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Complementors' Coopetition-Based Business Models in Multi-Platform Ecosystems

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Abstract

Multi-platform ecosystems (MPEs) are comprised of multiple platforms integrated to create and capture value together. The collective value creation and capture within MPEs gives rise to coopetion, which impacts the business model configurations for both incumbents and entrants that provide complementary offerings. Previous platform research has predominantly focused on incumbent platforms. This research focuses on the question of how entrant platforms configure their business models to endorse coopetition with incumbents in the MPEs within the healthcare sector. Our findings indicate that entrant platforms configure their business models to integrate into MPEs and need to flexibly align with the complementarity requirements set by the incumbents, combine inter- and intra-platform collaborative dynamics in their business models, and build on coopetition with incumbents.

Introduction

Digital platforms have become a prominent component of the digital economy (Cusumano et al., 2020; Hein et al., 2019; Rietveld et al., 2019), including in healthcare. The increased adoption of digital health technologies globally brings new challenges for digital platforms operating in the healthcare domain. These challenges affect incumbent platforms, which must keep up with rapidly changing requirements and newness threats from the entrant platforms. Meanwhile, entrant platforms lack sufficient resources to meet the regulatory requirements and sustain enough revenue streams to develop their

Keywords: Multi-platform ecosystems, Coopetition, Complementarity

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platforms (Aerts et al., 2023). Entrant platforms need extensive resources to get their technologies accredited by hospitals and establish trust mechanisms with them, as healthcare is a highly regulated domain. Incumbent and entrant platforms need to configure their business models to find new value creation mechanisms outside their ecosystem boundaries and start collaborating with their competitors. In turn, these dynamics drive the competing platforms to collaborate and integrate their technologies into Multi-platform Ecosystems (MPEs) for collective value co-creation and co-capture (Mohamed et al., 2023).

Coopetition aggregates all actors in the MPEs in the creation of shared value, and it affects the actors' choice of competition outside the borders of the MPEs. From the strategic perspective, integration into the MPEs grants the incumbent platforms the autonomy to decide the governance mechanisms for the whole ecosystem, which triggers governance tensions between ecosystem actors in the later phases of integration (O'Mahony and Karp, 2020). The alignment of multi-layered relations between incumbent and entrant (complementing) platforms in MPEs is complex and differs from the single multi-sided platform (Mohamed et al., 2023; Zhang and Williamson, 2021). Research on common value co-creation and business model configuration in complex domains like MPEs is lacking. Recent research on platform business models has focused on incumbent platforms, often referred to as platform owners. However, there is scant research on firms' business models offering *complementary* platforms (Ritala et al., 2014) or their business models and coopetition dynamics in multi-platform ecosystems. The extant research considered platform ecosystems as organizations where the leadership role was granted to the owner of the platform's technological hub (Hein et al., 2019; Kretschmer et al., 2020). The platform leader orchestrates the governance mechanisms and designs the roles of admitting new complementors to the platform core (Cusumano and Gawer, 2002; Gawer, 2014). The extant research has examined collaboration-competition dynamics in the platform setting from the platform leader's perspective. However, most of the extant research used publicly available data for the platform companies, which may be considered biased and incomplete because it lacks data from managers and decision makers in the platform firms.

In this study, we consider the managerial influence on the platform decision to configure their business model for establishing coopetition with the competing platforms. In doing so, we use the digital stroke pathway as the context for this study, in which the implementation of cross-integration between multiple platform providers is required. The incumbent platform providers are the platform leaders who orchestrate the governance mechanisms for the overall platform ecosystem. Given the complex entry requirements and regulations in the healthcare domain, entrant platforms are the complementors for the incumbent's offering and collaborate with the incumbent platforms to get access to the healthcare domain.

This study develops the following research question: how do entrants configure their business models to endorse coopetition with incumbents in MPEs? We argue that platforms integrate into MPEs to scale and renew their businesses through coopetition with a large base of stakeholders integrating into MPEs. The paper concludes that entrant platforms configure their business models to endorse inter-platform coopetition and gain approval from incumbent platforms in highly regulated domains like healthcare.

Approach

Definition of key concepts

Platform business models

At the single multi-sided platform level, the business model creates value by facilitating the exchange between the demand side (end-users) and the supply side (producers) (Gawer, 2014). The network effect influences the dynamics of platform business models when users on the demand side grow to an extent that motivates complementors to join the supply side of the platform to add their complementary innovations and generate greater value for the platform (Tiwana et al., 2010). The platform leader decides on the degree of platform openness through governance mechanisms by granting access to complementors on the supply side to the platform

to add their innovations (Tiwana, 2013). Depending on the degree of openness set by the governance mechanisms, when it becomes publicly known how to integrate complementary offerings to the leading platform, new complementors will be encouraged to join the platform and provide complementary offerings to the it (Cusumano and Gawer, 2002).

As a starting point for building up the conceptual framework for MPE's thinking, the extant research has examined the emergence of the digital platform from the single-sided platform perspective. The supply-side platform operates to fulfil the demand created by the end-users on the demand-side platform. The demand side aggregates the end-user group, and the supply side aggregates the platform complementors, and in some cases, it aggregates the third-party complementors. The digital multi-sided platform aggregates both demand-side and supply-side platforms around both sides. (Tiwana et al., 2010; Cusumano and Gawer, 2002). The direct network effect occurs when the platform becomes favourable to many users on the demand side. The more it aggregates complementors on the supply side, the more it provides a complementary offering that matches the core of the central platform (Economides, 1996; Tiwana et al., 2010).

Yet unlike industrial/product-oriented platforms, digital multi-sided platforms establish complex ecosystem dynamics (Cusumano et al., 2020; Tiwana, 2013). The governance mechanisms determine the role of each complementor in the platform ecosystem, specifying who does what, and what types of innovation are needed, specifically when these innovations take place in the complementary modules (Boudreau, 2010). Furthermore, when it becomes publicly known how to integrate complementary modules to the leading platform, new complementors will be encouraged to join the platform ecosystem (Cusumano and Gawer, 2002). Moreover, this increases competition in multi-sided markets, introducing challenging new forces for the platform leader to emphasise, adding innovations to the overall platform ecosystem and protecting the technology from imitation (Zeng et al., 2019). As part of coping with the competition that might arise from the complement's side or entrant platforms, the platform ecosystem can evolve as a meta-organisation in which the architecture design of the leading platform's infrastructure can enable the aggregation of platforms around the technological core (Kretschmer et al., 2020).

MPEs include leading and complementary platforms aggregated around the technological core of the leading platform (Kretschmer et al., 2020). The architectural design of the platform ecosystem enables the central platform to provide the technical infrastructure for complementors to create their complementary offerings and expand their business scope (Tiwana, 2013). Further, it enables the central platform to orchestrate the value creation and capture for the entire platform ecosystem (Baldwin, 2012; Yrjölä et al., 2021). The platform ecosystem leverages the capabilities of complementors to add new features that the platform owner does not see (Tiwana et al., 2010; Isckia et al., 2020) and transform the business models of both incumbent and complementor platforms.

Inter-platform coopetition in MPEs

Strategic management scholars define coopetition as the alignment of collaborative dynamics with competitors to achieve a more significant competitive advantage for both parties than a single firm could achieve alone (Ritala and Hurmelinna-Laukkanen, 2009). In the digital platform setting, coopetition occurs when complements align their heterogeneous motives to join the platform ecosystem to use resources efficiently, share costs, risks, and resources for innovation and improve the competitive dynamics

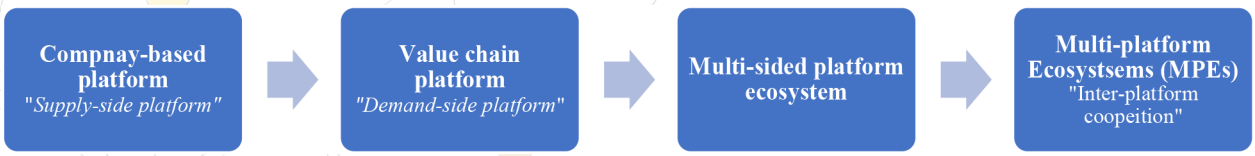

Figure 1. The conceptual development of Multi-platform Ecosystems (MPEs)

of the platform ecosystem. In this sense, the value is captured by involving competitors in the company's business model (Ritala et al., 2014). Although coopetition intensifies data sharing between complementors in MPEs, it can stimulate tensions between complementors when the individual platform's opportunistic behaviour becomes visible (Mohamed et al., 2023; O'Mahony and Karp, 2020).

The value proposition in digital platforms forms around end-user centricity and information exchange between end-users, platform leaders, and complementors (Gawer, 2014). The integration between the platform leader and complementor enables the exchange of the platform leader's internal resources and facilitates complementors in adding complementary innovation and expanding the scope of the platform (Isckia et al., 2020; Zeng et al., 2019). Value creation thus depends on the degree of integration between both sides of the platform. Moreover, it enhances platform leaders to establish a large base of users and complementors to enable the cross-side network effect between these two groups (Tiwana, 2013). Nevertheless, achieving the full integration dynamics between multiple complementors and leaders in multi-platform ecosystems is challenging. In MPEs, incumbent platforms come at the centre of the platform ecosystem and design the integration roles for other complementors involved in them (Cusumano and Gawer, 2002; Rietveld et al., 2019; Teece, 2018). Yet designing and managing complementarity becomes complex when multiple platforms have unequal leadership roles within the same ecosystem (Mohamed et al., 2023).

Research method

We opt for a qualitative case study approach (Yin, 2015) to address the configuration of complementor's business models when integrating into MPEs. We collected the research data through 13 semi-structured interviews with project managers from the selected case companies between June 2020 and November 2021. We followed purposeful sampling in the selection of the case companies (Patton, 1990), where all cases were part of the Stroke-Data consortium in Finland, which aims to co-create a patient solution for stroke prevention, treatment, and rehabilitation. We discussed the following themes during interview rounds: the platform's integration strategy to the MPEs, the type of market opportunities driven by integration into the MPEs, the configuration of the platform's business model, complementarity with other partners, and the platform's future business model and revenue model scenarios. We reached data saturation after the last interview round, and no further data collection could develop additional insights for this study. We anonymised any information that could affect the case company's future strategies. We transcribed all interviews to start the data analysis.

We followed the thematic analysis approach to analyse our data (Braun and Clarke, 2006) and started the analysis with an in-depth reading of interview transcripts and highlighting the relevant themes for our study. We categorised the common themes into three categories, following Zott and Amit's (2010) business model design elements of content, structure, and governance to analyse how the platform conducts business and delivers value to its customers. The content refers to the activities performed by the focal platform; the structure describes how various activities can be linked and what sequence is needed; and governance refers to who does what.

Key insights

Using Zott and Amit's (2010) business model design elements, we identified what kind of adjustments entrant (complementing) platforms make to their business model to endorse coopetition and meet the integration requirements imposed by the incumbents in MPEs. We consider the choice of our analysis approach justified, because the selected platforms configure their business models to integrate the external capabilities (i.e. coopetition with incumbents) with internal resources in support of innovation strategies (i.e. integration into MPEs). Further, the business model determines a firm's bargaining power, which

means that the greater the value the focal firm has, the greater the bargaining power it will have, i.e. bargaining power between incumbents and entrants' platforms integrating into MPEs.

In the analysis of our case study, we identified the content, structure, and governance of the complementing "entrant" and incumbent platforms. We found that complementing entrant platforms configured their business model to best align with the coopetition requirements set by the incumbents to achieve market entry into the healthcare domain. The licensing requirements to admit a new device is rather complex, and the initial cost required to run the piloting study to get a licensed medical device is beyond the resources of the newly born entrant firms.

Our findings indicate that incumbents design the governance mechanisms in MPEs to control the platform's central technological hub. In other words, incumbents facilitate the coordination and data-monetisation activities between complementors in MPEs. Whilst complementors agree to the governance mechanisms that define platform-to-platform openness strategies, coopetition dynamics within and outside MPEs are difficult to identify by the complementors due to their limited financial resources and uncertainty about new markets. The key findings of our analysis are presented in Table 1.

Table 1.

Complementors' Business Model		Incumbent Platform Business Model	Business Model configuration in MPEs
Platform B	**1. Content** The platform *applies cross-collaboration with all platforms integrating into MPEs*. The current usage of the platform focuses on the rehabilitation and prevention sides of the stroke treatment journey. The *coopetition with all platforms is a renewed opportunity* to expand into the treatment parts of the stroke. **2. Structure** A big data platform integrates and monetises sleep and rest periods *with other platforms* integrating into the stroke-data MPEs. **3. Governance** *Coopetition with incumbents and other new entrant platforms* to develop secondary prevention solutions for strokes. Through the *partnership with other new entrants,* the company supplies platform E with their sensors to help build the AI-oriented platform.	**Platform A** **1. Content** The platform offers a preventive solution for medical care professionals and patients and *regulatory experts* to certify medical devices/solutions. **2. Structure** The platform is integrated into MPEs to *expand the business scope through collaboration with new entrants* and develop an initial prototype for Software as a medical device for clinical decision making through data integrations with other platforms. **3. Governance** Platform-to-platform openness to developing software as a medical device that supports healthcare professionals in clinical decision making. Also, personalised support for patients alongside their *treatment journey.*	**1. Complementor business models** Enable the establishment of collaborative relationships between competing firms as new entrants arrive with a radical innovation that may disrupt the market dominance for incumbents. The resource limitations and higher levels of market uncertainty are the drivers for new entrants to establish coopetition-based business models with incumbent platforms. **2. 'Complementors' joint business models** Relieve some of the integration conflicts between complementors and platform leaders. Deciding who designs the governance mechanisms and how to share data is related to platform-to-platform openness from the beginning of integration.

Table 1. Complementors' business model configuration in the MPEs[1]

[1] The italic font refers to coopetition in the business model elements.

Table 1.

Complementors' Business Model		Incumbent Platform Business Model	Business Model configuration in MPEs
Platform C	**1. Content** Platform specialising in business intelligence, data reporting, warehousing and planning. **2. Structure** Established *collaboration with platform E* to build the rehabilitation platform. **3. Governance** The platform unifies the stream analytics generated from the business analytics platform to the platform D concept and meets the integration requirements for MPEs.	**Platform G** **1. Content** AI-based analytics platform to measure ECG. **2. Structure** *Coopetition with new entrants* to further develop the AI-driven analytics platform. **3. Governance** The platform applies *platform-to-platform openness* as a data source for all platforms integrating into the MPEs. The platform sensor monitors the patient status either from home or the hospital environment.	**3. Approval of the complementors' business models for entry and the creation of new market opportunities** Coopetition with incumbents helps gain approval to "entrants'" business models in complex domains. Entrants can find their place in MPEs through collaboration and sharing the high costs of R&D. In parallel, coopetition-based business models enable incumbents to keep control of the propensity for sudden competition from entrant firms.
Platform D	**1. Content** Empathic building platform specialising in data visualisation from *all possible data collection points.* **2. Structure** *Collaboration with platform C* for data visualisation and all other platforms to integrate solutions around the empathic building platform. **3. Governance** Platform integration into all points on the digital care pathway for stroke prevention, treatment, and rehabilitation.		**4. Coopetition-based business model as an international market approach for complementor platforms** Resource limitations, market uncertainty, and competition drive new entrants to configure their business model based on the mechanisms set by incumbent firms. Otherwise, they cannot establish collaborative dynamics with well-established incumbents. Coopetition will guarantee entrant platforms a fair share of the business when expanding internationally.
Platform E	**1. Content** AI platform developed based on the *integration phases and complementors* needs in the MPEs. **2. Structure** The platform operates in the Finnish market *and collaborates with platform A to access other Nordic countries.* **3. Governance** The platform applies *platform-to-platform openness* through a *partnership* with Platform A		

Table 1. Complementors' business model configuration in the MPEs (*Continued*)

Table 1.			
Complementors' Business Model		**Incumbent Platform Business Model**	**Business Model configuration in MPEs**
Platform F	**1. Content** The platform develops its sensors to continuously monitor people at risk of stroke or stroke reoccurrence. **2. Structure** *Collaboration with the incumbent* platforms to *gain access to the Asian market.* **3. Governance** The platform seeks the *approval of the incumbent platforms A and G* to use their sensors in stroke rehabilitation and prevention.		

Table 1. Complementors' business model configuration in the MPEs (*Continued*)

Discussion and conclusion

Our motivation for this study was to understand how entrant platforms configured their business models to endorse coopetition with incumbent platforms when integrating into MPEs. This paper enriches our understanding of the inter-platform coopetition when platforms shift from the single multi-sided platform ecosystem to multi-platform ecosystems. We emphasised healthcare as a complex, rapidly changing, and highly regulated domain that facilitated the competing platforms to engage in collaborative dynamics as the central part of their value creation and capture in healthcare. From the entrant platforms' perspective, they lacked sufficient resources to meet the entry requirements set by healthcare. At the same time, incumbents collaborated with entrants as a strategic approach to overcoming possible competition in the future. We analysed the business model configuration for both entrant and incumbent platforms, with a particular emphasis on the entrant platforms during their integration into MPEs – i.e. the ecosystem of multiple platforms working together to create a shared value for the whole platform ecosystem. The extant studies have examined MPEs as a multi-layered system using modular design as a critical element for managing interdependencies between modules and bringing active cooperative dynamics to the ecosystem (e.g. Yrjölä et al., 2021). Tensions of managing modularity in multi-layered systems arise from battles for market dominance between different modules. The platform leader designs the modular business model to guarantee equal opportunities for all modules involved in the multi-layered system.

Four significant findings have emerged from our analysis. First, we argue *that platforms' need to configure their business models to integrate into MPEs* is common in complex domains like healthcare. Incumbent platforms take the platform leader role and design the governance mechanisms for the whole ecosystem to guarantee market dominance and overcome sudden competition by complementors. This finding resonates with the platform leadership strategies in the single multi-sided platform setting, where the platform leader decides the level of platform openness that enables complementary innovations to expand the scope of the platform (Den Hartigh et al., 2016). Further, we conclude that resource limitation and higher levels of market uncertainty drive entrant platforms to configure their business models for coopetition with regulated incumbents.

Second, we argue that complementors configure their business models when integrating MPEs to best align with the *complementarity requirements* set by incumbents, especially in complex domains like healthcare, where the integration and optimisation requirements for admitting new technologies and creating trust are complex. Our findings extend Kretschmer et al.'s (2020) view on the hierarchy and establishment of the incumbents that place a considerable hurdle for the platforms to enter specific markets unless the platform leader grants complementors the flexibility and autonomy to design their offerings.

Third, we find that *complementor platforms must be flexible* when configuring their coopetition-based business model with incumbents to gain their approval to verify the overlapping goals and decide the size of market share from the cooperative relations. Our view is consistent with Kretschmer et al.'s (2020) study on meta-organisation features, where control of the platform is granted to the central technological hub to facilitate the coordination between the existing and new complements, as entrants integrate into MPEs to increase their opportunities in the ecosystem (Isckia et al., 2020). This finding highlights that MPEs grow when they become open and attract many complementors to integrate into the ecosystem. Nevertheless, this raises cooperative tensions between complementors concerning future collaborations that may influence some complementors' future market strategies (Zhu and Iansiti, 2007).

In MPEs, the dynamics of the ecosystem evolve, as many platforms decide to integrate their complementary technology or open their technical core for other platforms to build their offerings upon. The complementarity does not limit the layered setting. Instead, some platforms can simultaneously have the complementor and owner roles, which means integrating into MPEs *combines inter- and intra-platform collaborative dynamics*. We conclude that the coopetition in MPEs conceptualizes two elements: (I) the number of complementors is bigger than the number of platform owners, and (II) the platform owner decides the openness of the platform infrastructure to attract complementors who add complementary innovations and increase the value of the platforms.

Fourth, this study concludes that the *complementors' business models build on coopetition to benefit incumbent and new entrants integrating into MPEs*. Platform-to-platform openness and governance mechanisms are the wheels for admitting new complementors to MPEs. Nevertheless, platform leaders decide the governance mechanisms in MPEs, and they develop through multiple transitions. Platform leadership activity varies between centralise-d and decentralised control over the complementors who integrate into the MPEs. The transitions in leadership roles are generated from the platform leader strategy to maintain the same level of market dominance by not admitting platforms that might turn into sudden competitors in integrations' later stages.

Finally, this case study has analysed complementors' approaches to configuring their business models as part of their renewal strategy. Further research could investigate the specifics of business models as the coopetition relationship emerges. In particular, an examination of the conditions in which the tensions of coopetition occur when new entrants have business opportunities outside the scope of MPEs that may intensify the competition between new entrants and incumbents would be valuable. Further, we encourage additional empirically grounded studies in different domains (instead of the healthcare domain used in this study) to investigate how the integration requirements and drivers may be formed in other settings.

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