OWNERSHIP STRUCTURES AND GOVERNANCE STRATEGIES FOR DIGITAL PLATFORM ECOSYSTEMS: AN EMPIRICAL STUDY

Research Paper

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Abstract

Platform governance can contribute to the overall success of an ecosystem; however, what factors influence governance decisions remains to be understood. We propose that platform owners define and implement platform governance following their unique structure of ownership as digital platforms may be owned by a single, or many independent intermediaries. To compare platform governance across the specific ownership structures of incumbents, strategic alliances, and start-ups, this paper employs an embedded multiple-case study with 34 interviews and rich secondary data. Our findings illustrate the governance characteristics of each ownership structure and the influence of internal factors and the surrounding ecosystem on their governance decisions. We discuss governance strategies for each ownership structure regarding cost synergies, co-creation synergies, and growth opportunities. This study highlights the interdependence between platform governance and ownership structure and provides practical guidance for different platform ownership structures to design suitable platform governance strategies.

Keywords: platform governance, ownership, strategy, incumbent, strategic alliance, start-up.

1 Introduction

By redesigning "how industries are defined, how ecosystem participants interact, how stakeholders' needs are met, and how value is created and shared" (Accenture, 2017), platform ecosystems are expected to generate $10 trillion for businesses and society from 2017 to 2027. Platform ecosystems are driving industry leaders' actions because they want to be among the digital transformation winners and capture value for their businesses (Böttcher et al., 2021; Floetgen, Strauss, et al., 2021). Platform ecosystems are platform owners who implement governance mechanisms to facilitate value-creating mechanisms on a digital platform among an ecosystem of autonomous actors (Hein et al., 2020).

However, the successful implementation of a digital platform ecosystem is not easy, and one-third of all platform ecosystem failures can be attributed to poor governance choices (Floetgen, Novotny, et al., 2022; Reeves et al., 2019). To create value and survive, digital platforms must establish an appealing governance model that complies with government regulations while balancing openness and control (Falk & Riemensperger, 2019; Floetgen, Ziegler, et al., 2022). Platform governance defines fundamental rules for platform access and allows for the specification of critical behavioral guidelines (Huber et al., 2017). Therefore, platform governance provides important adjustment screws and opportunities for platform owners when designing and maintaining a thriving platform ecosystem to shape and maintain the relationship between platform ecosystem owners and independent actor groups (Eisenmann et al., 2006; Floetgen, Novotny, et al., 2021; Riasanow et al., 2020).

However, successful platform governance heavily depends on the platform ownership structure (e.g., Bakos & Katsamakas, 2008; Floetgen et al., 2020). The platform owner, also known as the ecosystem's keystone firm or the economic catalyst, is the lead firm primarily responsible for the platform (Tiwana, 2013). Multiple companies can share platform ownership; a platform does not have to be proprietary or for profit. Platform owners amass substantial power and influence, putting their interests ahead of those of other stakeholders (Chen et al., 2020). Although the importance of ownership structure was established in the marketplace research (Yoo et al., 2007), it has been less prominent in platform research.

However, different platform ownership structures, such as incumbents, alliances, and start-ups, have emerged as prominent in recent years. First, incumbent ownership refers to platform owners who have already established businesses in a market or industry (Chen, 2023). Second, a strategic alliance covers multiple platform owners (i.e., two or more companies) who have agreed to collaborate on a mutually beneficial digital platform project while maintaining their independence (e.g., Mowery et al., 1996). Third, some start-ups serve as platform owners for newly established companies (Katila et al., 2012). Each of these ownership structures has distinct platform governance implications: An incumbent platform owner may offer high financial incentives to complementors, whereas a start-up platform owner may only offer lower monetary compensation due to limited financial resources. Moreover, a start-up may offer complementors flexible monetization concepts, such as revenue share and an app publishing fee. In contrast, less agile incumbent platforms may not provide that flexibility to ensure standardized processes. In return, platform owners may switch ownership structures based on platform governance design decisions to leverage different characteristics of each ownership structure suited to their platform ecosystem and strategic orientation. Creating a spin-off or start-up within an incumbent company, founding two start-ups and building an alliance, and joining a strategic alliance with multiple incumbents are some examples.

Platform governance research has primarily focused on a generalistic and isolated perspective of platform owners, such as analyzing the control mechanisms (e.g., Karhu et al., 2018) or incentive mechanisms (e.g., Ye & Kankanhalli, 2018)), while ignoring the ownership structure of the digital platform and how it may affect governance decisions. Because governance is critical to the success of digital platforms and poses a large opportunity for companies to capture value and remain competitive (Chen et al., 2022), the differences in governance based on the ownership structure represent an important yet understudied "adjusting screw" for platform owners when designing and maintaining platform ecosystems (Kretschmer et al., 2020). Hence, insights into the dependence of the ownership structure on platform governance could lead research to rethink and refine the established and generalized approaches to platform governance, as well as assist practitioners in minimizing ineffective governance decisions (Schreieck et al., 2016; Song et al., 2018). The following research question is addressed in this paper: *How do incumbents, strategic alliances, and start-ups platform ownership structures influence platform governance decisions?*

Therefore, this paper evaluates platform governance from the ownership standpoint. It (1) contrasts an incumbent, a strategic alliance, and a start-up ownership structure, and (2) identifies internal and ecosystem platform governance influencing factors. We leverage an embedded multiple-case study of three platform ecosystems, including 34 interviews and extensive secondary data (Fontana & Frey, 1994; Yin, 2014). Accordingly, we discuss governance strategies for each ownership structure in terms of cost synergies, co-creation synergies, and growth opportunities. We contribute to the platform governance literature by deconstructing platform governance's reliance on platform ownership. Moreover, we provide practical guidance for various platform ownership structures to design appropriate platform governance strategies.

2 Theoretical Background

The platform governance literature argues that managing the triangulation relationships between the roles (e.g., complementors, customers, stakeholders) in the context of an ecosystem subject to network effects and winner-takes-all dynamics goes beyond the platform owner's ability to design, implement, and market the platform, and thus, platform governance is required (Foerderer et al., 2018; Tiwana, 2015; Tiwana & Konsynski, 2010). Platform governance includes the platform owner's decisions concerning complementors, specifically access and behavior guidelines (Gawer & Cusumano, 2014; Huber et al., 2017; Tiwana, 2013). Three major platform governance research streams can be identified in the existing literature: organizational, engineering, and economical.

First, the organizational research stream considers the optimal governance form and structure, how governance is managed, and how competition is addressed. Most governance structure research divides governance into the concepts of roles, pricing and revenue sharing, boundary resources, openness, control, technical design, competitive strategy, and trust, or an abstraction of these concepts (e.g., Halckenhaeusser et al., 2020; Hein et al., 2016; Perscheid et al., 2020; Schreieck et al., 2016). Second, the engineering research stream highlights the importance of modular architecture with a stable core for fostering value co-creation (Baldwin & Woodard, 2009; Hanseth & Lyytinen, 2010; Spagnoletti et al., 2015; West, 2003). This research stream contends that platforms encourage the reuse of shared resources, such as application programming interface (API) and software development kits, to promote scope economies (Floetgen et al., 2020; Foerderer et al., 2018; Gawer & Cusumano, 2014). A platform's aspects, such as safety, security, and real-time requirements, become more important as its architecture is modularized (Soeldner et al., 2015). Third, the economic research stream concerns business concepts and strategies for designing and operating a platform (Caillaud & Jullien, 2003). For example, in the context of pricing, these papers argue that the less price-sensitive side is charged, whereas the other side is subsidized, to solve the chicken-and-egg problem and bring the price-sensitive side onto the platform (Hagiu, 2006).

The platform governance literature within its three research streams focuses primarily on how co-creation can be promoted and the impact of organizational, engineering, and economic factors and actions on it. Even with these research streams, there must be theoretical convergence on the existence of an underlying platform governance influencing aspect that uses maturity and openness, for example, as proxies for itself. Because different governance approaches emerge when looking at different companies, this research investigates the role of varying platform ownership structures as such a factor. However, as the platform business has grown in popularity (e.g., Foerderer et al., 2018; Huber et al., 2017; Wareham et al., 2014), it has become critical to understand the impact of ownership on platform governance.

3 Embedded Multiple-Case Study

We used an embedded multiple-case approach to generate inductive theory (Eisenhardt, 1989). A polar sampling of various platform ownership structures ensures adequate theoretical sampling, allowing for transparent observation of emerging relationships and constructs (Martin & Eisenhardt, 2010). The platform ownership structures of a start-up, incumbent, and strategic alliance were chosen using this sampling approach. Through several levels of analysis (i.e., corporation and technical platform, and ecosystem) within the embedded research design, the richness and accuracy of our results were enhanced (Martin & Eisenhardt, 2010; Yin, 2014).

Table 1 summarizes the three platform cases we used to develop and evaluate platform governance based on the structure of ownership. Across all cases, we conducted 34 interviews and transcribed, anonymized, and returned the results to obtain additional comments and correct misunderstandings. Moreover, technical and strategic experts representing the platform owner's perspective were interviewed for the expert interviews (see Table 1). By interviewing experts from various hierarchical levels and areas of the company, information bias and retrospective sensemaking were reduced (Martin

& Eisenhardt, 2010). The interview guidelines have been designed for open-ended questioning to give the respondents the most significant possible scope for answers and ensure that the context and personal knowledge of the interviewees are captured (Myers & Newman, 2007). Moreover, we supplemented and triangulated our findings with rich secondary data sources, such as terms and conditions, platform complementor portals, community and company websites, and developer forums.

Within-case and cross-case analyses with no initial hypotheses were used following the multiple-case study approach (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). For the within-case analysis, we used MAXQDA software to code each transcript according to the grounded-theory coding process of open, axial, and selective coding (Corbin & Strauss, 2008).

After each company's within-case analysis was completed, the cross-case analysis was performed (Eisenhardt, 1989; Eisenhardt & Graebner, 2007). Alternative theoretical relationships and constructs that describe data patterns better than the initial theory were sought for this purpose (e.g., Martin & Eisenhardt, 2010). To that end, different preliminary theories from two cases were tested against the third case using the replication logic (Yin, 2014). Memos, lists, graphs, and tables were used to better understand the patterns and relationships that existed between the cases (Urquhart et al., 2009). The cross-case analysis allowed us to look at cases from different perspectives and reduce the risk of inaccurate and unreliable theory (Eisenhardt, 1989). The iteration was continued until theoretical saturation occurred, at which point further iterations added no value.

Case descriptions

The **incumbent** was founded in 1847, focusing on industry, infrastructure, mobility, and health. Before entering the market in 2016 with a cloud-based industrial internet of things (IIoT) platform, the incumbent gained experience with several sector-specific platforms. The incumbent's platform enables its customers to conduct near-real-time analyses of products, facilities, systems, and machines.

The **strategic alliance** was founded in 2017 as a joint venture between German and Singaporean global mechanical and plant engineering market leaders. The goal is to bundle the know-how of the strategic alliance members in mechanical engineering, production, and information technology (IT) using a manufacturer neutral IIoT platform, resulting in high customer value and digital production standards.

The **start-up** was founded in 2012. The start-up runs a localization platform for the industrial sector, with the goal of increasing transparency for process optimization and automation. The platform provides the start-up's customers with a solution to advance the digital transformation of the shop floor through the seamless localization and networking of moving objects.

Primary data: Interviewee position and length

INCUMBENT 1/2	Cloud platform partner manager	56 min	2/2	Digital strategy manager	25 min
	Head of partner programs	23 min		Platform partner manager	54 min
	Cloud platform partner manager	31 min		Portfolio manager	25 min
	Digital product portfolio manager	29 min		Cloud platform partner manager	51 min
	Digital marketplace developer	42 min	**STRATEGIC ALLIANCE**	Director applications	49 min
	Digital product portfolio manager	27 min		Business development manager	67 min
	Cloud platform partner manager	51 min		Director applications	41 min
	Cloud platform partner manager	27 min		Innovation manager	53 min
	Digital industries segment manager	26 min		Sales lead manager	54 min
	Cloud platform manager	22 min		Technology consultants	52 min
	Digital product portfolio manager	42 min	**START-UP**	Founder and managing director	50 min
	Corporate strategy manager	43 min		Managing director	36 min
	Platform ecosystem manager	46 min		Head of project engineering	48 min
	Digital sales manager	46 min		Head of development	55 min
	Digital customer service manager	36 min		Product and project manager	41 min
	Cloud platform product manager	28 min		Sales and partner manager	49 min
	Management consultant	39 min		Founder and managing director	39 min

Secondary data	Material
Incumbent: Terms and conditions, Platform complementor portal, Community website, Developer forum, Company and platform website, Investor relations (annual and quarterly results 2018–2021)	→ 37 agreements, 1 portal (incl. resources, tutorials and handbooks), 1 website, 83 articles and FAQs, 2 websites, 18 documents
Strategic Alliance: Terms and conditions, Platform complementor portal, Community website, Company website, Company blog	→ 2 agreements, 1 portal (incl. resources, tutorials and handbooks), 1 website, 1 website, 16 articles
Start-up: Company website, Company blog	→ 1 website, 37 articles

Table 1 Case Study Data

4 Results

4.1 Platform Governance Characteristics based on the Ownership Structure

Based on the ownership structure, we identified four platform governance dimensions: design, accessibility, market, and trust. These dimensions are further subdivided into different platform governance components. Table 2 summarizes the governance characteristics for each platform ownership structure.

4.1.1 Design

Ownership. The existing literature (Bakos & Katsamakas, 2008; Tiwana & Konsynski, 2010) implies a link between ownership and corporate structure by comparing proprietary, that is, a single owner, and shared ownership between several owners. For example, the start-up under investigation is self-owned, whereas the strategic alliance is jointly owned, which requires the governance approach to be supported.

Governance Structure. All ownership structures apply centralized governance to keep control at a central point. To conserve existing resources, the start-up employs centralized governance. Meanwhile, members of the strategic alliance joined forces, concentrating power in a single organization. Furthermore, incumbents are attempting to standardize the governance approach to reduce workload and provide a basic governance foundation. The incumbent's digitalization and innovation strategy led manager of the incumbent to describe the central governance structure as follows:

> *"[…] then take into account the control of the ecosystem, the creation of the applications, the control of the data, the quality assurance side. So, that's fairly centralized."*

Decision Rights. The information technology governance literature assumes no relationship between the ownership structure and decision rights because dealing with increasingly complex problems and environments is seen as an impediment (Weill & Ross, 2004). Our interviews revealed that all of the case companies use contracts as part of the partner program to define and distribute decision rights among platform participants. For example, setting up a comprehensive partner program consumes resources and necessitates a thorough understanding of the platform business and potential complementors. Because start-ups lack these resources and competencies, and complementors require individual decision rights to make start-up co-creation appealing, the start-up under consideration assigns customized decision rights. During the interviews, the start-up's founder and managing director emphasized the importance of contracts for the distribution of decision rights and stated that the start-up will further homogenize them.

> *"[…] A clear commercial agreement behind it and a clear marketing strategy. It is obvious which of the two parties does what and how it is communicated to the outside world to guarantee a uniform value proposition and image to the outside world, which is very important within these partnership systems. […]"*

The strategic alliance and the incumbent already have a comprehensive and standardized partner program in place that handles decision rights. According to one partner manager, the incumbent sees automation as a way to save resources while increasing co-creation through scaling.

> *"It is currently done manually, but we are on our way to standardizing and industrializing that a little bit. Because our resources in the partner management are also stretched, we need to get quicker […]."*

4.1.2 Accessibility

Openness versus Control. The following are a few examples of how the informal alliance can be put to use.

> *"[…] In terms of [our] ecosystem [and its] characteristics, we operate in a very heterogeneous environment. […] And so from that nature, if you're going to provide a platform, it needs to be very open and flexible by its very nature. […]"*

Concurrently, the literature indicates that start-ups provide a higher degree of platform openness to promote co-creation and reduce the higher perceived risk caused by a lack of control mechanisms (e.g., Tiwana, 2013; Xie & Wang, 2020). The start-up under consideration does not currently require a comprehensive set of control mechanisms for its few close complementor relationships and does not see itself in a position to ensure the quality of the complements because it lacks the necessary resources and competencies.

Boundary Resources. Similarly to control mechanisms, the existing boundary resources literature anticipates that only a few large companies can provide comprehensive boundary resources (Eaton et al., 2015). The incumbent under scrutiny has the most extensive boundary resources. The start-up under consideration currently provides only a few APIs with limited scope, as it focuses its resources and competencies on other issues consistent with its corporate strategy. Apart from the API scope, the strategic alliance's technology consultants emphasize that API usability and backward compatibility must be ensured to successfully establish a platform. If the longevity of the APIs is not guaranteed and the complementors have high maintenance costs, it is difficult for them to profit financially from the platform, the incentives to cocreate for a platform are low.

> *"[…] especially concerning backward compatibility, the platform continues to develop, and the companies should know that all APIs that they publish must be maintained for life, and from my point of view, that is also a big problem with such platforms."*

In this respect, start-ups are disadvantaged as complementors perceive them as unstable and subject to frequent changes. As a result of its limited resources, the start-up relies on project-specific individual delivery of apps and software components. For example, whereas the incumbent and strategic alliance document extensively, the start-up considers documentation to be too time-consuming. Instead, of documentation, the start-up prefers to share tacit knowledge through direct communication. According to the start-up director's statement, the company is aware that this approach does not scale and will need to document more in the future.

> *"[…] But that will soon be available, […] and we will certainly have to do a bit more in terms of documentation, instructions, etc., which will have to be made available to complementors. Up to now, these have always been smaller things that complementors have done more on demand."*

Transparency. According to existing research, transparency is deeply ingrained in the culture of start-ups (Cohen et al., 2019; Leiponen, 2008). In contrast, the start-up relies on secrecy and low transparency to protect its platform ecosystem from competitors and hostile complementors as much as possible. However, because the start-up relies on a close relationship with a few carefully selected complementors, the overall transparency is not crucial. Both the incumbent and the strategic alliance agree that transparency is the only way to fully realize the platform's potential. According to a corporate strategy manager, incumbents, for example, use their community and other social boundary resources to make information freely available to current and potential complementors, customers, and stakeholders.

"[…] what <the platform> did is, they build up <the community>. This is beside the complementors, a community of customers, which can also be seen as partners. But this gives you transparency, […]."

4.1.3 Market

Pricing. All companies under study used a different pricing strategy. Due to low co-creation and numerous self-contributions, the start-up attempts to generate revenue through a modular subscription concept, project planning, customization, support contracts, and selling platform licenses to re-sellers and consultancies. However, a sales and partner manager stated that the start-up would like to transition to value-based pricing in the future:

"[…] The future goal is to align the pricing with the added value, i.e., the customer's benefit. This is also called value-oriented pricing. But it is tough."

The strategic alliance licenses platform access through a subscription model. Furthermore, the license fee already includes defined support and service scopes. However, complementors must purchase a license in order for the platform to be enabled for development and for them to be offer their complements. The incumbent charges the customer through subscriptions, which include a set amount of resource usage and data transmission on the platform. The head of the partner program states:

"[…] you have to pay for the data flow. And we don't care whether it's an open app you buy through the store or a dedicated certain app for one customer. In any case, you have to buy a <platform> license. But it's comparable to a telephone contract. You pay a monthly fee […]and get a guaranteed data transmission. If you want more data, you pay more […]."

Incentives. The incumbent is the only case of companies that use exclusivity to increase financial incentives as they allow only a limited number of complementors within a segment. Regarding non-financial incentives, the incumbent offers the most holistic approach with its multi-level partner program. Moreover, the incumbent leverages its customer base, as stated by a portfolio manager:

"[…] Nearly everyone wanted to collaborate with [the conglomerate] because of the brand. […]"

Competitive Strategy. Because of its corporate structure and low bargaining power, the start-up cannot compete directly with large corporations and companies and must instead rely on collaboration. The primary focus of incumbents and strategic alliances is co-opetition**.**

4.1.4 Trust

Trust is essential for co-creation (Hurni et al., 2021; Söllner et al., 2017) but is difficult to achieve due to changing competitive strategies (Gawer & Cusumano, 2002). All interviewees agreed that developing trust is difficult, especially for start-ups, because trust is often based on shared experiences. However, the start-up's founder and director mention that this is also a problem for the major players, even if they can benefit from an existing customer base.

"Our platforms try to get apps, but first, we must convince people to program apps in our platform, even though we still have few customers. So that's not so easy, even for the big ones. They must do much convincing to get people to program on our platform."

Dimension / Component		Incumbent	Strategic Alliance	Start-up
Design	*Ownership*	proprietary	shared among consortium members	proprietary
	Governance Structure	centralized	centralized	centralized
	Decision Rights	homogenized distribution via partner program	homogenized distribution via partner program	customized decision rights distribution

Accessibility	*Openness vs. Control*	open and standardized very strong formal control and medium informal control	open and standardized strong formal control and medium informal control	rather closed and low formal control
	Boundary Resources	extensive technical and social boundary resources	extensive technical and social boundary resources	medium technical boundary resources and low social boundary resources
	Transparency	high	medium	low
Market	*Pricing*	customer is priced (subscription with resource quota and pay per use)	customer and complementors are priced (platform subscription and own apps)	customer is priced (platform subscriptions, project planning, customization, service and support) and re-sellers
	Incentives	medium financial (fair compensation and joint marketing) and high non-financial (multi-level partner program and existing customer base) incentives	high financial (fair compensation and exclusivity) and medium non-financial (existing customer base) incentives	low financial (independent compensation) and low non-financial (none) incentives
	Competitive Strategy	co-opetition (focus on competition)	co-opetition	collaboration
Trust	*Trust*	high	high	low

Table 2 Platform governance characteristics based on the ownership structure

4.2 Platform Governance Influencing Factors

Our findings indicate that internal and ecosystem factors influence platform owners' governance decisions. Table 3 summarizes how each platform ownership structure is affected.

4.2.1 Internal

Management. The quality of managers influences the scope of platform governance (Eisenmann et al., 2011). Within the incumbent, top management determines the platform's strategy and governance. A steering committee manages the platform of the strategic alliance, whereas the CEO makes critical decisions directly at the start-up.

(Growth) Strategy. Not every strategy is appropriate for every ownership structure (Bustamante, 2019). The start-up has decided to build a real-time edge platform that will serve as a pre-data processor for cloud platforms. This is how the industrial sector was represented in the past and how it will be represented in the future. The strategic alliance's platform is a cloud and edge platform that can be white-labeled. In this sense, the platform is simply another component of the corporate strategy that enables it to generate additional revenue from its products and services for the strategic alliance member. However, it lacks the start-up's real-time capabilities. The incumbent platform's solutions are aimed at the industrial and telecommunications sectors. Thus, with its cloud platform, they focus on the industrial sector, whereas other business units can offer edge applications that are compatible with the platform.

Platform expansion can be aided by price cuts and subsidies, co-creation, or benefits from previously successful products or services (Xie & Wang, 2020). Although the strategic alliance and incumbent have relied on co-creation for future growth from the start, the start-up wants to expand its co-creation for future development, as confirmed by the start-up's product and project manager:

> *"[…] So external development is currently still more of a vision. That's quite clear. We have already collaborated with other companies, such as IBM."*

Bargaining Power. A company's ability to bargain effectively is a critical advantage (e.g., Banker et al., 2011; Jeon & Menicucci, 2017). Since the start-up has a small network and has yet to establish itself, its visibility and market power are limited. As a result, it is frequently regarded as unattractive for co-creation by complementors, as stated by the start-up's founder and managing director.:

> *"Exactly, so we don't yet have the possibilities in the company to sell a platform with our name or with any other relationships. [...]"*

Although the strategic alliance does not see its existing market power and visibility as an advantage in promoting co-creation, the incumbent sees its brand and history as a huge advantage. In particular, using the incumbent's sales and industry power helps it do so. The strategic alliance considers its existing know-how to be a critical advantage.

Resources and Competences. The accumulation of resources and competencies is required to achieve corporate goals (Eesley & Wu, 2020; Leiponen, 2008; Roshan et al., 2019). The start-up lacks resources due to its small size and low profile. However, a start-up manager stated that the know-how must be expanded to pursue the company's strategy and vision in the long term. The strategic alliance pools the member companies' resources and competencies, whereas the incumbent has sufficient resources to pursue its strategy.

Agility. Start-ups are more agile and frequently change their governance (Mettler & Guenduez, 2019; Samdanis & Lee, 2019). In-person interviews with the start-up confirmed the presence of flat hierarchies and fewer concerns about backward compatibility, company history, or legacy. Although the strategic alliance and incumbent are working to become more agile, they are still constrained by the following factors, according to the strategic alliance's director of business applications:

> *"[...] because of their size, [larger companies] are usually slower and less agile, and, for example, sometimes realize that there is a new market segment, and we don't have anything to offer in that area." [...]"*

Architecture. Platform architecture capabilities have an impact on platform governance (Constantinides et al., 2018). All ownership structures contribute to the creation of an abstract, layered, modular, interoperable, and stable architecture. The architecture becomes more complex depending on the ownership structure. Thus, larger and older companies, such as the incumbent and strategic alliance studied, consider the architecture's backward compatibility and security.

4.2.2 Ecosystem

Complementors. The willingness of complementors to cocreate (Evans & Gawer, 2016) and the resulting expansion of platform scope (Boudreau, 2012) are critical for the platform's success. According to the start- up's managing director, additional resources, such as personal contact, information, and training are required to persuade complementors to cocreate.:

> *"I have documents that I send to the partners, but I will still need personal contact here and there. To keep the motivation high, maybe do another training session to pass on information."*

In the case of a strategic alliance and an incumbent, complementors generate customer value by expanding the platform scope through co-created complements. According to an incumbent management consultant, the success of the conglomerate and consortium platform is essentially dependent on the availability of an extensive and robust complementor network:

> *"We cannot be experts in all areas ourselves. [...] For this, it is important to have partners who are familiar with the respective business areas."*

Competitors. The market situation and competitors lead to different positioning depending on the ownership structure (e.g., Roshan et al., 2019). Due to market fragmentation, it is difficult for a start-up to realize network effects. Simultaneously, the strategic alliance has joined forces to consolidate its interests and assert itself in the market. The incumbent is attempting to take advantage of internal knowledge and capability synergies.

Other Stakeholders. Although the literature identifies balancing interests as the primary issue with various stakeholders (Thies et al., 2016; Wessel et al., 2017), our interviews revealed that all companies focus customers.

Technical Innovations. Technological innovations have far-reaching effects for platform governance (Constantinides et al., 2018; Eaton et al., 2015; Nambisan et al., 2019). The start-up can react to technological innovations due to its high flexibility and adapts them to profit from the innovation. Also, the incumbent hopes for less technical lock-in and adapts innovations despite being less flexible. In our study, the strategic alliance does not appear to be concerned about technological lock-in.

Governments. Governments establish the legal framework within which all companies must operate (Crick et al., 2020). Government influence presents a unique challenge to the internationally active incumbent because it must comply with local law everywhere and adapt its governance approach accordingly. If the strategic alliance wishes to offer the platform to the public sector, the legislation will have a significant legal impact, as part of the governance will be predetermined.

Social Economics. Social and economic trends and their adoption can result in far-reaching platform governance changes (e.g., Manner et al., 2013). The conglomerate's experts also see the increasing importance of ESG criteria and the associated negative image of specific industries as opportunities and growth markets. According to a cloud platform internal partner manager, these companies seek ways to improve their efficiency and image, and the conglomerate can help.

> *"If the oil and gas price is down, that also impacts the business units mainly working in this area. So, of course, these effects you can also see, sure. But maybe even then, this might also be a chance because the customers are more open and willing to implement or integrate solutions, which help them to be better, faster, or have fewer incidents. So this is also a great chance. […]"*

Influencing Factor		Incumbent	Strategic Alliance	Start-up
INTERNAL	*Management*	top management	steering committee	CEO, senior employees
	(Growth) Strategy	generalized cloud platform (other business units add edge capabilities), co-creation, marketing, and demo versions with limited functionality	white-labeled, generalized edge and cloud platform, co-creation, marketing, demo versions, and expansion	real-time, focused edge platform, co-creation, resource saving marketing (e.g., congresses and lectures) and free demo versions
	Bargaining Power	high	high	low
	Architecture	abstract, layered, modular, facilitate ease of use, interoperability, stability, backward compatibility, and security	abstract, layered, modular, facilitate ease of use, interoperability, stability, backward compatibility, and security	abstract, layered, modular, focusing on facilitating ease of use
	Resources and Competences	high	medium-high	Low (help of accelerators)
	Agility	low	medium	high
ECOSYSTEM	*Complementors*	complementors are attracted	complementors are attracted	complementors perceive co-creation as not attractive
	Competitors	small, fragmented market	increasing market tension (tech giants' entry)	winner-takes-all market
	Other Stakeholders	customers, consultants, system integrators, re-sellers, hardware manufacturers, cloud infrastructure providers, and other business units	customers, consultants, system integrators, re-sellers, hardware manufacturers, and cloud infrastructure providers	customers, consultants, system integrators, re-sellers, hardware manufacturers, and labs
	Technical Innovations	regular technology transitions (avoid lock-in and benefits)	no fear of technology lock-in	benefit from technology innovation
	Governments	compliance with local law, industry specifics, and public tenders	compliance with law and alliance members	compliance with law
	Social Economics	digitalization, economic upswing, globalization, and ESG	digitalization, economic upswing and globalization	digitalization

Table 3 Platform governance influencing factors based on the ownership structure

5 Discussion

Platform ownership structures influence platform governance and thus can determine whether platform ecosystems succeed or fail. Although it has been established that platform governance contributes to overall platform success, our results provide insights into how different platform owners execute platform governance (i.e., design, accessibility, market, and trust) depending on their specific ownership structure, and how internal and ecosystem factors influence their governance decisions. Subsequently, we will go over governance strategies for each ownership structure in terms of cost synergies, co-creation synergies, and growth opportunities (see Table 4).

Cost synergies can be achieved by reducing duplicated efforts (Eklund & Kapoor, 2019). By avoiding redundancies, a holistic governance approach with no superfluous elements can be created (e.g., an *incumbent* reducing to one harmonized, automated complement control mechanism instead of individualistic control). Our results show that reducing intra-incumbent platforms to a maximum of one can result in significant cost savings for incumbents. This can reduce the duplication of platform core development and governance design efforts. Furthermore, the platforms' resources and capabilities can be bundled, resulting in faster platform core development and more holistic platform governance. Consolidation of platforms within an incumbent will almost certainly result in employee resistance and concerns about the viability of industry-specific use cases (Nan, 2011). Because incumbents, such as the one we studied, rely on a generalized platform with industry-specific complements, they should be able to address employees' concerns. Another way an incumbent can capitalize on cost synergies is to rely heavily on automation in control mechanisms. *Strategic alliances* should also rely on automated control mechanisms more and more. This allows them to realize cost savings while also ensuring standardized control and quality of the supplements. Because manual efforts also take a significant amount of time, they limit the company's ability to scale co-creation (Prahalad & Ramaswamy, 2004). *Start-ups* do not rely on co-creation but on customization due to corporate structure constraints. However, these customizations take longer to market than platforms that rely on co-creation, resulting in duplicated efforts for each customer. Customization leads to the platform's scalability being severely limited (Crick et al., 2020). This is a problem, especially for a start-up looking to scale and grow quickly. The increasing shift from customization to co-creation allows for the utilization of cost synergies and increases the platform's scalability. Even if developing a homogenized partner program requires resources up front, it saves time and money in the long run by eliminating the need for individual complementor contracts.

Co-creation and revenue synergies result from combining efforts and reducing co-creation barriers (Prahalad & Ramaswamy, 2004). Co-creation can be promoted further by combining efforts (e.g., a start-up utilizing piggybacking to promote co-creation). Consolidating the platforms of several incumbents leads to cost synergies and co-creation synergies. A holistic complement offering is more likely because complementors are not required to engage in intra-conglomerate multi-homing and can focus on one platform, resulting in higher co-creation complementor numbers (Hein et al., 2019). Thus, efforts are pooled and co-creation barriers are reduced. Because incumbents tend to design the platform in an open and generalized manner, this appears to be the best approach. When strategic alliance members' social boundary resources are freely available, complementors can decide more quickly whether they can imagine co-creation, and transparency improves. This increased transparency can increase trust in the strategic alliance and the platform, as the complementors have a pleasant experience with the strategic alliance right from the start (Bolton et al., 2013). According to the results, all of this increases the platform's co-creation. Because boundary resources in the strategic alliance under consideration are hidden behind a registration and manual approval wall, it can take a long time for a potential complementor to gain access to them, stifling co-creation. Furthermore, the strategic alliance should combine and expand non-monetary incentives. This could be accomplished, for example, through a multi-tiered partner program. The appreciation for loyalty, generating sales, and customer satisfaction can be achieved and motivated by gaining privileges, visibility, or reputation. The lack of a multi-level partner program in the strategic alliance we studied means comparatively few non-financial incentives for co-creation, which leads to lower complementor numbers. A strategic alliance can further align complementors with the company's values and vision by expanding informal control mechanisms. This, in turn, leads to a greater number of co-creation relationships. Because *start-ups* frequently require a successful product, service, and history, they can only gain an advantage by bundling with a successful company's product or service. This piggybacking strategy can be used as a pre-processor platform for a larger digital platform of a successful company, as in the case of the start-up we studied. This allows customers and complementors to familiarize themselves with the start-up's platform and develop trust (Söllner et al., 2017). This trust may result in a greater number of co-creation relationships. To make the transition from customization to co-creation, start-ups must first provide rudimentary boundary resources for complementors. Boundary resources are thus required to capitalize on co-creation synergies. The main reason for low co-creation in the start-up studied is a lack of boundary resources.

For **growth opportunities**, white spots are identified. Closing these existing gaps results in a more holistic platform governance approach and allows the company to expand further (e.g., a consortium developing a new joint developer forum and thus extending the boundary resource component of platform governance). The results show that an incumbent's governance approach must be flexible to facilitate market and capability expansion. The platform governance must continue to support the platform's expansion into new markets and vertically along the supply chain (Floetgen, Mitterer, et al., 2021; Rivera, 2017). The incumbent studied, for example, could strategically align itself to expand vertically along the supply chain and extend its edge and real-time capabilities. At the very least, the boundary resources would have to be adjusted in this case. The most critical white spots in *strategic alliance* governance are the lack of pricing subsidies, the perception of technological innovations, and the development of new markets. According to existing literature, at least one side of a platform should be subsidized to foster further platform growth and healthy co-creation relationships (Eisenmann et al., 2006; Hagiu, 2006). The studied strategic alliance does not subsidize any site. Therefore, strategic alliances should consider subsidizing complementors to avoid a shortage of complements and complementors where only customers develop complements for themselves. Without subsidies, the platform may become unappealing to complementors and thus customers in the long run. Start-ups frequently lack the resources and capabilities to close gaps. Accelerators can help, but start-ups should prioritize closing fewer resource- and expertise-intensive white spots (Tötterman & Sten, 2005). Start-ups should promote co-creation to survive and grow in the market in the long term. Therefore, they should rely on resource saving informal control and gatekeeping mechanisms within the framework of formal control. Furthermore, providing basic social boundary resources, such as API documentation, encourages co-creation, leads to co-creation synergies, and increases environmental transparency.

Strategy	Incumbent	Strategic alliance	Start-up
Cost synergies	Consolidation of intra-conglomerate platforms; reduction of management involvement in the control	More automated control	The transition from customization to co-creation; homogenized partner program
Co-creation Synergies	Consolidation of intra-conglomerate platforms	Higher transparency; bundling and expansion of non-financial incentives; expansion of informal control	Piggybacking; transition from customization to co-creation
Growth opportunities	Facilitate market and capabilities expansion	Subsidize complementors; facilitate technology transition; facilitate market expansion	Facilitate co-creation via informal control, gatekeeping, and simple social boundary resources

Table 4 Platform governance strategies based on the ownership structure

6 Conclusion

By outlining and examining how platform governance differs based on platform ownership structures, this paper contributes to the platform governance literature and may lead to a rethinking of platform governance (Hein et al., 2020). In particular, we demonstrate the mirroring principle (Tiwana, 2013) by explaining how the ownership structure is mirrored in platform governance decisions. Our results provide a platform-owner-centric perspective on platform governance, considering internal, and ecosystem factors influencing platform governance decisions. Hence, we contribute to the literature on platform governance (Perscheid et al., 2020; Song et al., 2018) by identifying cost synergies, co-creation synergies, and growth opportunities as platform governance strategies based on different ownership structures. Furthermore, the findings assist researchers in considering platform strategies specific to ownership when analyzing value co-creation in digital platform ecosystems.

Our results assist practitioners in developing governance approaches by outlining the solution space for governance decisions based on the structure of ownership. Furthermore, the identified cost, co-creation, revenue synergies, and growth opportunities provide additional opportunities for practitioners to improve platform governance.

However, this research endeavor is not without limitations. First, only one case was considered for each ownership structure. We attempted to mitigate this by conducting 34 interviews with open-ended questions to provide the respondents with the most significant possible scope for answers and to ensure that the interviewees' personal knowledge was also captured. Second, because we relied on expert interviews as our primary data source, our results may be influenced by subjectivity. Hence, we triangulated the interview findings with a wealth of secondary data. Finally, our findings are limited to our chosen ownership structure contexts and cases. Other ownership structures and contexts' influences and governance characteristics may differ significantly from the one studied, resulting in different results.

Platform ecosystems enable companies to leverage co-creation and are appealing in an increasingly complex and competitive market. This paper adds to existing platform governance literature and practitioners' understanding of how incumbents, strategic alliances, and start-ups' platform ownership structures influence platform governance. Although existing literature lacks a clear understanding of how platform ownership is influenced, this paper identified each ownership structure's specific characteristics and influencing factors by analyzing 34 archive expert interviews and a wealth of secondary data. We find that incumbents provide the most comprehensive platform governance approach, closely followed by strategic alliances. Start-ups cannot provide such a comprehensive governance approach due to their young and small company structure. Finally, platform governance strategies for leveraging each ownership structure are identified in this paper.

7 Acknowledgement

The authors would like to thank the editor and anonymous reviewers for their helpful comments and suggestions. This work was in part funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) – project no. 464594907.

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