Korean to their language, and that's on the official App". The complementing works of the sub-ecosystem pushed the core ecosystem to reconfigure themselves to include the products generated by the sub-ecosystem's activity on their sub-platform.

Along with the micro reconfiguration that affects minor parts of the product, we also observed macro reconfiguration of the platform ecosystem. The director of New Media Division at SM Ent. elaborated that "We are preparing for many technology-related initiatives. We have a complex cultural space called Artium, where we produce hologram concerts. So even if the artistes are not present, we can hold concerts using holograms. For VR, we are shooting and showing EXO's [a boyband] concerts from 360 degrees. Next, we have things related to IoT. So we have many partners such as Samsung and Google. We have a department that plans for VR [content] but we work with technology companies who can produce them. Technology companies need our context so we collaborate". The core ecosystem coevolves with sub-ecosystems bearing adaptable new technologies resulting in boundary expansion (Tan et al. 2016) of the core ecosystem.

On the other hand, the interviews also highlighted some coevolutionary interaction between the core and the sub ecosystem, which mimics a host-parasite relationship. The project manager of game M recalled one of his experiences where they had to ban an unpacked content from the game. "There was a user named 'H (user name removed for anonymity)' who modified [unpacked] the client program so that it could express sexual activities. As a consequence, we had to patch our client program so that it does not allow to run that unpacked content. This is only one example among many different types of unpacked contents [distributed through the sub-ecosystems] out there that we as the platform owner have to deal with…As one of the attempts to prevent our users from creating and using unauthorized SW we once had to change the client SW packaging method."

5 DISCUSSION AND CONCLUSION

Based on our examination of the global phenomenon that is Korean digital entertainment and the complementarities in platform ecosystems, we suggest that unique coevolutions occur in different categories and with different entities. Not surprisingly, we find that the core ecosystem is very supportive to the sub-ecosystems should they find it to be beneficial to them. However, we also find that not all coevolution is geared towards being mutualistic. Some relations appeared to be exploitive, resembling the host-parasite relations. In such cases, the core ecosystem was forced to invest additional resources only to maintain their status (Derfus et al. 2008) and a negative reciprocal cycle was built. While a number of factors, such as entry barrier and copyright laws, were found to be important, we notice that socio-political factors also play an important role (e.g. consumers selecting pirated contents over the proper distribution – low level of acknowledging copyright infringements etc.).

Overall, our findings indicate that the digital platform ecosystem cannot be expressed in a simple layer of a focal firm and its complementors. Rather, it is more complex with multiple ecosystems, core or sub, interacting and coevolving as a whole. We notice and point out that the literature so far, even if they referred to 'platform ecosystems' as their context, concentrate more on the platform aspects neglecting the ecosystem aspects. Therefore, to extend our definition of digital platform ecosystem to also consider the ecosystem-ness, we propose a new hypothetical framework (Figure 1). We suggest adding the definition of ecosystem proposed by Adner (2017) in which he says that an ecosystem is 'an alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize', would be helpful to illustrating the development of our understanding of the mechanisms of complementarities.

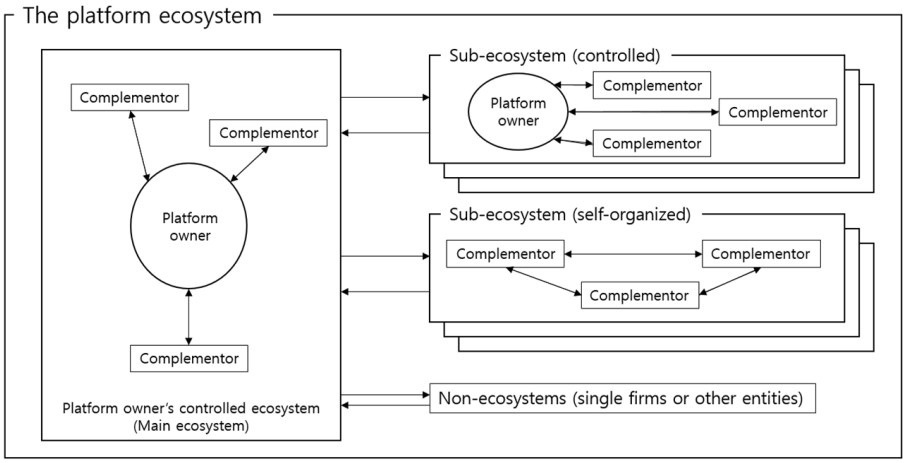

Figure 1. Summary Conceptual Framework of Coevolution of Digital Platform Ecosystems

Based on it, we suggest that the entities in the platform ecosystem establishes a tighter and more complex network with each other. There is a need of a different approach in ecosystem management and strategy. It is not about maintaining multiples of single firms but is about maintaining the interactions between complex structures, the sub-ecosystems.

For future plans, we will be continuing to collect data that would support our categorization of coevolution. Meanwhile, we suggest a number of interesting topics that may be worth looking into. Research may investigate into uncovering other enablers of coevolution for digital platform ecosystems. We also see opportunities in investigating the hyper-complex technical structure the platform ecosystem has ended up building. This may provide us with a better understanding towards the effect of technology in the platform ecosystem. In conclusion, we believe that building on this new approach, our understanding of the digital platform ecosystem may be better developed and be more practical.

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Acknowledgements

The authors thank Ziziu Guo from the University of New South Wales and Applied Artificial Intelligence Institute of Deakin University for supporting this research.