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The impact of Google's in-app commission fee changes on the local app ecosystem: A case study of Korea

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The impact of Google's in-app commission fee changes on the local app ecosystem: A case study of Korea☆

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1. Introduction

Proliferation of smartphones provides unprecedented access to information, entertainment, and interaction with others. Along with the device's seamless Internet connectivity, it is the availability of various mobile apps that magnify the experience. Apps, the abbreviated form of applications, refer to executable pieces of software that are presented as applications, services, or systems to the platform's end-users (Ghazawneh & Henfridsson, 2013). Apps reach end users through mobile app stores which are distribution platforms or an open market where apps produced by developers are downloaded by the platform's end-users. The current app store market is dominated by two major operating systems, Google and Apple, that deliver comprehensive "content, hardware, software, and distribution" services (West & Mace, 2010, p. 275). With smart device purchase and its embedded operating system determining global app store usage, 72.92 percent of Google Android users and 26.53 percent of Apple iOS users are anticipated to use either Google or Apple's app stores (O'Dea, 2020). Sensor Tower reports that among the 111 billion dollars in mobile app revenue, App Store earned approximately 72.3 billion dollars and Google Play generated around 38.6 billion dollars in 2020 (Chan, 2021).

The presence of mobile app store platforms is essential for apps to reach end-users and generate revenue. Attachment to mobile app store platforms enable cost-efficient development,

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access to user data, and better reach to end-users. App store platforms also benefit from mobile content firms that as their apps enhance the value of the platform and attract more end-users (Boudreau, 2012; Suarez & Cusumano, 2009). The interdependent relationship between mobile content firms and platform owners creates a unique relationship where both parties rely on each other's resources to enhance value and competitivity (Cennamo & Santalo, 2013; Hein et al., 2020; Jacobides et al., 2018). Despite the mutually dependent relationship, recent case studies depict how platform owners benefit from their gatekeeping position and take control over the whole ecosystem (Eaton et al., 2015; Gawer & Cusumano, 2014; Ghazawneh & Henfridsson, 2013). This is especially evident in the mobile app store ecosystem where app store owners serve as key intermediaries in distributing apps and connecting end-users to mobile content firms.

App store owner's exertion of dominant power is demonstrated through Google's recent policy change in extending the 30 percent commission policy on all paid and in-app purchases made on Google Play. The sudden announcement created significant backlash from many mobile content firms and related stakeholders for abuse of monopolistic power. While Google has accommodated the resistance by reducing commission fees to 15 percent for the first one-million-dollar revenue on all companies, the company remains to be criticized for not tackling the essence of the issue: the enforcement of Google's proprietary billing systems to all paid and in-app purchases. Google's policy change comes as a critical concern for countries where the majority use Android-based smart phones that rely on Google Play as the dominant app store. Mobile content firms that launched apps using Google's open system and flexible payment policies are now suddenly enforced to adopt the payment system and pay commission fees without much opportunities for negotiation. Even though there are governmental efforts to prevent antitrust behaviors and coalitions of mobile content firms proposing bills to regulate the dominance of Apple and Google, the time-extensive procedure leaves local mobile content firms to consider viable options as the policy will be enforced from October, 2021. In light of the time constraint, mobile content firms are in the dilemma of just endorsing the policy or considering alternative options. Mobile content firms can remain on Google Play and abide to the in-app payment enforcement policy, or express resistance by directing users to alternative payment methods outside the app, or leave Google Play and adopt an alternative app store. The study aims to examine the practical decisions of local mobile content firms in responding to Google's in-app payment policy change. While there are numerous studies on platforms and its relationships with complementors, there are limited studies that focus on the perspectives

of complementors and their evaluation of accepting the enforcement policies of dominant platform owners. By analyzing the decision-making processes of local mobile content firms through the analytic hierarchy process (AHP), this study hopes to provide academic and practical implications.

2. Literature Review

2.1. Platform and ecosystem

2.1.1. Mobile app store platforms

A platform, traditionally understood as a long flat raised structure that transports and connects people to places (Cambridge Dictionary, n.d.), has extended its definition to connect users and complementors in the digital environment. By connecting different parties, mediating transactions, and helping third-party actors produce products or services, digital platforms are perceived as important online matchmakers that cohere and manage different parties to co-create value (Lusch, 2011).

Previous literature defines the complexity of digital platforms into market-based, technical systems related, and socio-technical management attributes (Baldwin & Woodard, 2009; Hein et al., 2020). The market-based perspective interprets platforms as a mediator that profits from the interaction between two or more groups of parties (Rochet & Tirole, 2003). Platforms with two-sided markets benefit from network externalities as every additional actor enhances the value of the platform. However, with complementors only registering platforms that have accumulated end-users, and end-users utilizing platforms that have accrued many complementors, the intermediary platform is challenged to accumulate actors on both sides simultaneously. Caillaud and Jullien (2003) describe this dilemma as a chicken-and-egg problem that must be solved for the platform to succeed. The market-based perspective ultimately demonstrates that the platform market is for incumbents that have better opportunities to leverage strong network effects. Eisenmann et al. (2011) substantiate that platform owners maintain market dominance by using information superiority and existing resources to increase the scope of services to other market segments. Incumbent platforms with larger networks therefore have better chances to demonstrate the “winner-take-all” effect by attaining and sustaining power (Cennamo & Santalo, 2013; Levis, 2010).

The technical system perspective focuses on platform infrastructures and software

affordances that enable the development of various services on the platform. Platform architecture is composed of core components that designate specific interface design rules, and peripheral components that can be decomposed and recombined to flexibly accommodate the heterogeneous needs of users (Yoo et al., 2010). The combination of core and peripheral infrastructures is an essential toolkit that provides stability and creativity to mobile content firms (Hein et al., 2020). The core architectural modules offer stability as mobile content firms reduce development costs and benefit from economies of scale and scope. In addition to the advantages of producing large volumes of competitive services targeted at different markets, platforms also provide economies of substitution as mobile content firms reuse and upgrade components without designing every app system from scratch (Thomas et al., 2014). The peripheral components support innovation through various software development kits (SDK) or application programming interfaces (APIs) that can assist in cultivating apps with distinctive value. Platform's technical architecture thus enables complementors to build new modules using fundamental infrastructure and easily revise system components to make apps with low costs and distinct value.

The socio-technical perspective focuses on the tensions that rise from platform owner's utilization of technological systems to integrate and govern the actors on the platform. Similar to a conductor in an orchestra, platform owners exert influence over complementors through decision rights partitioning, portfolio control, and pricing policies (Tiwana, 2014). First, platform owners and mobile content firms struggle in obtaining authority over decisions related to strategy and implementation. Strategic decision rights refer to direction-setting and means of achieving specific orientations, whereas implementation decision rights refer to technical execution decisions such as choice of functions, designs, and user interface. Decision rights that reside with the platform owner leads to centralization and decision rights that inhere with mobile content firms result in decentralization. Within the continuum of centralization and decentralization, platform owners continuously strive to gain centralized authority in influencing mobile content firm's objectives and technical details. Second, platform owners exert control by managing the platform's portfolio based on the four pillars of process, gatekeeping, relational, and metrics. In other words, platform owners examine the app development process, release apps that are relatable to the platform's values and standards, and measure the app's performance metric to maintain the quality of the platform. Third, platform governance is demonstrated through pricing policies. Platform owners implement pricing policies after considering the subjects, duration of time, and revenue split structure. In the case

of app stores, Apple and Google subsidize mobile content firms through a predetermined percentage of 30 percent for each dollar of revenue (Eaton et al., 2015). Revenue is accrued from paid apps, freemium apps, or apps with specific items available for purchase (Roma & Ragaglia, 2016). Platform governance is important for platform owners as it reduces the behavioral complexity of the platform and integrates autonomous mobile content firms into a harmonious whole.

Based on the three characteristics emphasized in literature, mobile app store platforms are important mediators that entail network externalities, a modular technological architecture, and a governance structure. To comprehensively understand the two-sided market and the power dynamics between platform owners and complementors, mobile app store platforms are generally interpreted under the concept of ecosystems (Jacobides et al., 2018; Kostovska et al., 2020).

2.1.2. Business ecosystem

The concept of ecosystems is used as a prominent analogy to explain the interconnected structure of organizations that extend across various industries. Ecosystem refers to an environment where various different species compete, coexist, and are influenced by external forces. The dynamically coevolving environment is comprised of keystones, dominators, and niche players that seek to enhance ecosystem sustainability through innovations (Iansiti & Levien, 2004). Keystone is the central actor that improves the overall sustainability of niche players by creating and sharing value. Niche players are non-dominant actors or complementors that create differentiated value by leveraging on keystone players. Dominators are similar to keystones that arise through network centralization and strong influence in the ecosystem. However, unlike keystones, dominators progressively reduce the diversity of niches and take over the ecosystem.

Business ecosystems are formed through the existence of keystones, niche players, and potentially dominators that form a large number of loosely interconnected networks. Moore (1996) defines business ecosystems as an “economic community supported by the foundation of interacting organizations and individuals – the organisms of the business world” that coevolve and “align themselves with the direction set by one or more central companies” (p. 26). In other words, business ecosystems are a complex network of actors that center around

keystone players and establish symbiotic relationships for the innovative sustainability of the ecosystem.

The dynamics of business ecosystems are adapted to industries and Internet platforms with consistent changes and technical innovations (Isckia, 2009; Karhu et al., 2014; Thomas et al., 2014). Jacobides et al. (2018) illustrate platform ecosystems as a "hub and spoke" structure where complementary actors are attached to the digital platform by forming unique and supermodular relationships (Helfat & Raubischeck, 2018; Jacobides et al., 2018). In the case of app store ecosystems, mobile content firms and platform owners are a unique complementarity as they both cannot function effectively without each others' support and presence. Both are also a supermodular complementarity as synergy is created from each other's presence: mobile content firms enhance the value of the platform, and platforms help mobile content firms earn revenue. The mutually interdependent relationship between platform owners and mobile content firms is strengthened with the inclusion of end users, and the triangular structure empowers each player to cooperate in developing an innovative ecosystem.

2.1.3. Mobile app store ecosystem

App store platforms are keystones with rich network hubs and foundations for niche players to survive. The existence of app stores is critical as they contribute to providing stability, diversity, and productivity in the mobile app store ecosystem (Helfat & Raubitschek, 2018; Tiwana, 2015). App store's efforts to provide interoperability and sufficient supply of resources help niche players, namely media content firms, to leverage on the platform and develop specialized capabilities. For instance, the platform's extensive network is an important asset that improves the diversity and productivity of mobile content firms on the platform. Large number of end-users attract mobile content firms from different origins to the platform, and the exclusive apps produced by mobile content firms continuously lock-in users to the platform. Along with network externality benefits, the app store platform's core and peripheral infrastructures entitle app stores to become the cornerstones in sustaining the ecosystem. The core architectural modules create surplus for all mobile content firms by providing economies of scale and scope benefits. With fundamentally essential elements all enfolded into the platform, mobile content firms are able to share the costs with other firms and focus more on specializing their apps. The peripheral components such as SDKs and APIs also contribute in

creating and sharing value as the tools enable mobile content firms to efficiently package and distribute the content to end-users. Mobile app stores fulfill the role as keystones as they provide rich technical affordances that reduce initial financial outlays and empower mobile content firms to continuously create distinctive value. In addition, the large networks contribute in creating positive feedback loops which ultimately locks in both media content firms and end users to the app store platform (Levis, 2010).

The role of app stores is pivotal to the sustainability of the ecosystem such that its removal is perceived to create a dynamic cascading effect to all related participants and the ecosystem as a whole. Despite their contributions as keystones, the App Store and Google Play are perceived as dominators due to their dominant position in the ecosystem and overarching control over resources. Iansiti and Levien (2004) describe Apple as the classic example of a dominator that eliminates the ecosystem's diversity and robustness. Apple's App Store conducts a walled garden strategy where all participants are strictly controlled by Apple. Any means of jailbreaking or challenging the closed iOS operating system is prohibited. For example, Apple banned the launch of Cydia, an alternative app store for jailbroken iOS users, by releasing an updated developer program license agreement that prevents jailbreaking and the distribution of apps other than the official App Store. The App Store also monitors the launch and development process of third-party apps. The initial rejection of Google Voice on Apple due to functional similarity with Apple's iPhone Dialer illustrates how the App Store controls products and protects innate apps from third-parties. In addition, the App Store prohibits the use of third-party billing systems and takes 30 percent of given transactions from all payments within the platform. While the commission fees are used to maintain the app store and uphold its standards, the app store is criticized for its anti-competitive behavior in enforcing only its payment system and dominating opportunities for value creation and value capture.

Compared to Apple's control over the App Store, Google Play is more of a keystone predator that has transitioned to become a dominator in the Android-based app store ecosystem. The platform's openness and relatively loose control enhances the participation of various app developers and mobile content firms, which positively influence the accumulation of large user bases (Choi et al., 2019). While the app store enforces a relatively loose policy to mobile content firms, Google Play operates its own apps that challenge the diversity in the app store. Google is renowned for implementing envelopment strategies that integrate various services in different industries into the Google platform. For instance, online payment services (Google

Checkout), productivity software (Google Docs), cloud storage service (Google Drive), web browser software (Chrome), and video content software (YouTube) are all linked to its search platform and mobile phone operating systems (Eisenmann et al., 2011). The benefit of offering Android-based devices to more than 70 percent of global users further empowers Google to lock-in users. Google's expansion into different markets discourages the creativity of mobile content firms and reduces the robustness in the mobile app store ecosystem. Turbulent changes enforced by app stores is perceived as an abuse of power that triggers mobile content firms to respond by implementing strategic responses.

2.1.4. Power of app stores

Keystone's ability to become dominators is due to its unique power in the ecosystem. App stores, as keystones, have the power to influence the survival and health of the entire ecosystem. Power is a comprehensive term that incorporates various meanings such as authority, influence, dominance, centralization, and decision rights (Jasperson et al., 2002). Despite multiple interpretations of power, the underlying premise is that power is not exercised in isolation. In other words, power is a relational variable that is exercised in personal or organizational relationships. Emerson (1962) substantiates that power is related to ties of mutual dependence among actors. The group with the most dependence on others provides basis of power for the other group to influence or control. Power is thus interpreted as having to do with "relationships between two or more actors in which the behavior of one is affected by the behavior of the other" (Tolbert & Hall, 2009, p. 69).

Within mutually dependent organizational networks, power arises from resource control and network centrality (Astley & Sachdeva, 1984). First, resource control refers to the organization's power in controlling the supply of resources to others. This concept is derived from the resource dependence perspective where organizations are identified as mutually interdependent entities that exchange resources for operational sustainability (Pfeffer & Salancik, 1978). Even though firms rely on each other to reduce uncertainties, asymmetrical exchanges are anticipated to occur due to differences in the resource value and size of the firm. Organizations with value-enhancing resources are likely to accrue more net power than those in need of resource supply. Power asymmetry increases when an organization controls resources that are scarce and valuable to the other organization's functioning (Tolbert & Hall,

2009). Pfeffer and Salancik (1978) thus depict that power arises from organizations that possess discretionary control over resources which are rare, non-substitutable, valuable, and imperfectly imitable by others. In the case of mobile app stores, Google Play and the App Store possess resources that are essential for mobile content firms' survival. The technical infrastructures, user data, and the rich network externality are some examples of resources that are inherent to the specific platform. Even though platform owners need mobile content firms for augmenting the platform's value and exclusivity, platform owners have far more resource control than mobile content firms in the duopoly market (Maggio, 2017; Nieborg et al., 2020).

Second, network centrality contributes to power formation as organizations within reciprocal relationships create a stable network of patterned interactions. Freeman et al.'s (1979) experiment demonstrates that centrality in social networks is created from structural relationships rather than emotional intimacy. In other words, centrality in organizational networks is established based on the entity's level of non-substitutability in the primary workflow (Hickson et al., 1971). Cook (1977) distinguishes network centrality from resource control by emphasizing that power from network centrality is derived from structural dependence, or "the position of the actor within the exchange network" (p. 72). App Store and Google Play are functionally indispensable in the mobile app store ecosystem as they are the keystones for distributing apps on mobile devices. Despite the unique and supermodular complementarity relationships between platform owners and mobile content firms, the app store market dominance by Apple and Google leaves mobile content firms vulnerable to the power of platform owners.

The power from resource control and network centrality enables app stores to exert influence that is far beyond its obvious sphere. Srnicek (2017) asserts that the quantity and quality of data extracted from network effects empower app stores to transition from keystones to dominators. For example, app stores that have vast repositories of data gain competitive advantage in locking-in users to the platform by providing customized and enclosed services. Apple's closed iOS and strict control over the App Store creates a "walled garden" where all data is collected and managed by Apple. Google Play also has a clear lock-in strategy as synchronized services are consistently updated and provided based on accumulated data from hardware and software users. The growing emphasis on user data and its commercial value further motivate app stores to strengthen their positions as dominators that internally extract the mobile app store ecosystem's value. As Google and Apple reduce competition in the app

store ecosystem and the Internet platform industry, the dominant uses of U.S.-based Internet platforms raise concerns over data security, privacy, and most importantly, sovereignty (Schiller, 2015; Jin, 2015).

2.2. Google Play's policy change

2.2.1. Impacts on niche players in the app store ecosystem

Niche players in business ecosystems refer to the firms that leverage on the keystones to develop specialized capabilities (Iansiti & Levien, 2004). In the mobile app store ecosystem, mobile content firms are the niche players that focus on differentiation by reducing duplicate efforts on fundamental resources and investing more on ways to enhance its competitive strategies. If keystones influence the overall shape and direction of the ecosystem, niche players are the elements that perform the conduct. Differences in responsibilities and resource control capabilities empower keystones to have a significant degree of influence on niche players. The extent of influence is considerable especially when the app store is monopolized by multinational tech companies, Apple and Google, in each operating system. The recent removal of Epic Games' video game Fortnite from the App Store demonstrates how mobile content firms are vulnerable to the power of app stores. Epic games' decision to bypass App Store's 30 percent commission payment by installing an alternative payment system within its renowned game, Fortnite, has led Epic Games to be withdrawn from the app store. While Epic Games has filed a lawsuit against Apple for abusing its market dominance, the case has turned into a long battle as Apple is strongly defending its role as keystones and accusing Epic Games for breach of contract in circumventing the mobile app store's in-app purchase policy (Swartz, 2021). The Epic games lawsuit demonstrates that despite the unfair treatments that mobile content firms receive, the overarching power of keystones leave mobile content firms with little choice but to abide to the enforcement or take action with high costs and risks.

Google's recent in-app payment policy change is a movement that strengthens Google's evolvement as a dominator in the mobile app store ecosystem. While Google had existing policies that advise app developers to use Google's billing system on in-app purchases made on Google Play, the policy was not strictly enforced. Google's recent policy change now enforces the use of Google's billing system which takes a 30 percent commission fee on all paid and in-app purchases made on Google Play. Even though Google has revised the standards

to reduce commission fees to 15 percent for the first $1 million revenue on all company's revenue on Google Play, the commission fee is anticipated to create burdens for mobile content firms.

The policy change has created notable backlash in Korea where the country's smartphone market is dominated by Android phones. Reports claim that users are susceptible to the policy changes as only 8.9 percent are iPhone users and the majority rely on Samsung (72.3%) or LG (9.6%) smartphones (Cho, 2020). In addition, the in-app payment policy that was only applied to the Korean game sector is now enforced and applied to all mobile content firms that provide paid apps or in-app payment features on Google Play. Google emphasizes that only a few companies will be affected as 95 percent of apps developed in Korea are free, and 98 percent of apps among the remaining 5 percent already follow Google's in-app payment policy (Cho, 2020). Although Google claims that the policy affects only a small percentage of mobile content firms, the commission policy change adds another layer of burden for mobile content firms that are already coerced to follow Google Play's platform control and standards. Coalitions have been formed by local mobile content firms such as Korea Internet Corporations Association and the Korea Startup Forum to file complaints to the Korea Communications Commission regarding the legitimacy of Google's policy change. The National Tax Service also announced its decision to review Google's taxation options on the commission fee revenue. With the policy being enforced in October, the time-constraint condition motivates local mobile content firms to accept the policy with the expense of financial burdens or resist the policy with the cost of losing technical support and platform networks.

2.2.2. Local alternative app stores in Korea

Google's relatively open platform policy enable various alternative app stores to compete with Google Play. Among app stores that are not originated from the U.S. or Europe, there is Samsung's Galaxy Store and One Store. Korea's One Store is unique as it is a consortium of the nation's three mobile carriers and Naver. Established in 2016, One Store stands out as an alternative app store on the Android-based platform with parent companies that can cooperate in providing collaborative resources and networks. With policies that strive to benefit app developers, One Store is slowly enlarging its market share in Korea. For example, after Google's in-app payment policy change announcement, the market share of One Store has

increased from 11.7 percent in 2019 to approximately 20 percent (Kim, 2021). Although One Store is limited to the Korean market, the acquisition of a 15-million-dollar investment from Microsoft and Deutsche Telekom validates One Store's potential to grow and become a feasible alternative to Google Play (Lim, 2021).

Google's in-app payment policy change is planned to be implemented in October, 2021. The existence of local app stores enables mobile content firms to consider different alternatives despite high switching costs. Mobile content firms therefore have the option of residing with Google's policies or making initiatives to resist the policy change. This study aims to examine mobile content firms' strategic decisions in responding to Google's policy change and identify the factors that contribute in making the decision.

Therefore, the study presents the following questions.

RQ1. Are local mobile content firms willing to endorse the current payment enforcement policy or are they inclined to select alternative options?

RQ2. What are the key determinants that are valued in responding to Google's in-app payment policy change?

3. Methodology

3.1. Analytic hierarchy process (AHP) model

The analytic hierarchy process (AHP) model, proposed by Saaty in the 1970s, is used in various studies related to analyzing complex decision-making processes (Saaty, 1987). The framework arranges factors in a hierarchic structure descending from the overall goal to criteria, sub-criteria, and alternatives. By categorizing factors into successive levels and conducting paired comparisons, the AHP model provides an overall view of the complex relationships inherent in the situation and enables accurate comparisons of homogeneous factors (Saaty, 1990). The AHP decomposes problems through pairwise comparisons and creates a combination of relative and absolute scales that demonstrate how one factor is more dominant than the other in a given situation (Saaty, 2008). The hierarchy of criteria and alternatives are determined based on the relative importance and priority weights. Vargas (1990) surmises that the AHP model is effective in integrating qualitative aspects such as perceived risks or uncertainty into the analytic process, and intuitively understanding the apportionment of the

whole into its constituent parts.

The AHP is applied in academia and practical domains as it is useful in easily understanding the core of the problem and conducting proper decision-making processes. Along with early studies that use AHP for market choices and business process outsourcing, the model is also used to project or examine the impacts of new technology (Vargas & Saaty, 1981; Yang et al., 2007). For instance, Kim and Kim (2017) investigate the rationale behind newspaper management's decisions in adopting robot journalism in newsrooms, and Park et al. (2019) adopt the framework to examine the key services and players in the smart car market. The AHP is also used for solving complex problems related to stakeholders. Nielsen and Mathiesen (2006) demonstrate how AHP is useful in discovering the essence of the problem and understanding the differing views of stakeholders. Álvarez et al. (2013) adopt the AHP model to corporate social responsibility (CSR) decisions in large infrastructure projects and substantiate that the AHP clarifies decision problems and helps arrange relationships by revealing stakeholder's preferences. In consideration of the model's functionality and performance, this study finds AHP to be fit in examining the key factors that are valued in adopting app store platforms and responding to Google's in-app payment policy.

3.2. Criteria for responding to Google's in-app payment policy change

The structure of the AHP model proposed in this study is constructed of three levels. In a hierarchical descending order of levels, the model is composed of criteria, sub-criteria, and alternatives. The objective goal of this study is to understand the factors that stakeholders prioritize in responding to Google's in-app payment policy change. The study will use the AHP to examine the factors that affect stakeholder's decisions in adopting app store platforms after Google's in-app payment enforcement. The first level refers to the major criteria that stakeholders consider when adopting app store platforms. Perceived benefits, perceived challenges, and perceived environmental factors were included as the major criteria. The second level relates to sub-criteria factors such as technological support, global consumer acquisition, marketing effect, revenue loss, consumer loss, lack of autonomy, competition with Google apps, isomorphism, and governmental support. Pairwise comparison among sub-criteria attributes will be performed to evaluate the hierarchy of importance. The last level represents alternatives which are remaining on Google Play, remaining on Google Play but

using external billing systems, or shifting towards adopting alternative app stores like One Store as the primary app distribution channel.

3.2.1. Perceived benefits

As keystones of the ecosystem, the mobile app store provides various benefits for mobile content firms in the ecosystem. The mobile app store's network externalities, data resources, and technical infrastructure support stakeholders to develop and distribute apps on the platform. The study forecasts that the technological cost savings, market access, and innovation opportunities are important attributes that distinguish the app store from other alternatives. As niche players that leverage on the resources of keystones, the benefits received from Google Play is anticipated to influence mobile content firm's decision-making processes in accepting Google's in-app payment policy.

Technological support refers to the technological support that mobile content firms receive from app store platform owners. Platform owners offer investment-intensive infrastructure and complementary resources such as SDKs and APIs that help mobile content firms save duplicate costs in developing apps. For example, mobile content firms enable mobile content firms to reduce upfront investment costs and transaction costs through payment mechanism infrastructure. Platform's technical affordances provide mobile content firms the economic viability to focus on greater specialization and long-tail markets (Tiwana, 2014). The platform owner's ability to consistently afford technical investments and update complementary resources thus distinguish the platform from other competitors and ultimately engage mobile content firms to remain locked-in to the platform (Müller et al., 2011).

Global consumer acquisition is guaranteed through the platform's network externalities and position in the ecosystem. Google Play's sufficient networks help mobile content firms reach a prospective pool of end-users easily and cost-effectively. Based on accumulated user data, platform owners prescreen potential users and promise mobile content firms the opportunity to break even with investment costs (Tiwana, 2014). Google Play's services in different geographical markets and industry segments are important in augmenting opportunities for mobile content firms to reach potential end-users. App stores with large coverages therefore lowers the barriers for mobile content firms to enter global markets and creates a net effect of expanding user demands for mobile content firm's apps (Evans et al.,

2006).

Marketing effect focuses on the positive effects that virtuous feedback loops can yield. End-users' responses help mobile content firms accommodate and create innovative apps that are sustainable in the app store. As apps with high number of downloads are displayed on the app store's top-ranking list, mobile content firms are able to benefit from marketing effects that the platform provides. Bowman et al. (2015) substantiate that high-volume and high-user reviews implicitly encourage users to download mobile game apps with little search costs. Once an app achieves high ranks and reviews, the positive feedback loop ensures continued exposure to reach end-users and opportunities to lock-in users (Levis, 2010; Nieborg et al., 2020). Lee and Raghu (2014) thus find that mobile app's success on the app store is determined by the app's quality updates and high ranks. Stakeholders are therefore anticipated to select app store platforms that guarantees positive feedback loops and marketing effects as it is associated with the mobile content firm's sustainability.

3.2.2. Perceived challenges

In exchange for the benefits, mobile content firms are required to follow the standards of keystones. While the standards are necessary for the overall health of the ecosystem, it becomes challenging when the keystones transform into dominators. Mobile content firms bear the risk of being enforced to suddenly share revenues and become highly vulnerable to the app store's competing services. The study projects that endorsing the changed commission policy and launching apps on Google Play is accompanied with risks that influence mobile content firm's decisions.

Revenue loss is a risk that mobile content firms face due to high commission fees that are paid to platform owners. Apple and Google implement a fixed scale of 30 percent for each dollar of revenue collected from in-app payments. While both app stores have reduced the commission fee scale to 15 percent for mobile content firms under one-million-dollar revenue, the policy in collecting revenue remains intact. In contrast to Apple and Google's in-app payment policy enforcement, alternative app stores are lowering commission fees and encouraging mobile content firms to achieve better revenue savings. For example, Korea's One Store charges a commission fee of 20 percent for in-app purchases, and 5 percent for apps that use alternative means of payment. The relatively high commission rates on Google lead mobile

content firms to share the burden with end-users by increasing the price of services and goods. High prices discourage end-users' purchase intentions, which further leads to revenue loss, and dampens mobile content firm's investments on developing apps. A vicious cycle is thus created from the in-app payment enforcement as mobile content firms face the risk of revenue loss and decline in investment.

Consumer loss is another probable risk that mobile content firms face after the in-app payment policy implementation. High commission fees become a burden to end-users and can discourage app payments. Even though mobile content firms resolve the commission fee problem by adopting external website payment systems, price sensitive end-users may search for alternative apps or app stores that offer services with low or free prices. Increase in service prices is especially a concern for mobile content firms as Google Play is generally composed of end-users with relatively low willingness to pay. Roma and Ragaglia (2016) demonstrate that freemium revenue models in Google Play suffer from low app sales as users generally prefer free apps and have low intentions to upgrade the app to the full paid version. Lee and Ragu (2014) also indicate that price updates are highly correlated with the app's success. With commission fees enhancing the price of apps and in-app services, mobile content firms are assumed to experience consumer loss and low app download rates.

Lack of autonomy highlights mobile content firm's susceptibility to platform owners. Under platform capitalism, stakeholders in the ecosystem are tied to the decisions of platform owners and all app development processes are in need of the platform owner's consent. Despite efforts to challenge the system, studies demonstrate how the App Store and Google Play resist decentralization (Eaton et al., 2015; Ghazawneh & Henfridsson, 2013). The recent in-app payment policy change is also an illustration of how Google seeks to retain authority despite significant backlash. Even though the commission fee percentage is modified to accommodate the rising criticisms, the core problem of enforcing proprietary billing system to in-app payments remain unchanged. The critical problem of losing autonomy is that mobile content firms have limited access to user data. Google's control over data exacerbates mobile content firms' vulnerability in gaining ownership of information that is critical for survival in the data driven, capitalist environment. Lack of autonomy is thus an important challenge that mobile content firms face when launching apps on monopoly platforms.

Competition with Google apps is associated with the envelopment strategy employed by platform owners. Based on accumulated user data, platform owners have better access to

information and resources. Platform owner's app development impedes competition as they create apps with better accessibility and customization. For example, Google's enclosed ecosystem of search, news stories, videos, email, and cloud services attract users to continuously select Google's services due to synchronization and compatibility advantages. Wen and Zhu (2019) depict that Google's entry to complementor's markets reduces mobile content firm's innovation and threatens the sustainability of developers with limited product offerings. Mobile content firms thus need to consider the threat that platform owner's service entry can yield.

3.2.3. Perceived environmental conditions

The environment is important in affecting the mobile content firm's decisions and actions. Pfeffer and Salancik (1978) emphasize that the means of learning about the environment, attending to the environment, selecting and processing information in the environment, and adding meaning to the environment are critical determinants that affect the actions of organizations. In ecosystems where niche players are tied to the decisions of keystones or dominators, environmental conditions are significantly important in affecting the mobile content firm's decisions to resolve or adapt to the power dominance of app stores.

Isomorphism refers to mobile content firms following successful cases in uncertain environments. Among a plethora of apps, mobile content firms face uncertainty in effectively distributing apps and reaching end-users. DiMaggio and Powell (1983) propose that organizations under ambiguous conditions model itself after organizations that are perceived to be successful. As major studios or publishers launch apps on the App Store and Google Play, new mobile content firms may also find major app stores to be the viable option (Nieborg et al., 2020). Caplan and Boyd (2018) assert that Facebook became the dominant platform for distributing news based on news outlets following the isomorphism and producing content that is fit for Facebook's newsfeed. The algorithm-based user data, better accessibility than traditional media outlets, and high user engagement are analyzed as some of the key attributes that implicitly impacted traditional news outlets to change their organizational model or distribution channel. The more mobile content firms seek to gain competitivity and profit in an uncertain environment, mobile content firm's platform decisions are anticipated to be influenced by successful mobile content firms or dominant platforms.

Governmental support is interpreted as the greater power in the larger social system. Pfeffer and Salancik (1978) affirm that organizations with less power strategically use governmental assistance which include direct monetary support or market protection from monopolistic dominance. In light of Apple and Google's monopolistic power, governments are implementing regulatory pressures and antitrust investigations to fight back against the app store's control over in-app purchases and commissions. The recent decisions from EU to regulate Apple's in-app payment system and the antitrust lawsuits from U.S. states accusing Apple and Google of thwarting competition and preventing third party billing systems are important examples of governmental support. The Korean government is also advancing bills to speculate Google's anti-competitive activities and help local mobile content firms protect their rights in selecting means of payment. As Korea has its own alternative app stores, governmental support in helping the innovative growth of local app stores is also pivotal. Government support is thus anticipated to contribute in creating an environment that protects and innovates local mobile content firms and app stores to enhance their value in the app store ecosystem.

3.2.4. Alternatives

The study proposes three scenarios as probable alternatives that mobile content firms can choose from. The first scenario is to endorse Google's policy change by remaining on Google Play and accommodating the payment enforcement. This scenario is for mobile content firms that are willing to embrace Google's in-app payment system and their dependence on the platform. The second scenario is to express some level of resistance by remaining on Google Play but using external payments. Rather than implementing Google's proprietary billing system, mobile content firms can direct users to make payments on company websites. The second scenario strategy enables mobile content firms to utilize Google Play's resources while also retaining some degree of freedom by using different means of payment. Mobile content firms, however, have the risk of losing consumers due to the inconvenience in making payments. The third scenario is to "take a leap of faith" and shift towards utilizing alternative Android-based app stores. By slowly leaving Google Play and adopting a new primary channel for app distribution, mobile content firms can distribute apps in a more developer-friendly environment.

Based on the three criteria, nine sub-criteria, and three alternatives, this study aims to understand mobile content firm's response to Google's in-app payment policy change. By using the AHP, the study will first examine mobile content firm's decisions to either endorse or resist Google's in-app payment policy. Next, the study will utilize criteria weights to identify the key factors that contribute to such decisions. The proposed framework is demonstrated in Figure 1.

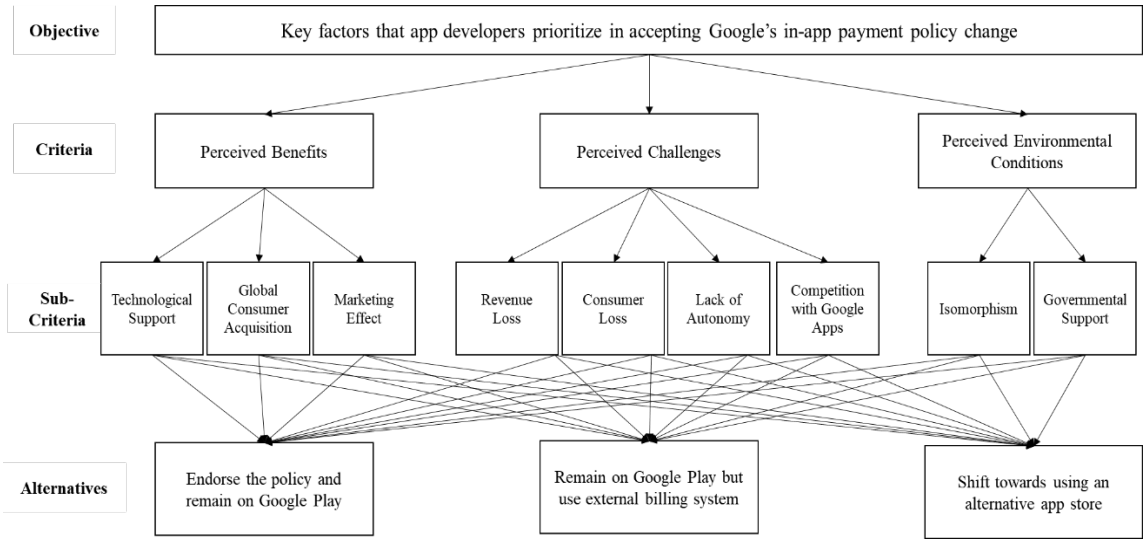

Figure 1. AHP model for responding to Google's in-app payment policy change

3.3. Data collection

The study examined the AHP model by conducting a survey to senior managers in mobile content firms. Respondents were collected from firms that released mobile app services on Google Play and offered paid apps or in-app payment features. In particular, they were required to be in part of or in charge of the company's strategies toward Google's in-app payment policy change. Respondents were collected by contacting major content firms that attended related official meetings and emailing firms with high revenues on Google Play. The response rate was low as many were concerned with causing tensions with Google. Therefore, the study collected only a few responses from major mobile content firms that had more than one-million-dollar revenue and were subject to the 30 percent commission fee.

The study collected responses from senior managers affiliated in 18 different firms from mid-April to May, 2021. By eliminating one respondent that showed insufficient consistency, the study examined 17 respondents. Majority of the responses (70.6%) were from senior

managers that have more than 10 years of experience in the industry. Respondents were generally from the R&D sector or positions that were related to planning, managing, or responding to policy and regulations (88.2%). Each respondent was from mobile content firms that offered paid apps or in-app payment features. Respondents were from various mobile content firms such as Korea's major OTT and music streaming service providers, Internet portals, and game companies. Of the seventeen firms, seven were listed in Stock Exchange. Majority of respondent's companies offered comprehensive content services (41.2%) and used app stores other than Google Play (88.2%). The mobile content firms generally relied on Google's in-app payment system or used alternative means of payment simultaneously. Only three firms were independent from Google's in-app payment system. Among the 17 firms, 29.4 percent were reported to make more than the one-million-dollar threshold and were subject to pay the 30 percent commission fee. Details of respondents and their affiliated firms are shown in Tables 1 and 2.

Table 1. Description of respondents

	Item	Frequency	Percentage (%)
Gender	Male	16	94.1
	Female	1	5.9
Job type	R&D	6	35.3
	Marketing & Sales	2	11.8
	Planning & Management	5	29.4
	Policy & Regulation	4	23.5
Work experience	5 – 10 years	5	29.4
	10 – 15 years	3	17.6
	15 – 20 years	6	35.3
	More than 20 years	3	17.6
Total		17	100

Table 2. Description of respondent's content company

	Item	Frequency	Percentage (%)
App store usage	Only Google Play	2	11.8
	Google Play + App Store	4	23.5
	Google Play + App Store + α	7	41.2
	Google Play + α	4	23.5
App genre	Game	3	17.6
	Camera/Video	2	11.8
	Music	2	11.8
	E-Publishing	1	5.9
	Others	2	11.8
	Comprehensive	7	41.2
Mobile app payment system	Google's in-app payment system only	6	35.3
	Alternative payment system only	3	17.6
	Google's in-app payment system + Alternative system	8	47.1
Mobile app revenue	Less than 1 million dollars	12	70.6
	More than 1 million dollars	5	29.4
	Total	17	100

3.4. Data analysis

The responses were analyzed using the technical computing language software, MatLab. The consistency ratio (CR) was examined to verify the validity of the responses. Saaty (1983) claims that responses with CR values below 0.2 is considered tolerable especially in social sciences where respondents have different perspectives and understandings of the hierarchies. Except for one response, all responses had a CR below 0.2. The study therefore analyzed 17 survey responses from senior managers in local content companies that released apps on Google Play. With previous studies conducting AHP analysis on 15 stakeholders, the sample size number was not regarded as a problem in analyzing the results (Chen et al., 2017; Newell & Seabrook, 2005).

4. Results

4.1. Criteria weight

The respective weight of criteria used in the model are analyzed in Table 3. Results demonstrate that perceived environmental condition (.459) is the most important factor

followed by perceived risks (.399) and perceived benefits (.142). Within the perceived environmental conditions, governmental support had the most weight with .657. In the perceived risks criteria, consumer loss (.346) had the highest weight followed by lack of autonomy (.271), competition with Google apps (.202), and revenue loss (.180). Under the perceived benefits criteria, global consumer acquisition (.463) was found to be more important than marketing effect (.443) and technological support (.095).

Global weights symbolize the relative importance of each sub-criteria. The value was calculated by multiplying the first level criteria's weights with the local score of each sub-criterion. The global weights of nine variables demonstrated that governmental support (.302) and isomorphism (.157) are the most important factors in influencing mobile content firm's responses to Google's in-app payment policy change. Along with the two variables in the environmental conditions criteria, consumer loss (.138), lack of autonomy (.108), and competition with Google apps (.081) were also emphasized as influential factors. The platform's marketing effect (.063) and technological support (.013) were the two least important criteria.

Table 3. AHP criteria weights and ranks

Criteria	Weight (W_C)	Sub-criteria	Local score (W_L)	Global weight ($W_C * W_L$)	Rank
Perceived Benefits	.142	Technological support (TS)	.095	.013	9
		Global consumer acquisition (CA)	.463	.066	7
		Marketing effect (ME)	.443	.063	8
Perceived Challenges	.399	Revenue loss (RL)	.180	.072	6
		Consumer loss (CL)	.346	.138	3
		Lack of autonomy (LA)	.271	.108	4
		Competition with Google apps (CG)	.202	.081	5
Perceived Environmental Conditions	.459	Isomorphism (IS)	.343	.157	2
		Governmental support (GS)	.657	.302	1

4.2. Alternatives

The priority among the alternatives is measured by first examining the local score of each sub-criterion under the given alternatives. The local score is then multiplied with the global weight score which is the product of first level criteria weights and sub-criteria local scores. The multiplied values become the global weight for alternatives, and the sum of global weight values is regarded as the total weight of each alternative criteria.

Table 4 shows the sub-criteria's local values under each alternative. The alternative option related to remaining on Google Play was found to be strongly influenced by benefits in global consumer acquisition (.386) and marketing effect (.357). Isomorphism was also an important predictor to remain on Google Play (.350). However, risks related to revenue loss (.204), lack of autonomy (.212), and competition with Google apps (.229) showed weak relations. For the alternative of remaining on Google Play but using external billing systems, revenue loss (.520), competition with Google apps (.410), and lack of autonomy (.402) were found to be important factors that senior managers consider. The alternative to shift towards using an alternative app store was strongly correlated with lack of autonomy (.386), competition with Google apps (.361), and governmental support (.355).

Table 4. Local scores for AHP alternatives

	Remain on Google Play and endorse the policy		Remain on Google Play but use external billing system		Shift towards using an alternative app store	
Sub-criteria	Local score (W_L)	Ranks	Local score (W_L)	Ranks	Local score (W_L)	Ranks
TS	.318	4	.373	6	.309	4
CA	.386	1	.365	8	.249	9
ME	.357	2	.390	4	.253	8
RL	.204	9	.520	1	.276	7
CL	.307	5	.388	5	.305	5
LA	.212	8	.402	3	.386	1
CG	.229	7	.410	2	.361	2
IT	.350	3	.359	9	.292	6
GS	.273	6	.372	7	.355	3

The global weights of the alternatives are measured using the first level criteria weights

from Table 3 and the sub-criteria local weights from Table 4. The total weight of remaining on Google Play was .288, which is the lowest among the three proposed alternatives. Shift towards using an alternative app store ranked second with a global weight of .322. The most probable alternative had a global weight of .390, and was to remain on Google but use external billing systems. Table 5 and Figure 2 presents the results of the AHP analysis.

Table 5. Priorities in AHP alternatives

		Remain on Google Play and endorse the policy		Remain on Google Play but use external billing system		Shift towards using an alternative app store	
Sub-criteria	Criteria weight	Global weight ($W_C * W_L$)	Rank	Global weight ($W_C * W_L$)	Rank	Global weight ($W_C * W_L$)	Rank
TS	.013	.004	9	.005	9	.004	9
CA	.066	.025	4	.024	8	.016	7
ME	.063	.022	6	.025	7	.016	8
RL	.072	.015	8	.037	6	.020	6
CL	.138	.042	3	.054	3	.042	3
LA	.108	.023	5	.044	4	.042	4
CG	.081	.018	7	.033	5	.029	5
IT	.157	.055	2	.056	2	.046	2
GS	.302	.082	1	.112	1	.107	1
Total Weight ($\sum W_C * W_L$)		.288		.390		.322	
Rank		3		1		2	

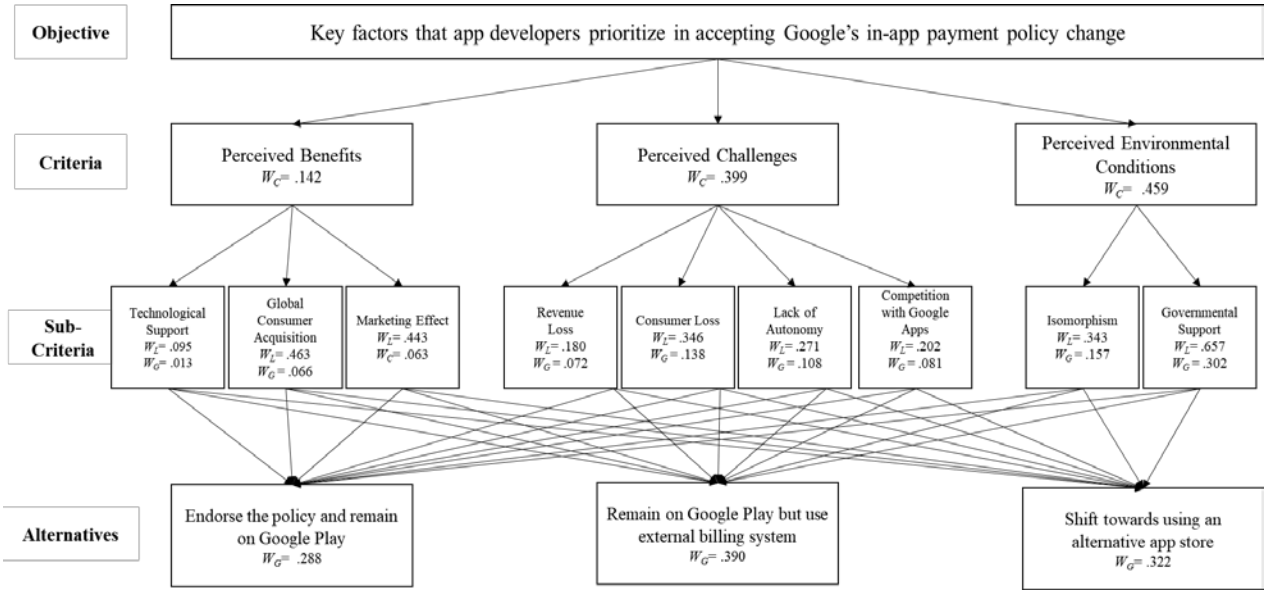

Figure 2. The decision model for accepting Google's in-app payment policy change

5. Discussion and Conclusion

5.1. Summary of findings

The mobile app store ecosystem is described as an environment where mobile content firms and related stakeholders are centered around the platform owners, Apple's App Store and Google's Google Play. The relationships between mobile content firms and platform owners are mutually interdependent, yet the differing level of resource control and centrality in the network lead Google Play and the App Store to exert significant power. As the first to launch the App Store, Apple conducted strict control over the iOS-based app store to retain its exclusive and dominant position. Google, on the other hand, had a relatively loose stance on app store control to successfully compete against other Android-based app stores and accumulate positive network externalities. Google's recent policy change however is a decision that contradicts original initiatives and an enforcement that abuses the vulnerability of mobile content firms that heavily depend on Google Play. In light of the current backlash from local mobile content firms, this study examines the priorities that are considered when accepting Google's in-app payment policy change.

The study examined 17 survey responses from senior managers that release apps on Google Play. All 17 companies offered paid or in-app payment features and were identified as generally using only Google's payment system or simultaneously using alternative payment

systems. The results were analyzed based on the perspectives of senior managers that are aware of the company's managerial processes in responding to Google's policy change. Among the three major pillars, perceived environmental condition was the most important factor that influenced mobile content firm's decisions. Rather than the challenges and benefits that the company receives from Google, it was the environmental conditions that mostly affected mobile content firm's behavioral intentions and strategies. Mobile content firms were found to be isomorphic and seemed to be conscious of competing firms' strategies. In particular, local mobile content firm's decisions had a strong correlation with government support. This finding is in line with Pfeffer and Salancik's (1978) assertion that companies in weak power positions strategically rely on governmental assistance. For mobile content firms in environments dominated by Google and Apple, the role of government support was the foremost factor that influenced mobile content firm's decisions to abstain or embrace Google's policy change.

The challenges accompanied with Google's in-app payment policy change was perceived as the next significant factor in affecting senior manager's decisions. Of the four major sub-criteria, consumer loss was perceived to be the biggest concern for senior managers. As companies distribute the commission fee through service price increases, the study finds that companies fear the loss of consumers especially in a dynamic market with fickle consumer tastes and low purchase intentions (Roma & Ragaglia, 2016). Lack of autonomy was also perceived to be a concern that motivates managers to seek viable options. This is in line with numerous studies emphasizing how mobile content firms are enforced to follow the policies of dominant platform owners (i.e., Eaton et al., 2015; Ghazawneh & Henfridsson, 2013). Competition with Google apps was ranked third within the perceived risks criteria. As mentioned by Zhu and Liu (2018), senior managers showed concerns of Google pushing incumbent apps out of the market with their superiority in resources and user data. The last factor was related to revenue loss. As content company's revenue is significantly driven by users, the study validates that consumer's lack of purchase intentions and ultimate absence from the app is the most critical concern for local content companies.

The study findings demonstrate that benefits from using the platform are less prioritized when making decisions related to Google's in-app commission policy change. Technical support was ranked with the least priority followed by marketing effects, and global consumer acquisition. In contrast to studies emphasizing how mobile content firms are heavily reliant on platform owners with network externalities and abundant resources (i.e., Müller et al., 2011;

Tiwana, 2014), the study finds that the benefits are of less priority when making decisions to remain or leave Google Play.

Among the three suggested alternatives, remaining on Google Play but using external billing systems was perceived to be the most viable option. Mobile content firms were also shown to have more preference toward shifting towards using an alternative app store rather than remaining on Google and endorsing the changed policy. However, the high weights on government support and the isomorphism strongly imply that mobile content firm's decisions are heavily dependent on government policies that protect and innovate local firms, and the actions of other firms within the industry. The decision to adopt any of the three alternatives was also influenced by concerns related to consumer loss and lack of autonomy. The study findings carefully suggest that with the help of environmental factors and the assurance of retaining users, mobile content firms are willing to divert and adopt alternative app stores that guarantee autonomy and more mobile content firm-oriented benefits.

5.2. Implications

Google's announcement to extend the 15-30 percent commission fee to all paid and in-app purchases made on Google Play came as a surprise to local mobile content firms in Korea. Even though Google claims that the commission fee is essential in enhancing the quality of the platform and harnessing the health of the mobile app store ecosystem, the enforcement is perceived as an abuse of Google's dominant position in the market. In Korea, where there are alternative local app stores, mobile content firms are found to take the risk in resisting Google's policy through the use of external billing systems or shift toward alternative platforms. However, in a market dominated by Google Play's influence, governmental support is found to be the most determining factor that affects mobile content firms' decisions. As one of the first to examine mobile content firms' responses to Google's in-app payment policy change, this study offers findings with academic and practical implications.

In an academic perspective, the study integrates various literature to explain platforms and their power dynamics with mobile content firms. Along with prevailing literature on platforms and ecosystems, concepts from resource dependency theory and network centrality are used to explain the power of keystones in the ecosystem. While previous studies on app store ecosystems focus on the antitrust behaviors or dominating role of Google and Apple, this

study specifically focuses on Google's commission policy change and depicts the perceptions of local mobile content firms through the AHP analysis. The findings provide a guideline to understanding the responses of local mobile content firms and their priorities in responding to Google Play's policy change. The analysis therefore contributes to extending the concept of platform ecosystems and specifying the features that niche players value when adopting app stores.

From a practical perspective, the study applies viable solutions to the Korean government, local mobile content firms, and Google. First, government support is the most critical prerequisite in supporting the mobile content firms' decisions. Government support is required in not only protecting local mobile content firms but also for innovating the development of local app stores. After Google's decision to reduce the commission fee to 15 percent for the first million-dollar revenue, the government has shown a shy and restrained approach to accusing Google over its anti-competitive behavior. The assistance from the government is critical for local mobile content firms to diverge from Google Play's power structure, and for local app stores like One Store to thrive. Korea's Fair Trade Commission is advised to examine the in-app payment enforcement thoroughly to probe whether Google has broken Korea's competition rules. Policies can also be implemented to thwart Google's antitrust practices. However, they should be made not based on political arousal but based on comprehensive research and the inclusion of social interests.

Korea's mobile app store ecosystem is unique as there are potential subsidiaries to Google Play. To help local app stores thrive in a market dominated by Google, the Korean government is advised to implement plans that foster the growth of local app stores. For instance, app stores can be improved by providing tax incentives to mobile content firms that launch apps on local app stores. Education programs or military replacement opportunities can also be an incentive in recruiting proficient candidates that contribute to the app store's innovativeness and mobile content creativity. As more firms strive to launch apps on alternative app stores, policies that protect local mobile content firms from launching apps on multiple app stores need to be in place. For example, Google is infamous for enforcing retaliatory treatments to mobile content firms and app developers that do not abide to the app store's policy. Governmental protection and speculation are thus essential for mobile content firms to cooperate and act in their interests.

Second, the cooperative role of mobile content firms is also required in supporting the

local mobile app store ecosystem. While mobile content firms rely on the app store platform's resources, platforms also depend on mobile content firm's exclusive apps. Maggio (2017) claims that apps specifically designed for the iPhone or Samsung smart phones enhance not only the value of the app but also the exclusivity of the app store platform and the accompanying device. Mobile content firms are therefore encouraged to strengthen their competitivity by developing apps with exclusive value. The innovative and exclusive value of the app is anticipated to help mobile content firms continuously retain its users, even with the adoption of third-party proprietary system. The high preference of isomorphism implies that mobile content firms, in ambiguous conditions, are sensitive to the strategies of competing firms. In a market dominated by Google, mobile content firms seem to take action only when there are movements from other competing firms. Instead of creating a prisoner's dilemma situation, mobile content firms are advised to cooperate by creating coalitions to defeat the uncertainty and strive for common goals. Similar to the activities of Coalition for App Fairness, a group composed of leading app developers and critics that raise voices against Apple and Google's monopolistic control over in-app purchases and commissions, cooperative efforts are needed in raising voices and criticizing Google Play's control. While there is the Korea Internet Corporations Association, more cooperation from mobile content firms is needed to gain more attention and power in helping the local app store ecosystem to prosper.

Local app stores are advised to strengthen their positions by enhancing resources and opening the platform for more value creation and value capture. Entering the market later than Apple, Google implemented a 'get-big-fast' strategy where the platform owner sets low prices to quickly accumulate users and leverages on this installed user base to generate revenue (Cennamo & Santalo, 2013). Korea's One Store is also advised to adopt a 'get-big-fast' strategy by not only setting low prices but also enabling mobile content firms to become the owners of the app store. With major game companies resisting to launch apps on One Store due to the fear of receiving retaliatory treatments from Google, One Store is a platform with limited content diversity and geographical reach. However, by encouraging game companies to join the consortium, One Store can gain more apps that generate revenue and garner user attention, while game companies obtain a new distributary channel. With more firms in the consortium, One Store has the potential to reach broader users in different markets. To increase game company's incentive to join One Store, government subsidies or tax benefits can also be granted for the company's contribution in supporting the growth of local app stores. Through collaborative efforts in helping the growth of One Store, the study believes that the local app

store can become a viable alternative to the dominator, Google Play.

Last, Google Play is advised to consider the responses of its niche players and provide flexibility in the policy. While Google has made amendments in the policy by lowering the commission fee percentage to 15 percent and offering time for mobile content firms to accommodate the change, the in-app payment policy is still an enforcement to mobile content firms. Google Play is advised to provide a clear guideline and enable mobile content firms to easily implement third-party billing systems on their apps. Disadvantageous treatments and unfair advantages over apps that use its billing system must be avoided. Iansiti and Levien (2004) claim that dominators are functionally replaced by substitutes when the ecosystem is no longer robust in providing diversity or innovativeness. In order to maintain its position in the app store ecosystem, Google Play is recommended to reduce its anti-competitive behaviors and consider ways to build a sustainable ecosystem where all participants can create and captivate value.

5.3. Limitations

The study is not without limitations. The biggest challenge to conducting the study was in collecting respondents from media content firms. The sensitivity of the issue and difficulty in approaching appropriate respondents was a time extensive process. Once the policy is enforced and all mobile content firms have a solid strategy, the study can be replicated to understand the strategic decisions of local mobile content firms. Second, future studies can collect more samples and analyze the perspectives of mobile content firms in different sectors. For instance, mobile content firms in the game sector or those with less than one-million-dollar revenues can be examined to gain a comprehensive understanding of differing perspectives toward Google's in-app payment policy change. Firms with more than one-million-dollar revenue can also be investigated to further interpret their concerns and needs. Last, the study focuses on Korean mobile content firms and their local settings. The results are therefore refined to the market conditions and regulatory environment of Korea. Studies in different geographical conditions can be conducted to compare the different needs of mobile content firms. Along with the above suggestions, more interest and efforts towards creating a healthy mobile app store ecosystem is needed especially as the market is dominated by U.S. based firms. Through collaborative efforts, the study hopes that local firms will become strong

substitute keystones or niche players that contribute to the stability, productivity, and innovativeness of the app store ecosystem.

References

Álvarez, M., Moreno, A., & Mataix, C. (2013). The analytic hierarchy process to support decision-making processes in infrastructure projects with social impact. *Total Quality Management & Business Excellence*, *24*(5-6), 596-606. https://doi.org/10.1080/14783363.2012.669561

Astley, W. G., & Sachdeva, P. S. (1984). Structural sources of intraorganizational power: A theoretical synthesis. *Academy of Management Review*, *9*(1), 104-113. https://www.jstor.org/stable/258237

Baldwin, C. Y., & Woodard, C. J. (2009). The architecture of platforms: A unified view. In A. Gawer (Ed.) *Platforms, markets and innovation* (pp. 19-44). Edward Elgar Publishing.

Boudreau, K. J. (2012). Let a thousand flowers bloom? An early look at large numbers of software app developers and patterns of innovation. *Organization Science*, *23*(5), 1409-1427. https://doi.org/10.1287/orsc.1110.0678

Bowman, N. D., Jöckel, S., & Dogruel, L. (2015). "The app market has been candy crushed": Observed and rationalized processes for selecting smartphone games. *Entertainment Computing*, *8*, 1-9. https://doi.org/10.1016/j.entcom.2015.04.001

Caillaud, B., & Jullien, B. (2003). Chicken & egg: Competition among intermediation service providers. *RAND Journal of Economics*, *34*(2), 309-328. https://www.jstor.org/stable/1593720

Cambridge Dictionary (n.d.). Platform. In *Cambridge Dictionary.com*. Retrieved January 24, 2021, from https://dictionary.cambridge.org/dictionary/english/platform

Caplan, R., & Boyd, D. (2018). Isomorphism through algorithms: Institutional dependencies in the case of Facebook. *Big Data & Society*, *5*(1), 1-12. https://doi.org/10.1177/2053951718757253

Ceccagnoli, M., Forman, C., Huang, P., & Wu, D. J. (2012). Cocreation of value in a platform ecosystem! The case of enterprise software. *MIS Quarterly*, *36*(1), 263-290. https://www.jstor.org/stable/41410417

Cennamo, C., & Santalo, J. (2013). Platform competition: Strategic trade-offs in platform markets. *Strategic Management Journal*, *34*(11), 1331-1350. https://doi.org/10.1002/smj.2066

Chan, S. (2021, Jan 4). *Global consumer spending in mobile apps reached a record $111 billion in 2020, up 30% from 2019*. Sensor Tower Blog. https://sensortower.com/blog/app-revenue-and-downloads-2020

Cho, M. (2020, Nov 24). Google delays Play Store commission fee increases in South Korea after facing

backlash. *ZDNet*. Retrieved from https://www.zdnet.com/article/google-delays-play-store-commission-fee-increases-in-south-korea-after-facing-backlash

Cook, K. S. (1977). Exchange and power in networks of interorganizational relations. *The Sociological Quarterly*, *18*(1), 62-82. https://doi.org/10.1111/j.1533-8525.1977.tb02162.x

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 147-160. https://doi.org/10.2307/2095101

Eaton, B., Elaluf-Calderwood, S., Sørensen, C., & Yoo, Y. (2015). Distributed tuning of boundary resources: The case of Apple's iOS service system. *MIS Quarterly*, *39*(1), 217-244. https://www.jstor.org/stable/10.2307/26628348

Eisenmann, T., Parker, G., & Van Alstyne, M. (2011). Platform envelopment. *Strategic Management Journal*, *32*(12), 1270-1285. https://doi.org/10.1002/smj.935

Emerson, R. M. (1962). Power-dependence relations. *American Sociological Review*, *27*(1), 31-41. https://www.jstor.org/stable/2089716

Evans, D. S., Hagiu, A., & Schmalensee, R. (2008). *Invisible engines: how software platforms drive innovation and transform industries*. The MIT Press.

Freeman, L. C., Roeder, D., & Mulholland, R. R. (1979). Centrality in social networks: II. Experimental results. *Social Networks*, *2*(2), 119-141. https://doi.org/10.1016/0378-8733(79)90002-9

Gawer, A., & Cusumano, M. A. (2014). Industry platforms and ecosystem innovation. *Journal of Product Innovation Management*, *31*(3), 417-433. https://doi.org/10.1111/jpim.12105

Ghazawneh, A., & Henfridsson, O. (2013). Balancing platform control and external contribution in third-party development: the boundary resources model. *Information Systems Journal*, *23*(2), 173-192. https://doi.org/10.1111/j.1365-2575.2012.00406.x

Hein, A., Schreieck, M., Riasanow, T., Setzke, D. S., Wiesche, M., Böhm, M., & Krcmar, H. (2020). Digital platform ecosystems. *Electronic Markets*, *30*, 87-98. https://doi.org/10.1007/s12525-019-00377-4

Helfat, C. E., & Raubitschek, R. S. (2018). Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems. *Research Policy*, *47*(8), 1391-1399. https://doi.org/10.1016/j.respol.2018.01.019

Hickson, D. J., Hinings, C. R., Lee, C. A., Schneck, R. E., & Pennings, J. M. (1971). A strategic contingencies' theory of intraorganizational power. *Administrative Science Quarterly*, *16*(2), 216-

229. https://www.jstor.org/stable/2391831

Iansiti, M., & Levien, R. (2004). *The keystone advantage: what the new dynamics of business ecosystems mean for strategy, innovation, and sustainability*. Harvard Business Press.

Isckia, T. (2009). Amazon's evolving ecosystem: A cyber-bookstore and application service provider. *Canadian Journal of Administrative Sciences*, *26*(4), 332-343. https://doi.org/10.1002/CJAS.119

Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal*, *39*(8), 2255-2276. https://doi.org/10.1002/smj.2904

Jasperson, J., Carte, T. A., Saunders, C. S., Butler, B. S., Croes, H. J., & Zheng, W. (2002). Power and information technology research: A metatriangulation review. *MIS Quarterly*, *26*(4), 397-459. https://www.jstor.org/stable/4132315

Jin, D. Y. (2015). *Digital platforms, imperialism and political culture*. Routledge.

Karhu, K., Tang, T., & Hämäläinen, M. (2014). Analyzing competitive and collaborative differences among mobile ecosystems using abstracted strategy networks. *Telematics and Informatics*, *31*(2), 319-333. http://dx.doi.org/10.1016/j.tele.2013.09.003

Kim, J., & Chea, S. (2020, Dec 2). One Store gains ground in local Android app market. *Korea JoongAng Daily*. Retrieved from https://koreajoongangdaily.joins.com/2020/12/02/business/industry/One-Store-app-market-Google/20201202175300439.html

Kim, S., & Kim, S. (2016). A multi-criteria approach toward discovering killer IoT application in Korea. *Technological Forecasting and Social Change*, *102*, 143-155. https://doi.org/10.1016/j.techfore.2015.05.007

Kim, D., & Kim, S. (2017). Newspaper companies' determinants in adopting robot journalism. *Technological Forecasting and Social Change*, *117*, 184-195. https://doi.org/10.1016/j.techfore.2016.12.002

Kostovska, I., Raats, T., Donders, K., & Ballon, P. (2020). Going beyond the hype: conceptualising “media ecosystem” for media management research. *Journal of Media Business Studies*, 1-21. https://doi.org/10.1080/16522354.2020.1765668

Lee, G., & Raghu, T. S. (2014). Determinants of mobile apps' success: Evidence from the app store market. *Journal of Management Information Systems*, *31*(2), 133-170. https://doi.org/10.2753/MIS0742-1222310206

Levis, K. (2010). Winner takes all in the networked economy. *Market Leader*, *47*, 22-25.

https://www.marketingsociety.com/the-library/winner-takes-all-networked-economy

Lusch, R. F. (2011). Reframing supply chain management: a service-dominant logic perspective. *Journal of Supply Chain Management*, *47*(1), 14-18. https://doi.org/10.1111/j.1745-493X.2010.03211.x

Maggio, E. (2017, Dec 30). 9 of the best apps you can only use on iPhones. *Business Insider*. https://www.businessinsider.com/9-best-ios-exclusive-apps-2017-12

Moore, J. (1996). *The death of competition: Leadership and strategy in the age of business ecosystems*. WileyHarperBusiness.

Müller, R. M., Kijl, B., & Martens, J. K. (2011). 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*(2), 63-76. https://doi.org/10.4067/S0718-18762011000200007

Nieborg, D. B., Young, C. J., & Joseph, D. (2020). App imperialism: The political economy of the Canadian app store. *Social Media+ Society*, *6*(2), 1-11. https://doi.org/10.1177/2056305120933293

Nielsen, J. R., & Mathiesen, C. (2006). Stakeholder preferences for Danish fisheries management of sand eel and Norway pout. *Fisheries Research*, *77*(1), 92-101. https://doi.org/10.1016/j.fishres.2005.08.002

O'Dea, S. (2020, Nov 30). *Mobile operating systems' market share worldwide from January 2012 to October 2020*. Statista. https://www.statista.com/statistics/272698/global-market-share-held-by-mobile-operating-systems-since-2009

Park, J., Nam, C., & Kim, H. J. (2019). Exploring the key services and players in the smart car market. *Telecommunications Policy*, *43*(10), 101819. https://doi.org/10.1016/j.telpol.2019.04.003

Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective*. Harper & Row.

Rochet, J. C., & Tirole, J. (2003). Platform competition in two-sided markets. *Journal of the European Economic Association*, *1*(4), 990-1029. https://doi.org/10.1162/154247603322493212

Roma, P., & Ragaglia, D. (2016). Revenue models, in-app purchase, and the app performance: Evidence from Apple's App Store and Google Play. *Electronic Commerce Research and Applications*, *17*, 173-190. http://dx.doi.org/10.1016/j.elerap.2016.04.007

Saaty, T. L. (1983). Priority setting in complex problems. *IEEE Transactions on Engineering*

Management, 30(3), 140-155.

Saaty, R. W. (1987). The analytic hierarchy process—what it is and how it is used. *Mathematical Modelling, 9*(3-5), 161-176. https://doi.org/10.1016/0270-0255(87)90473-8

Saaty, T. L. (1990). How to make a decision: the analytic hierarchy process. *European Journal of Operational Research, 48*(1), 9-26. https://doi.org/10.1016/0377-2217(90)90057-I

Saaty, T. L. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences, 1*(1), 83-98. https://doi.org/10.1504/IJSSCI.2008.017590

Schiller, D. (2015, Dec. 13). *Geopolitics and Economic Power in Today's Digital Capitalism* [Seminar]. Hans Crescent Seminar, London. https://informationobservatory.info/2015/12/14/geopolitics-and-economic-power-in-todays-digital-capitalism/

Schwarz, J. A. (2017). Platform logic: An interdisciplinary approach to the platform-based economy. *Policy & Internet, 9*(4), 374-394. https://doi.org/10.1002/poi3.159

Singh, M. (2021, Mar 17). *Google Play drops commissions to 15% from 30%, following Apple's move last year*. Tech Crunch. Retrieved from https://techcrunch.com/2021/03/16/google-play-drops-commissions-to-15-from-30-following-apples-move-last-year/

Srnicek, N. (2017). *Platform Capitalism*. Polity Press.

Statista (2021). *Apps worldwide*. Retrieved from https://www.statista.com/outlook/318/100/apps/worldwide

Suarez, F. F., & Cusumano, M. A. (2009). The role of services in platform markets. In A. Gawer (Ed.) *Platforms, markets and innovation* (pp. 77-98). Edward Elgar Publishing.

Tiwana, A. (2014). *Platform ecosystems: Aligning architecture, governance, and strategy*. Morgan Kakufmann.

Tiwana, A. (2015). Evolutionary competition in platform ecosystems. *Information Systems Research, 26*(2), 266-281. https://doi.org/10.1287/isre.2015.0573

Thomas, L. D., Autio, E., & Gann, D. M. (2014). Architectural leverage: Putting platforms in context. *Academy of Management Perspectives, 28*(2), 198-219. http://dx.doi.org/10.5465/amp.2011.0105

Tolbert, P. S., & Hall, R. H. (2009). *Organizations: Structures, processes and outcomes*. Pearson Prentice Hall.

Vargas, L. G. (1990). An overview of the analytic hierarchy process and its applications. *European*

Journal of Operational Research, *48*(1), 2-8. https://doi.org/10.1016/0377-2217(90)90056-H

Vargas, L. G., & Saaty, T. L. (1981). Financial and intangible factors in fleet lease or buy decision. *Industrial Marketing Management*, *10*(1), 1-10. https://doi.org/10.1016/0019-8501(81)90021-3

Wen, W., & Zhu, F. (2019). Threat of platform-owner entry and complementor responses: Evidence from the mobile app market. *Strategic Management Journal*, *40*(9), 1336-1367. https://doi.org/10.1002/smj.3031

West, J., & Mace, M. (2010). Browsing as the killer app: Explaining the rapid success of Apple's iPhone. *Telecommunications Policy*, *34*(5-6), 270-286. https://doi.org/10.1016/j.telpol.2009.12.002

Yang, D. H., Kim, S., Nam, C., & Min, J. W. (2007). Developing a decision model for business process outsourcing. *Computers & Operations Research*, *34*(12), 3769-3778. https://doi.org/10.1016/j.cor.2006.01.012

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary—the new organizing logic of digital innovation: an agenda for information systems research. *Information Systems Research*, *21*(4), 724-735. https://doi.org/10.1287/isre.1100.0322