Six Principles for Governing Mobile Platforms

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Abstract. Mobile platforms enable third-parties to extend and enhance functionalities of products and services by mediating these to consumers. A tremendously successful example is Apple's App Store where third-party developers contribute applications that add to the usefulness of the mobile device. However, research and practice still struggle with understanding why and when such mobile platforms prosper or wither. In this paper, we develop a framework to study how companies use governance mechanisms to attract customers and third-party developers. We demonstrate the usefulness of our framework by analyzing how governance mechanisms were used to change the interaction of platform, customers, and third-party developers. We derive six principles for governing mobile platforms that highlight the need to further investigate how governance mechanisms align the value propositions to platform operator, customers and third-party developers.

Keywords: mobile platforms, governance, controls, services

1 Introduction

Enabling third-party developers to add functionalities to a core product by providing a mediating mobile platform is an increasingly popular model to raise earnings and enhance customer satisfaction [1-3]. Mobile platforms are also known as App Stores providing a development and marketplace environment.

However, many companies struggle to provide a sustainable and thriving mediating platform. This challenge is illustrated by the fact that 97 percent of the mobile services market share is held by only seven platforms, despite the fact that 40 to 50 platforms exist [4]. As platforms are affected by network effects, the success of a platform is determined by having enough participants on the development side to attract the customer side and vice versa. These stakeholder interests need to be aligned by governance [5-6].

The struggle with platform success in practice highlights the complexity of mobile platform governance and reflects the immaturity of practical understanding and research on platform governance [7-9]. In particular, we observe that in practice platform providers use imitation strategies rather than developing a proactive governance

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concept [10]. Yet, imitation ignores the fact that platform governance needs to fit to the ecosystem of the platform which is never identical across platforms [4], [11].

In this paper, we triangulate results from heterogeneous background - a previous literature review, a basic governance concept for platforms and real world example - to posit initial principles for using governance to align the value propositions for platform operator, customers, and third-party developers. We thereby contribute to research on the important topic of mobile platforms by developing a theoretical framework that helps to study how companies use governance mechanisms to become attractive to customers and third-party developers. The usefulness of our framework will be demonstrated by analyzing how governance mechanisms were used to change the interaction of platform customers and third-party providers. In conclusion, we derive six principles for governing mobile platforms that highlight the need to further investigate how governance mechanisms align stakeholder interests.

The remainder of this paper is structured as follows: First, we discuss the literature on platform governance identified in the literature review of Manner et al. [8]. Based upon this, we adapt the basic concept of platform governance proposed by Manner et al. [8] to provide a practically applicable platform governance framework to study and classify the use of governance mechanisms in the mobile platforms of Apple, Google and Microsoft. We compile evidence from the field with literature to propose initial principles for using governance mechanisms to align the value propositions to platform provider, customers and third-party developers. Finally, we discuss our findings and conclude with an outlook on future research opportunities.

2 Theoretical Background

2.1 A Definition of Mobile Platform Governance

In this paper, we focus on mobile platforms such as Apple's App Store with two-market sides: the developer environment and the buying environment. Mobile platforms like Apple's App Store are socio-economic layered, consisting of an IT-based artifact which enables external knowledge holders to contribute functionality to a core product [7], [12]. In this way, platform providers are mediating the process of adding functionality to the IT-based marketplace and therefore to the consumers to gain further economic value; for example, by extracting revenue from transaction and to achieve their strategic aim.

Aside from platform providers, there are two major stakeholders to be considered in a platform ecosystem: developers and consumers. They are part of the definition of platform ecosystems as a functional unit consisting of the platform provider, developers, consumers as well as strategic partners of the platform provider [13-14]. The integration of third-party developers into the value creating process is a challenging concept. A platform provider needs to establish regulating guidelines, documentations and rules to enable and guide developers which assist them in creating compatible applications to extend the core product [9]. On the one hand, developers need support to be able to create functionality as well as creative freedom to be innovative [15]. On

the other hand, the platform provider must maintain control and prevent developers to bypass the platform, building a direct developer consumer relationship. Thereby, providers lose their possibility to integrate their strategic aims like a specific customer experience and gaining money from the platform [13], [16].

The regulating framework to shape a viable and sustainable platform is known as platform governance. It provides structures to manage the stakeholder relationships [17], determines the allocation and distribution of power for actions [18] and controls the actions of the platform stakeholders [19]. Hence, platform governance is defined as "the structure, power, processes, and control mechanisms that are applied by the platform owner to achieve his aims" [8].

2.2 Theories Related to Mobile Platform Governance

The key element to a viable platform is the balance of its ecosystem by sound platform governance [7], [11], [20]. It is a multi-dimensional concept that links the technical architecture of a platform with the ecosystem, and the platform provider's power. Hence, studying mobile platforms demands the investigation of technical, organizational and financial aspects [21].

Since the concept of platform governance touches many different disciplines, the existing knowledge of governance is very fragmented [7], [10]. Many researchers in the fields of economics, strategic management and organizational science have examined aspects of platform governance corresponding to their discipline [8], [11]. Information systems research now combines some of this fragmented work originating from its reference disciplines [8], [22].

Economics was one of the first research disciplines to study the underlying concept of platforms: pricing in two- and multi-sided markets [5-6]. They discuss pricing mechanisms for platforms and price elasticity in the competitive ecosystem of dynamic systems [6], [17], [23]. Still, research in this field provides little managerial implications for platform providers and governance [7]. Strategic management literature regards the role of platforms as complementary markets [3], [24], starting a broad discussion about "how open is open enough" [25], observing the field in a practical way and explaining the past [14], but not providing process implications for practitioners. Organizational science literature addresses platform governance from a control perspective [26]. Controls are considered a powerful instrument to synchronize activities [27] and to "assure ongoing alignment between their investment in the community and related product goals" [28].

Across all streams of literature, there is consensus that successful platform governance fits to the ecosystem of a platform and thus cannot be easily imitated [7], [9]. Hence, actively developing distinct platform governance mechanisms that fit to the platform ecosystem might be a solution [7]. Yet, a comprehensive understanding of platform governance, its elements and how they are linked together is necessary.

3 A Comprehensive View on Mobile Platform Governance

In this chapter, we discuss the elements of platform governance derived from literature and their links to each other, building a comprehensive view on mobile platform governance based on the findings of Manner et al. [8]. Figure 1 illustrates the three levels of the platform governance framework. The top level is the market structure, the second level is the governance policies and the bottom level is the governance configuration. Taking this perspective, we begin to elaborate on the elements of governance and its implications.

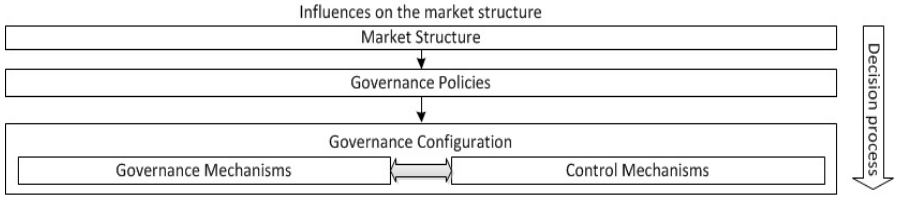

Fig. 1. Top level governance framework [8]

3.1 Market Structure

The value propositions of a platform depend on the congruence of the platform with a dynamic market structure [4], [11]. The discipline of marketing defines the market structure as the macro-ecosystem of the platform [29]. Thus, a fit between platform governance and the ecosystem is vital for platform success [7]. As an example, software providers "are constantly evolving, increasing their depth and/or reach and in the process redefining their boundaries", which stresses the importance of ecosystem alignment [1], [30]. Following a similar line of arguments, de Reuver et al. [31] suggest important triggers that describe a dynamic market structure, such as the emergence of new technologies, regulatory changes, or competitive changes from changing consumer behavior or behavior of competitors. These dynamics in the market structure require to constantly realign the value propositions of platform operators, customers, and third-party developers [2], [6]. Consolidating literature on classical market structures [29] and electronic markets [32], we condense the following triggers of a market structure for mobile platforms. These triggers constitute important cues to the platform operator when formulating the objectives and the strategy along with the business model [32]: **Legal triggers** describe events originating from legislation, government agencies, or jurisprudence that affect the platform, e.g., restrictions to access user data [8]. **Technical triggers** originate from technical progress, e.g. the increasing availability of fourth generation broadband Internet access. Also pre-commercial developments have to be taken into account as they may have significant impact on the design of a platform [4], [16]. **Socio-economic triggers** refer to economic events and actions that also influence social reality, for example the increasing awareness for privacy issues in society [4], [7], [32]. **Competitive triggers** originate from changes in the competitor's behavior. For instance, such triggers comprise of

strategic moves of competitors that shift competition advantages between market actors [7], [19]. **Stakeholder triggers** refer to actions of customers, third-party developers or other strategic partners of the platform operator. To give an example, developers who are disgruntled by poor technical support, might switch to competing platforms. Changes in customer behavior are also important triggers [11], [21], [31].

3.2 Governance Policies

The next task is the transition from ecosystem to governance, which is a sub form of the market structure [33]. This is achieved by the formulation of policies. We define policies as an organizing logic which is derived from the market structure. Heading up, we assessed the basement of literature identified by Manner et al. [8]. Thereby, we observed a variety of issues which lead to seven policy sections. These aim at resolving particular questions.

Standardization policy: To what extent shall the platform be standardized? This implies a trade-off, considering that a too high degree of standardization means poor usability for developers but assures flexibility to adapt to ecosystem changes [18]. The interaction between different functionalities can be supported by standardization which can deliver an added value by complementary use. However, innovation can be hampered. Ensuring usability is a further trade-off for platform providers. Ease of use is supported by a uniform interaction design but it demands high and expensive control efforts. These rules aim at aligning features, services and platform experience. Providing a new API or SDK sets a standard as well as implementing a new section within a marketplace.

Incentive policy: How are the platform stakeholders incentivized, especially developers? Users as well as developers need to adapt to the platform. It is not well known what really motivates developers to develop for a certain platform. According to Holzner et al. [15], financial aspects, prestige and creative freedom are important incentives for developers. Providing creative freedom contradicts to the user's demand of ease of use and compatibility of functionality. The design of the incentive policy must therefore be balanced with the standardization policy. Many other examples exist. Yet, they pose interdependencies to other policies [7], [15]. Incentives can be either positive like new incentive programs or negative when a previously implemented incentive is withdrawn by the provider.

Legal policy: Who is allowed to use, change, transfer and benefit from the platform and its facilities? Property rights for apps could remain with the developer, but could also be transferred to the provider. This issue may be addressed – for example – by shared income and licenses [19]. With increasing access to the core product by applications of third-parties, new legal issues arise.

Quality of Service policy: Which quality of service is offered to the customer? Quality is an important aspect for platforms regulated by governance [33]. This topic addresses issues of functionality, availability, performance and perceived service quality from the viewpoint of service consumers [21], [34].

Distribution policy: How are services, support and tools distributed by the platform? Making content accessible in the right way to the customers is vital for custom-

er satisfaction and service usability. Developers have to be provided with the latest SDK and processes for application integration have to be implemented [19]. In general, the whole value network from developer to service consumer is covered. There are also different ways to enable customers to access the offering. For instance, Android customers can choose between several distribution platforms, but Apple customers must use Apple's App Store or install illegal software applications like Cydia [12], [34].

Finance policy: How is revenue generated and how are the financial aspects organized on the platform? More important is the share of profit between the platform stakeholders [21]. Customers need to pay reasonable prices for their added functionalities. Developers need to make stimulating profits or they will not continue developing for the platform. A platform provider needs to skim enough off the platform revenue streams to be able to continue offering and nurturing the platform. Detailed aspects are the right to set prices on applications, discretization of prices and entry fees for developers [18-19], [21].

Security policy: What security standards have to be implemented? This refers to data, communication and distribution security, access to personal user data and similar aspects [16], [18-19]. The platform provider decides what APIs are offered and thereby which access the third-party applications are allowed to the device. The more APIs are offered, the more functionality can be built. On the downside, possibilities for security gaps that need to be controlled increase in number. The security policy also ensures the authentication process and determines the authorization of third-party applications and users.

The goal is to align policies perfectly to the market structure [7], [35]. The five core papers on platform governance, identified by Manner et al. [8] revert to more than twenty different aspects, which have to be resolved in a platform context. These all can be categorized into the above mentioned policies. Based on literature, we believe that a main challenge on this governance level is to find the correct fit between these policies [7]. For example, the more technical support (quality of service policy) is provided to the developers, the more skilled they get. Thus, the platform provider can grant skilled developers a higher degree of design clearance, which stimulates them positively (incentive policy). But a too high degree could infringe the platform, when allowing too much access to programming interfaces and other means of the standardization policy. The implementation of low admittance criteria for developers to foster immigration (incentive policy) is another aspect. But to keep the desired quality-of-service, one has to adapt the technical support to the needs of unskilled developers. All interdependencies are of a varying nature and must be analyzed in the specific context. The policies defined here provide view of issues every platform has to consider.

3.3 Governance Configuration

The constituted governance policies must be implemented to manage consumer experience and to align with stakeholder objectives [20]. Platform operators need to choose from a plethora of formal and informal mechanisms to implement their gov-

ernance policies [16]. Every mechanism can be described from a governance perspective as well as from a control perspective [7], [18].

De Reuver and Bouwman [18] classify governance mechanisms into three not-mutually exclusive categories: **Authority-based governance mechanisms** employ the platform provider's power to enforce behavior as desired using policies. **Contract-based governance mechanisms** refer to legally binding agreements, whereas **trust-based governance mechanisms** are based on the assumption that the target group has strong incentives to reach the desired goal and levers these incentives [18].

Control mechanisms inform the platform operator about the extent to which the governance mechanisms are effective and efficient. Originally, Ouchi [36] defined three different types of control mechanism: outcome, behavior and social control. They all aim at achieving coordination between parties with different intentions and goals in organizations. Kirsch [37] expanded social control through self-control. Thereby, she distinguishes between group and individual level. Cardinal et al. [38] adds input control where meeting desired inputs such as employee skills to an objective are appreciated. However, we differentiate the following control mechanisms: **Input control mechanisms** define required characteristics of provided input, e.g. developers and apps. Meeting these characteristics is rewarded. An **output control mechanism** sets a desired output. Again, reaching such goals is rewarded. **Behavior control** provides procedures and routines to reach a goal, where compliance with the procedures and routines is rewarded. **Social control mechanisms** strengthen common values and shared beliefs. People acting according to these are rewarded by social acceptance to the system. Such a control is implemented by rewarding behavior that has a "substantially overlap" with the interests of the subject under control [36], e.g. developers that code in a certain style are rewarded by thorough feedback on their code.

Output and behavior control are formal mechanisms, whereas input and social control are informal mechanisms. According to previous findings, control is implemented by a mixture of control mechanisms [36-37]. Applying the right balance of each control mode is essential [39].

3.4 A Framework for Mobile Platform Governance

We have three levels to consider when designing a platform governance concept. The first level is the market structure giving an overview of the platform's current situation which is influenced by legal, technical, socio-economic, competition and stakeholder behavior aspects. Changes to these imply an adaption of the present governance concept. Therefore, it resembles the starting point for the development of sound governance.

Table 1. Governance Framework: Important elements and corresponding levels.

		Level Aspects						
Market Structure	**Factors**	Legal	Technical	Socio-Economic	Competition	Stakeholder Behavior		
Governance Policy	**Policies**	Standard-ization	Incentive	Legal	Quality of Service	Distribution	Finance	Security
Governance Configuration	**Governance Mechanisms**	Authority-based	Contract-based	Trust-based				
	Control Mechanisms	Input	Outcome	Behavior	Social			

On the second level, governance policies are derived to implement the business strategy in conformance with the market structure and to achieve corresponding goals. At the bottom layer, governance mechanisms implement the policies from a means point of view, focusing on its characteristics, whereas controls focus on targets, mainly specific stakeholders and their behavior. Table 1 aggregates the critical issues of platform governance into a morphological framework.

4 Insights from Changes in Governance Concepts

In order to understand the effectiveness of governance concepts, we analyzed three governance changes from different platform providers: Apple, Android, and Microsoft. The goal of the multiple change analysis was to find out, if the framework is applicable for governance change analysis and findings on how successful platforms are governed. Apple's App Store and Google's Google Play mobile platforms have often been described in research as completely different (closed vs. open). Therefore, they are suitable platforms to gain insights. We also chose the Windows Phone Store in contrast to the two mobile platform leaders Apple and Google [34]. At present, Microsoft battles with establishing a developer and consumer base rather than base extension. The chosen cases are suitable to demonstrate the framework applicability and to provide further insights as they provide a wide variety.

4.1 Governance Changes in the Apple Platform

Earlier this year, **Apple** made a significant privacy change. This was triggered by a broad discussion in politics and society overall (**socio-economic and stakeholder behavior trigger**) about the unauthorized extraction of personal data like the address book by application providers. Apple may have feared that the discussion could start to unsettle users and make them more reluctant to buy applications. Then, the attractiveness of the platform for users would have additionally suffered**.**

In consequence, Apple used its power as platform provider and applied an adapted security policy prohibiting unauthorized access via applications without prior asking for access to secure the trust of its mobile device customers.

To enforce the security policy Apple changed from a **contract-based** governance mechanism, which only prohibited the unauthorized access in the guidelines, to **au-**

thority-based governance**.** Previously, although it was forbidden to access the data, it was not controlled, whether the application recorded data without permission. This means it was **social control (informal).** The new control consists of a mixture of input and behavior control. The implemented **input control mechanisms** are a change in the SDK and the release of a new operating system **(authority-based)**, whereas contracts remained as **behavioral control** steering the developers behavior **(contract-based)** [40]. In this real world change, we find two principles applied. It presents a formal input control supported by an informal behavioral control presenting a **control mix**. Since Apple aimed to limit uncertainty by generating new trust of users in Apple who otherwise would have left the platform, we also find high **mechanism strength** that is **proactively** implemented, as there was no lawsuit or law at the moment of change.

4.2 Governance Changes in the Android Platform

The second example analyzes **Google**'s change of their platform governance concept regarding the Android billing system. Google had installed a **contract-based** mechanism controlled by **social control** to make developers use Google's in-app billing system for in-app purchases. However, Google recognized that more and more developers circumvent Google's in-app billing system.

Due to this fact, consumers were confronted with different billing systems, which negatively influenced their experience and Google's revenue. This omitting behavior of the developers as **stakeholders** triggered a governance change. Android changed the approval process regarding in-app billing. Google established its own billing system, implementing an **authority-based** governance mechanism via an adapted **standardization policy.** This policy change is controlled by an adapted approval process. The approval process, as a form of **output control,** now rejects any applications infringing this rule [41]. We identify that governance changes trigger control changes in the same direction. More strict governance leads to a formal strict control. Therefore, we derive a **congruency** between governance and control.

4.3 Governance Changes in the Windows Platform

The last case deals about the **Windows Phone** Store. Being a new entrant with already two major **competitors** like Android and Apple, Windows needed to catch up with the amount of application offerings. Only few developers worked for Windows Phone due to the lack of advantages they saw in providing their applications for Microsofts' small consumer base [15]. Microsoft needed to establish a relationship to potential application developers to gain a certain amount of developers providing innovative and various applications to also attract consumers.

Hence, **trust-based governance** in the form of a new **incentive policy** for developers was introduced. By providing free phones for developers, promising visibility of their apps as well as advance payment, money and prestige was given as incentive. From a control perspective, Microsoft also implemented an informal **social control**. By providing these incentives they reached a substantially overlap between the devel-

opers' interests and its Windows Phone Store [36], [42]. In this real word example, we observe two principles. Firstly, the Windows Phone platform implemented **proactively** the incentive policy to achieve more participants. Secondly, the governance and control mechanisms were implemented **congruently** as a light governance mechanism is supported by a light informal control.

5 Six Principles for Governing Mobile Platforms

Principles for governing mobile platforms have not yet been suggested in literature. We therefore propose to derive principles for governing mobile platforms based on our framework, evaluated literature and real world examples of governance changes. The suggested principles are reflected between these sources and identified in at least two of them to achieve more robust results [43].They are summarized in Table 2.

We argued that all three governance levels (market structure, governance policies and the governance configuration) are important. Each governance level sheds light on different aspects that need to be considered when deriving platform governance. Thus, we propose "consider every governance level" as the first governance principle.

The next topic to be considered is the dynamic nature of the ecosystem of the platform. To be viable, platform owners need to quickly react to changes in the ecosystem [7]. This requires an ongoing evaluation and anticipation of changes and their impacts to the market structure. Platforms should constantly adapt their governance and learn from these changes. Our second governance principal is therefore: "Use proactivity to ensure viability".

The direct link between the market structure and the governance policies implies the need to align both levels. We argue that mechanisms are the means to enforce policies. Thus, changing policies always trigger a subsequent change in the governance configuration. Therefore, we propose the third and the fourth governance principle "Adapt policies to changes in the market structure" and "Constantly align governance and control mechanisms".

Platform providers differentiate primary and secondary objectives, e.g. being profitable or establishing a large user base [2], [15]. Primary objectives need to be enforced by authority-based governance and formal control to ensure their pursuit. Secondary objectives are mainly supported by trust-based and informal control. Thus, our fifth governance principle is: "Enforce primary objectives through authority-based governance and formal control". Yet, control modes are implemented by a mixture of controls, where formal controls are the main part, aided by informal instantiations [37]. Applying the right fraction of each is essential. Our sixth governance principle is therefore: "Aid formal control with the right amount of informal control".

Table 2. Six principles for governing mobile platforms from a provider's perspective

#	Principle	Explanation	Rationale	Source*
1	Complete Use	Platform providers should think through all three governance levels to structure their governance decision process and evaluate the impact of the change.	Governance can be divided into three abstract and interdependent levels. All of them have to be considered when implementing governance as each has significant implications on the platform.	L, FW, RW
2	Proactivity	Anticipate changes in the ecosystem to be ahead of your competitors and thus ensure competitive advantage and success.	Governance is about the alignment with the ecosystem. Anticipating changes enable to adapt faster than your competitors.	L, RW
3	Congruency I	Governance policies need to be aligned with the market structure to guarantee the correct implementation of governance and control mechanisms	Governance policies contain implementation guidelines. Implementing the right strategy is vital for platform success. Thus, the correct alignment of market structure and policies is a precondition to provide a thriving platform.	FW, RW
4	Congruency II	Governance and control mechanisms have to be aligned with the policies to ensure correct implementation of the strategic aims	Governance and control mechanisms are the means through which the platform provider takes action. After formulating the correct strategy in the policies, its manifestation in tangible mechanisms is essential to ensure platform enforcement.	FW, RW
5	Mechanism strength	When pursuing a primary business objective, providers should only use authority-based governance and formal control (and no other means)	Platform providers need to meet primary goals to be successful. Mechanisms which ensure the fulfillment of the goals are necessary. Relying on trust and good will is not a viable option.	RW, L
6	Control mix	Formal controls to ensure primary objectives should be aided by informal controls.	Primary goals should not be enforced by informal controls as they are essential and fulfillment should not be exposed to uncertainty. Consequently, formal controls are required. To ensure that primary goals are reached, further aid is necessary to limit uncertainty by adding extra informal controls.	RW, L

*Source: L - Literature on platform governance; FW - Governance framework; RW - Real-world Examples

6 Discussion

Research on platform governance is fragmented [7], [9]. As many companies fail in providing a thriving platform by aligning stakeholder interests in real world, we argue that platform governance research could advance understanding of why some mobile platforms prosper and others wither. Although research on platforms and governance is increasing, there are little empirical insights on this complex concept to this point. When a complex phenomenon is studied, a triangulation of sources is especially appropriate since it contributes to the robustness of results and a more complete understanding [43]. Therefore, we combined insights from literature qualitatively, reflecting these on a previously developed framework and deriving insight from real world examples.

We adapted a basic mobile platform governance concept provided by Manner et al. [8]. Unlike its predecessor, the framework combines the elements together and provides classification characteristics within each level making it applicable for real word governance change analysis. The final framework structures platform governance into three distinct levels, the market structure, governance policies and the governance configuration as well as provides classification characteristics within the

level, enabling platform providers to structure their decision. Moreover, we analyzed three real world governance changes demonstrating the applicability and usefulness of the framework to analyze and understand governance.

To support the framework with guidance, we proposed six principles for governing mobile platforms which are based on literature findings, elements of our framework and three real world governance changes. Each principle was derived from at least two of these three sources. Hence, we claim to have proposed robust findings.

The first principle **complete use** was found in literature, derived from the framework and within each real word example as we were able to fully apply the framework. In fact, we could also find the **proactivity** principle proposed by literature as it is reflected in all presented governance changes. Every store actively initiated a change without being forced by for example law or bankruptcy.

The third principle of **congruency I** between market influence factor and the governance policy is validated by the fact that a market influence factor triggering the governance policy change was identified within each change. The fourth principle **congruency II,** which proposes the alignment between governance and control, is reflected by the Windows Phone Store change where the implementation of a light governance mechanism is supported by a light informal control. The counterexample is provided by Google Play presenting the implementation of strict governance that leads to a formal strict control which in the end results in a high validity of this principle. Ensuring the enforcement with mechanisms is especially important when business interests are depending. Apple's interest not to lose trust of market participants was undeniably strong. Analyzing the change and detecting strong mechanisms supports and validates the literature derived principle of mechanism strength on the condition of business objectives. At last, literature is proposing that control mechanisms do not occur mutually exclusive. Evidence on our proposed principle of **control mix** was also found in reality where an input as well as behavioral control was applied by Apple's App Store.

Altogether, we were able to supply reliable verification for each principle. Furthermore, the principles were reflected and rationally analyzed to provide quality control. Our real world examples clearly support the claim that governance needs to be designed carefully. A fitting governance concept can only be designed for one certain platform, not for several and even such a concept does only fit until it needs to be adapted to the ecosystem again [7], [9], [11].

Our findings propose the first support for platform providers to develop governance rather than imitate as the framework proposes a structured way to analyze governance changes and enables to identify more easily what consequences a change could cause. Hence, it enables a well-structured decision. As the principles were derived from the three big players in the mobile service market, they will help practitioners to provide a thriving platform when combined with the presented framework. However, to this point the framework and the principles do not support the development of governance for a new platform or advise what governance policies should be adapted on the platform when for example a new competitor enters the market. Moreover, at the moment, the principles are of general nature that need to be analyzed more intensely in detail by future research and there may be more factors in real

world considered by practitioners that are not yet implemented in the framework and the principles derived from literature.

We acknowledge several limitations of our work. First of all, our framework is for the most part based on a literature review provided by Manner et al. [8]. Furthermore, although our examples provide a wide range as we chose three different platforms to prove the applicability of the framework, more changes should be looked at. Finally, our examples only observe changes from a secondary source. Interviews with the platform providers questioning their motives could provide more insights

7 Conclusion and Future Research

We analyzed the literature, proposed applicable mobile platform governance framework and applied the framework to analyze multiple governance change examples. Six principles for governing mobile platforms were derived from the framework, real world and literature insights.

Providing such a structured view on the multi-dimensional concept of governance based on research findings of several disciplines, builds a more mature view on platform governance and is a valuable contribution to research and practice.

However, we believe future empirical research could enlarge the proposed mechanisms. For example, we believe a legal factor, triggering changes, has to be integrated by contract- or authority-based governance mechanisms as well as by formal controls rather than by trust-based mechanisms and informal controls. As shown in the examples, governance policies can be ignored by stakeholders if not enforced by the right tangible mechanisms. Implementing weak governance, although a legal framework does exist, is to others an opportunity for a lawsuit claim.

A cross-case study analyzing a large amount of governance changes would be an adequate method for finally evaluating the framework and enlarging the governance principles. Interviews with platform providers would contribute to this research and enable to build a platform theory [43].

References

1. Jansen, S., Brinkkemper, S., Finkelstein, A.: Business Network Management as a Survival Strategy: A Tale of Two Software Ecosystems. In: Jansen, S., Brinkkemper, S., Finkelstein, A., Bosch, J. (eds.): IWSECO 2009. CEUR-WS.org, Vol. 505, pp. 34-48, CEUR Workshop Proceedings (2009)
2. Iyer, B., Lee, C.-H., Venkatramen, N.: Monitoring Platform Emergence: Guidelines from Software Networks. Communications of the Association for Information Systems 19, 1-13 (2007)
3. Gawer, A., Henderson, R.: Platform Owner Entry and Innovation in Complementary Markets: Evidence from Intel. Journal of Economics & Management Strategy 16, 1-34 (2007)
4. Basole, R. C., Karla, J.: Entwicklung von Mobile-Platform-Ecosystem-Strukturen und -Strategien. Wirtschaftsinformatik 53, 301-311 (2011)

5. Economides, N., Katsamakas, E.: Two-sided competition of proprietary vs. open source technology platforms and the implications for the software industry. Management Science 52, 1057-1071 (2006)
6. Rochet, J.-C., Tirole, J.: Platform Competition in Two-Sided Markets. Journal of the European Economic Association 1, 990-1029 (2003)
7. Tiwana, A., Konsynski, B., Bush, A.A.: Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics. Information Systems Research 21, 1-23 (2010)
8. Manner, J., Nienaber, D., Schermann, M., Krcmar, H.: Governance for mobile service platforms: A literature review and research agenda. ICMB 2012. AIS, Delft, NL (2012)
9. Ghazawneh, A., Henfridsson, O.: Balancing platform control and external contribution in third-party development: the boundary resources model. Information Systems Journal 23 (2), 173-192 (2013)
10. Burkard, C., Widjaja, T., Buxmann, P.: Software Ecosystems. Wirtschaftsinformatik 54, 43-47 (2012)
11. Haaker, T., Faber, E., Bouwman, H.: Balancing customer and network value in business models for mobile services. International Journal of Mobile Communications 4, 645-661 (2006)
12. Ballon, P., Walravens, N., Spedalieri, A., Venezia, C.: The reconfiguration of mobile service provision: towards platform business models. In: 19th ITS European Regional Conference, Rome, Italy (2008)
13. Ghazawneh, A., Henfridsson, O.: Micro-Strategizing in Platform Ecosystems: A Multiple Case Study. In: ICIS 2011 Proceedings, Shanghai (2011)
14. Kouris, I., Kleer, R.: Business models in two-sided markets: an assessment of strategies for app platforms. In: ICMB 2012. AIS, Delft, NL (2012)
15. Holzer, A., Ondrus, J.: Trends in Mobile Application Development. In: Hesselman, C., Giannelli, C. (eds.): Mobile Wireless Middleware, Operating Systems, and Applications-Workshops. Vol. 12, pp. 55-64. Springer, Berlin (2009)
16. Rudmark, D., Ghazawneh, A.: Third-Party Development for Multi-Contextual Services: On the Mechanisms of Control. In: European Conference on Information Systems (2011)
17. Brousseau, E., Penard, T.: The Economics of Digital Business Models: A Framework for Analyzing the Economics of Platforms. Review of Network Economics 6, 81-114 (2007)
18. De Reuver, M., Bouwman, H.: Governance mechanisms for mobile service innovation in value networks. Journal of Business Research 65, 347-354 (2011)
19. Ghazawneh, A., Henfridsson, O.: Governing third-party development through platform boundary resources. In: ICIS 2010 Proceedings, Vol. 48, St. Louis (2010)
20. Jain, A.: Apps Marketplaces and the telecom value chain. IEEE Wireless Communications 18 (4), 4-5 (2011)
21. Bouwman, H., Haaker, T., Faber, E.: Developing Mobile Services: Balancing Customer and Network Value. In: The Second IEEE International Workshop on Mobile Commerce and Services, pp. 21-31, Munich (2005)
22. Grover, V., Ayyagari, R., Gokhale, R., Lim, J., Coffey, J.: A Citation Analysis of the Evolution and State of Information Systems within a Constellation of Reference. Journal of the Association for Information Systems 7, 270-325 (2006)
23. Caillaud, B., Jullien, B.: Chicken & Egg: Competition among Intermediation Service Providers. RAND Journal of Economics 34 (2), 309-328 (2003)
24. Eisenmann, T., Parker, G., van Alstyne, M.W.: Strategies for two-sided markets. Harvard business review 84 (2006)

25. West, J.: How open is open enough? Melding proprietary and open source platform strategies. Research Policy 32, 1259-1285 (2003)
26. Eaton, B., Elaluf-Calderwood, S., Sørensen, C., Yoo, Y.: Dynamic Structures of Control and Generativity in Digital Ecosystem Service Innovation: The Cases of the Apple and Google Mobile App Stores. LSE, London Report 44, 1-25 (2011)
27. Busquets, J.: Orchestrating Smart Business Network dynamics for innovation. European Journal of Information Systems 19, 481-493 (2010)
28. West, J., O'Mahony, S.: The role of participation architecture in growing sponsored open source communities. Industry and Innovation 15, 145-168 (2008)
29. Kotler, P., Keller, K.L., Brady, M., Goodman, M., Hansen, T.: Marketing Management: European Edition. Prentice Hall, Harlow, UK (2009)
30. Hagiu, A.: Multi-sided platforms: From microfoundations to design and expansion strategies. pp. 1-26. Harvard Business School, Harvard Business School Strategy Unit Working Paper (2009)
31. De Reuver, M., Visser, A., Prieto, G., Bouwman, H.: Governance of flexible mobile service platforms. Intelligence in Next Generation Networks 1-6 (2010)
32. Neumann, D.: Market Engineering: A Structured Design Process for Electronic Markets. UVB, Karlsruhe (2007)
33. Methlie, L.B., Pedersen, P.E.: Business model choices for value creation of mobile services. Info 9 (5), 70-85 (2007)
34. Müller, R.M., Kijl, B., Martens, J.K.J.: A Comparison of Inter-Organizational Business Models of Mobile App Stores: There is more than Open vs. Closed. Journal of Theoretical and Applied Electronic Commerce Research 6, 63-76 (2011)
35. Tee, R., Gawer, A.: Industry architecture as a determinant of successful platform strategies: a case study of the i-mode mobile Internet service. European Management Review 6, 217-232 (2009)
36. Ouchi, W.G.: A Conceptual Framework for the Design of Organizational Control Mechanisms. Management science 25, 833-848 (1979)
37. Kirsch, L.S.: Portfolios of control modes and IS project management. Information Systems Research 8, 215-239 (1997)
38. Cardinal, L.B., Sitkin, S.B., Long, C.P.: A configurational theory of control. In: Sitkin, S., Cardinal, L.B., Bijilsma-Frankema, K. (eds.): Control in Organizations: New Directions in Theory and Research, pp. 51-107. Cambridge University Press, Cambridge (2009)
39. Schermann, M., Wiesche, M., Krcmar, H.: The Role of Information Systems in Supporting Exploitative and Exploratory Management Control Activities. Journal of Management Accounting Research (to appear) 24, 1-42 (2012)
40. Davies, C.: Apple privacy changes could impact 1000s of apps. In: Nguyen, V. (ed.): Slashgear, Vol. 2012. Slashgear, http://www.slashgear.com/apple-privacy-changes-could-impact-1000s-of-apps-16213785/ (2012)
41. Lunden, I.: Google Now Playing At Apple's Game For In-App Payments? No, Just Business As Usual, Says Google. In: Butcher, M. (ed.): Techcrunch, Vol. 2012. http://techcrunch.com, http://techcrunch.com/2012/03/09/google-now-playing-at-apples-game-for-in-app-payments-no-just-business-as-usual-says-google/ (2012)
42. Bowers, T.: App developers getting extra incentives from Microsoft. In: Hiner, J. (ed.): TechRepublic, Vol. 2012. TechRepublic, http://www.techrepublic.com/blog/career/app-developers-getting-extra-incentives-from-microsoft/4183 (2012)
43. Yin, R.K.: Case study research: Design and methods. Sage Publications, Inc, Thousand Oaks, CA (2009)