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BUSINESS MODEL ANALYSIS ON ANDROID APP STORES

ABSTRACT

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The recent growth in smart phone and tablet adoption has increased the popularity of mobile application stores, also known as app stores. This study examines the business models and underlying strategic factors of the app stores operating in the Android ecosystem. The study consists of a literature review on business models, two-sided markets and platforms, followed by a multiple-case study researching six Android app stores. The app store features and policies implemented by the studied app stores are analyzed in order to draw implications on business models and the underlying strategies. Effectively all of the app store's revenues come from the revenue share retained from the developers. Due to this dependency on the developers, app stores aim to provide tools that improve the monetization possibilities for the applications. Moreover, these tools and the revenues attained by using them are protected by certain policies and regulating processes exerted by the app stores. Furthermore, the device integration of the app store appears to be an important channel for the studied app stores to reach the users. Finally, developer aimed APIs and SDKs provided by the app stores stand out as an important strategic and competitive factor.

Keywords: business model, app store, platform, two-sided markets, multiple-case study

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Viimeaikainen kasvu älypuhelimien ja tablettien käytössä on kasvattanut mobiilisovelluskauppojen suosiota. Tässä tutkimuksessa tarkastellaan Android-ekosysteemissä toimivien sovelluskauppojen liiketoimintamalleja ja niihin liittyviä strategisia tekijöitä. Tutkimus koostuu liiketoimintamalleja, alustoja ja kaksisuuntaisia markkinoita käsittelevästä kirjallisuuskatsauksesta, sekä kuutta Android-sovelluskauppaa tarkastelevasta monitapaustutkimuksesta. Tutkimuksessa analysoidaan sovelluskauppojen ominaisuuksia ja menettelytapoja, joiden perusteella luodaan johtopäätöksiä liiketoimintamalleihin ja strategioihin liittyen. Valtaosa sovelluskauppojen tuloista saadaan sovelluskehittäjien kanssa tehtävästä tulojaosta. Koska sovelluskaupat ovat riippuvaisia sovelluskehittäjien saamista tuloista, sovelluskaupat pyrkivät tarjoamaan kehittäjille työkaluja, joilla voidaan parantaa sovellusten monetisointimahdollisuuksia. Sovelluskaupat myös pyrkivät turvaamaan tulonlähteensä pakottamalla tiettyjä menettelytapoja ja säädöksiä. Lisäksi, sovelluskauppojen laiteintegraatio on merkittävä kanava asiakkaiden saavuttamisessa. Voidaan myös todeta, että sovelluskauppojen tarjoamat kehittäjille suunnatut ohjelmointirajapinnat ja sovelluskehitystyökalut ovat tärkeitä strategisia ja kilpailullisia tekijöitä.

Asiasanat: liiketoimintamalli, sovelluskauppa, alusta, kaksipuoliset markkinat, monitapaustutkimus

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1 INTRODUCTION

Mobile application stores, also known as mobile app stores or just app stores, are marketplaces which connect mobile device users with application developers. The immense popularity of smart phones has lit up the markets for mobile applications, leading app stores to become important marketplaces. The smart phone markets are being dominated by the duopoly between Google's open source based Android and Apple's proprietary iOS as they control over 92% share of the mobile phone markets. According to a report by Gartner (2013), Android now commands nearly 75% market share of the mobile phone markets. Android's recent growth has been significant, as it has increased its market share by nearly twenty percentage points within a year.

The aim of this study is to explore the business models and strategies practiced by app stores in the Android operating system environment. Being a platform type of business, app stores function through the dynamics and interaction of the two different sides. Effectively all app store revenues come from the revenue share charged from developers (Gans, 2012). However, the means of achieving this may vary depending on the available resources and strategy practiced by the app store. Thus, the business models utilized by app stores and the logic behind them are being addressed, while also examining the residing strategies. One of the research aims of the present thesis is to study the interdependence between revenue generation logic and the policies set by the app stores.

These are few main factors that enable the competition between the app stores in the Android operating system environment. These factors are discussed next. With the largest app stores, such as Apple's App Store and Google Play, reaching saturation and congestion caused by enormous number of apps, application developers have began to search for alternatives. Numerous competing app stores have emerged to pursue a market share in the flourishing Android markets. The exact number is oblivious, but according to various reports, over 50 Android app stores exist worldwide. Generally in the Android environment, consumers may easily switch between app stores by simply downloading and installing alternative app stores to their devices. However,

some restrictions may apply, such as country or device dependency. For the most part, Android app stores do not prohibit developers from publishing their applications in multiple app stores simultaneously. Due to the difficulty of getting one's application discovered in the largest app stores, many developers have taken this approach to pursue greater visibility for their applications.

Being a relatively new phenomenon, only little research has been done on app stores in general. Moreover, a great number of previous researches focus on Apple's AppStore or iOS operating system (e.g. Idu, Zande & Jansen, 2012; Kim et al. 2013), or alternatively on studying the proprietary app stores on the respective operating systems (Kouris & Kleer, 2012; Tilson, Sorensen & Lyytinen, 2012b; Tuunainen, Tuunanen & Piispanen, 2011; Lee & Raghu, 2011; Schultz et al., 2011; Hyrynsalmi et al., 2012), or on the security issues regarding different app stores (Grace et al., 2012; Zhou & Jiang, 2012; Zhou et al., 2012). However, the openness of the Android ecosystem enables a unique competitive climate on one operating system. Whereas in proprietary operating systems the emergence of competing app stores is precluded, on Android, on the other hand, they are allowed. This study aims to illuminate the competitive aspects and the business models of the app stores on the Android operating system.

1.1 Research questions

The aim of the present thesis is to study the business models utilized by Android app stores. Platform strategies behind these business models are also discussed. Features and policies implemented by the app stores are studied and analyzed, after which implications on business models and strategies are drawn by reflecting the findings on the theoretical framework. This study is conducted as a multiple-case study researching six Android app stores. Data is gathered mainly by accessing the documents provided by the app stores and observing the app stores from user's point of view utilizing end-user devices. The main research questions of this thesis are as follows:

- What kinds of business models are utilized by the Android app stores?

Exploring the business models and the logic behind them is one of the main aims for this study. Since an app store is basically a platform, the focus is on how the both sides, the users and the developers, are catered for by the app stores. Revenue streams and the factors affecting them are also discussed.

- How do the strategic choices in terms of openness and control reflect to the business models of the app store platforms?

In the platform markets, certain policies may be used to gain competitive advantage. Thus, identifying common patterns in means of how the control is exerted is one of the aims of this study.

- Are there any differences between the business models utilized by keystone players and niche players?

As the case app stores of this study can be divided into two categories depending on their position in the ecosystem, the differences and the commonalities in the business models between these two types of players are discussed.

1.2 Structure of the present thesis

In the introduction the main idea of this study is presented. This includes a brief background review and a look on prior research identifying a gap in the literature. Research questions are also set.

The second chapter comprises the theoretical background for this study. The chapter begins with a review on business model literature. The definition of a business model is presented, as well as its research streams and applications. This is followed by a review on platform and two-sided markets literature identifying features and attributes specific to platforms in general.

The third chapter comprehends the research methods used in this study. The research methods used and the means of collecting the data are discussed in detail. Literature focusing particularly on mobile app stores is also discussed and the analytical framework is presented. Moreover, the case studies are introduced, followed by the case study reports and the cross-case analysis.

The final chapter presents the conclusion for the study. A summary of the results of this study is presented answering briefly to the research questions. Possible future research topics are also discussed.

2 LITERATURE REVIEW

In this chapter, the literature background for the present study is formed. First, an overview on business model literature is made discussing the definition of a business model, its research streams and applications. This is followed by a review of platform and two-sided markets literature, focusing particularly on notable characteristics and underlying strategic factors. The observations presented in this chapter will serve as the theoretical framework for this study, and will be adverted to during the methodology section.

2.1 Business model

According to Osterwalder, Pigneur and Tucci (2005), the term business model was first used in an academic article in 1957 (Bellman, Clark, Malcolm, Craft & Ricciardi, 1957) and in a title of an academic article in 1960 (Jones, 1960). It was not until in the mid-1990s that the popularity of the concept of business model finally took off, when it emerged as a buzzword standing for the shift from traditional to electronic business (Osterwalder, 2004). It has since drawn remarkable interest in both academic and business world (Shafer, Smith & Linder, 2005).

2.1.1 Research streams

Business model is a rather wide concept which has been studied from numerous perspectives and has generated multiple research streams. According to Zott et al. (2011), the concept of business model has been applied when trying to explain three phenomena: (1) e-business and the utilization of information technology in organizations; (2) strategic issues; and (3) innovation and technology management. Morris et al. (2005), on the other hand, consider different business aspects and identify three distinct approaches found in previous studies: (1) economic, (2) operational, and (3) strategic. Aiming at structuring and codifying the business model research area, Pateli and Giaglis (2004) classify

business model research into eight sub-domains. These sub-domains are briefly introduced in Table 1.

Table 1 Sub-domains in business model research literature (adapted from Pateli & Giaglis, 2004).

Sub-domain	Scope
Definitions	Aims at defining the purpose, scope, and center elements of the business model as well as identifying related concepts, such as strategy and business processes.
Components	Attempts to dismantle the concept of business model into fundamental components in order to attain more detailed ontological analysis.
Taxonomies	Research in this field aims at building typologies of business models based on a set of criteria.
Conceptual models	Aims at identifying and researching the inter-relationships between different components and elements in business models. Often produces visual representations of business models.
Design methods and tools	Research in this domain aims at building and developing appropriate methods and tools for designing business models.
Adoption factors	Attempts to identify the factors that concern the organizational adoption and usage of business model, as well as socio-economic implications of business model innovation.
Evaluation models	Research in this domain concerns evaluating and measuring business models in terms of feasibility, viability, and profitability.
Change methodologies	This domain relates to methods and guidelines that are utilized to change the current business model or adopting a new one in the midst of business or technology innovation.

Osterwalder et al. (2005) propose a hierarchical categorization of semantic levels of business models found in literature. These categories are demonstrated in Figure 1.
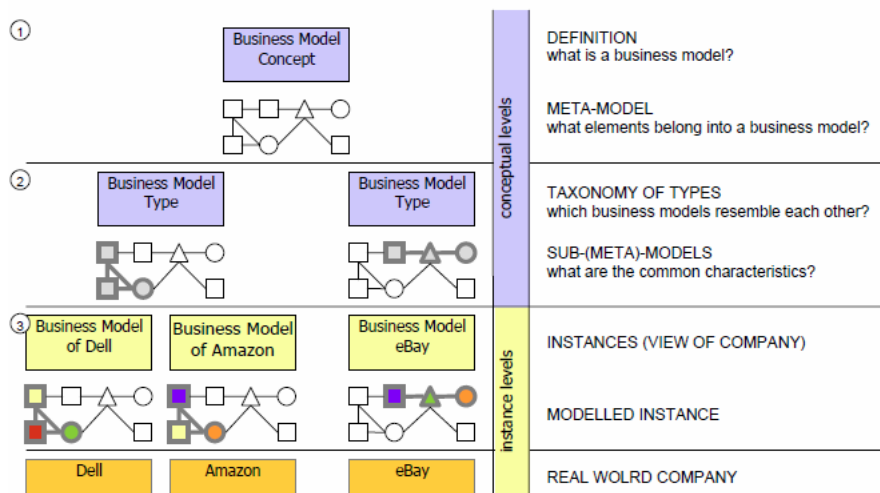
Figure 1 Business model concept hierarchy (Osterwalder et al., 2005)

The first level consists of abstract overarching concept definitions of what business models are and what they consist of. The first level business model concepts are generic and can be used to describe all real world businesses. The second level category holds a number of different abstract business models that are similar to some extent. Taxonomies do not necessarily reflect all businesses in general but can rather be applied to specific industries. The third level models are real life instances, such as business model or conceptualization of an actual firm. Such approach is often used to analyze real life businesses. The foregoing categories can be, but do not necessarily have to be, hierarchically linked. (Osterwalder et al., 2005).

2.1.2 Definition

Before going further into the definition and the origins of business model, a brief look at semantics of the term is made. Both the words business and model have certain meanings on their own. Based on dictionary definitions, Osterwalder et al. (2005) interpret the word *model* as: "*a simplified description and representation of a complex entity or process*", and the word *business* as: "*the activity of providing goods and services involving financial, commercial and industrial aspects*". Shafer et al. (2005) argue that a "*model*" is a representation of reality, whereas "*business*" encapsulates value creation and capturing. The preceding analyses provide quite clear semantic meanings for the words. However, when researching the literature for more precise definitions or conceptualizations for the term, the absence of unified consensus is axiomatic. Zott, Amit and Massa (2011) compile general level definitions of business models from prior literature and the variance in the presented definitions clearly indicates the lack of shared perception among scholars. These definitions are summarized in Table 2.

Table 2 General level business model definitions (Zott et al., 2011).

Business model definition	Author(s)
statement	Stewart & Zhao, 2000
description	Applegate, 2000; Weill & Vitale, 2001
representation	Morris, Schindehutte & Allen, 2005; Shafer, Smith & Lidner, 2005
architecture	Dubosson-Torbay, Osterwalder & Pigneur, 2002; Timmers, 1998
conceptual tool or model	George & Bock, 2009; Osterwalder, 2004; Osterwalder et al., 2005
structural template	Amit & Zott, 2001
method	Afuah & Tucci, 2001
framework	Afuah, 2004
pattern	Brousseau & Penard, 2006
set	Seelos & Mair, 2007

A definition of a term should be a synthesis and integration of earlier work and it should not be too complex to understand (Shafer et al., 2005). In order to gain insight on which definition to choose as a framework, a literature review on prior research will be conducted. The summary of definitions and the concept structure of business model from some of the most commonly cited studies are presented in Table 3. A more descriptive discussion on the chosen definitions is conducted below.

Table 3 Definitions and components of business model

Author(s)	Definition	Components
Amit & Zott, 2001	"A business model depicts the design of transaction content, structure, and governance so as to create value through the exploitation of business opportunities."	• Transaction content • Transaction structure • Transaction governance • Value creation
Chesbrough & Rosenbloom, 2002	"We offer an interpretation of the business model as a construct that mediates the value creation process."	• Value proposition • Market segment • Value chain • Cost structure • Profit potential • Value network • Competitive strategy
Morris et al., 2005	"A Business model is a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to create sustainable competitive advantage in defined markets."	• Factors related to offering • Market factors • Internal capability factors • Competitive strategy factors • Economic factors • Growth/exit factors
Shafer et al., 2005	"We define a business model as a representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network."	• Core logic • Strategic choices • Creating and capturing value • Value network
Osterwalder, 2004; Osterwalder et al., 2005	"A business model is conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm. Therefore we must consider which concepts and relationships allow a simplified description and representation of what value is provided to customers, how this is done and with which financial consequences."	• Value proposition • Target customer • Distribution channel • Relationship • Value configuration • Core competency • Partner network • Cost structure • Revenue model
Osterwalder & Pigneur, 2010	"A business model describes the rationale of how an organization creates, delivers, and captures value"	

Amit and Zott's (2001) abstract definition builds on fundamental ideas of strategic management and entrepreneurship. The approach focuses on the value creation within an e-business value chain through transactions between different actors. The value creation in e-businesses is analyzed through four value creation enhancing factors: efficiency, complementarities, lock-in, and novelty. (Amit & Zott, 2001).

In their study, Chesbrough and Rosenbloom (2001) describe the business model as a connecting piece between technology development and economic value creation. They identify constructive elements of the business model and present a detailed and operational definition. According to the authors, the business model should:

- Articulate the value proposition;
- Identify a market segment and define the mechanism for revenue generation;
- Define the value chain of the firm that is required to create and distribute the proposed value offering;
- Define the complementary assets needed to support position in the value chain;
- Detail the means by which the firm creates revenues;
- Estimate the profit potential and cost structure;
- Describe the position of the firm within the value network context; and
- Formulate the strategy through which a firm will gain and hold competitive advantage over its rivals.

Morris et al. (2005) adopt an entrepreneurial approach to business model, proposing an integrative strategic framework of a business model that can be used to analyze any type of company. The framework comprises of six components assessing value proposition, the customer, firm's internal competencies, competitive strategy (e.g. positioning), revenue logic and factors for future ambitions in terms of time, scope, and the size of the firm. The components of the framework are observed from three different levels reflecting divergent managerial purposes. The foundation level consists of generic decisions regarding the profound composition of the firm whereas the proprietary level aims at applying variable choices that are unique to a particular venture differentiating it from competitors and ultimately resulting in sustainable advantage. Supporting these, the third level serves as a set of guiding rules on how to execute decisions at the foundation and the proprietary levels. (Morris et al., 2005).

Shafer et al. (2005) aim at forming a unifying definition based on components identified and classified in extent literature. The definition consists of four key terms: core logic; strategic choices; creating and capturing value; and value network. Core logic concerns that the strategic choices made by the firm are in line with the business model in terms of internal consistency and the cause-and-effect relationships; business model is a reflection of the firm's strategic choices.

Strategic choices include developing core competencies and capabilities, and utilizing them in order to create and capture value to generate profit. Both the value creation and the capturing occur within a value network and thus creating and sustaining relationships with the parties involved, as well as positioning within the value network, are essential. The authors further point out, that their definition is not exclusive for e-businesses (Shafer et al., 2005).

Definitions in Osterwalder's studies (Osterwalder, 2004; Osterwalder et al., 2005; Osterwalder & Pigneur, 2010) stress value as a central idea of the business model. In his dissertation, Osterwalder (2004) takes a pragmatic approach to business model describing it as a conceptual tool designed to address the needs of business practitioners. Building on prior literature, he proposes a business model ontology that aims to describe attributes and constituents of a business model accurately. The business model ontology is presented in Figure 2. The business model ontology comprises of nine interrelated building blocks, which describe the firm's logic to make money. The blocks can be categorized into four main areas of a business: customer; infrastructure; product/offering; and financial aspects. Business model building blocks are described in Table 4.
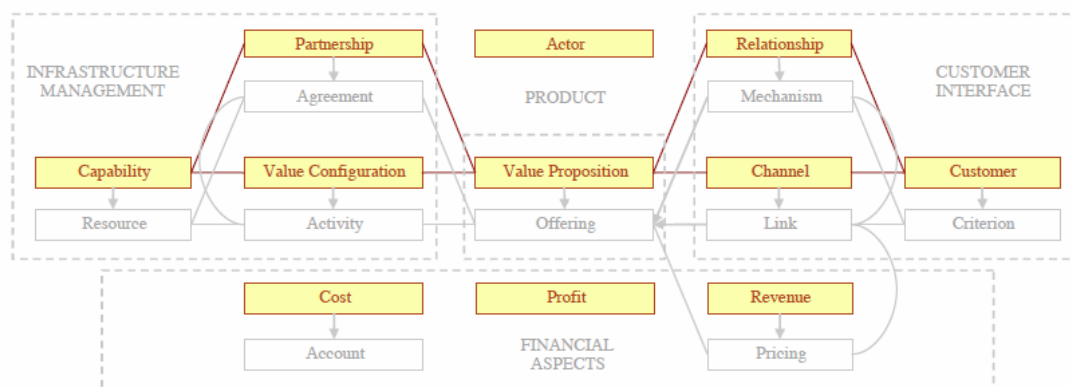
Figure 2 The business model ontology (Osterwalder, 2004)

Osterwalder continues the pragmatic approach in his later study developing the business model ontology further into the business model canvas in order to provide "*a shared language for describing, visualizing, assessing, and changing business models*" (Osterwalder & Pigneur, 2010). The business model canvas is well known and widely utilized in the business world and it serves as a practical tool for describing, designing, analyzing, and reinventing business models. The easily approachable tool has provided a pragmatic instrument for business model innovation which has been widely adopted especially in the so called "startup scene". The business model canvas builds on the earlier business model ontology and can be seen as a kind of a reconfiguration providing better accessibility and consistency. The left side of the business model canvas is called

Table 4 The nine business model building blocks (Osterwalder, 2004)

Pillar	Building Block of Business Model	Description
Product	Value Proposition	A Value Proposition is an overall view of a company's bundle of products and services that are of value to the customer.
Customer Interface	Target Customer	The Target Customer is a segment of customers a company wants to offer value to.
	Distribution Channel	A Distribution Channel is a means of getting in touch with the customer.
	Relationship	The Relationship describes the kind of link a company establishes between itself and the customer.
Infrastructure Management	Value Configuration	The Value Configuration describes the arrangement of activities and resources that are necessary to create value for the customer.
	Capability	A capability is the ability to execute a repeatable pattern of actions that is necessary in order to create value for the customer.
	Partnership	A Partnership is a voluntarily initiated cooperative agreement between two or more companies in order to create value for the customer.
Financial Aspects	Cost Structure	The Cost Structure is the representation in money of all the means employed in the business model.
	Revenue Model	The Revenue Model describes the way a company makes money through a variety of revenue flows.

efficiency side whereas the right side is referred to as value side (Osterwalder & Pigneur, 2010, 49). The nine building blocks of business model canvas and its equivalents in preceding business model ontology are illustrated in Table 5 and the business model canvas altogether is illustrated in Figure 3.

Table 5 Business model canvas vs. business model ontology

Building block in business model canvas (Osterwalder & Pigneur, 2010)	Equivalent in business model ontology (Osterwalder, 2004)
Customer segments	Target customer
Value propositions	Value proposition
Channels	Distribution channel
Customer relationships	Relationship
Revenue streams	Revenue model
Key resources	Value configuration
Key activities	Capability
Key partnerships	Partnership
Cost structure	Cost structure
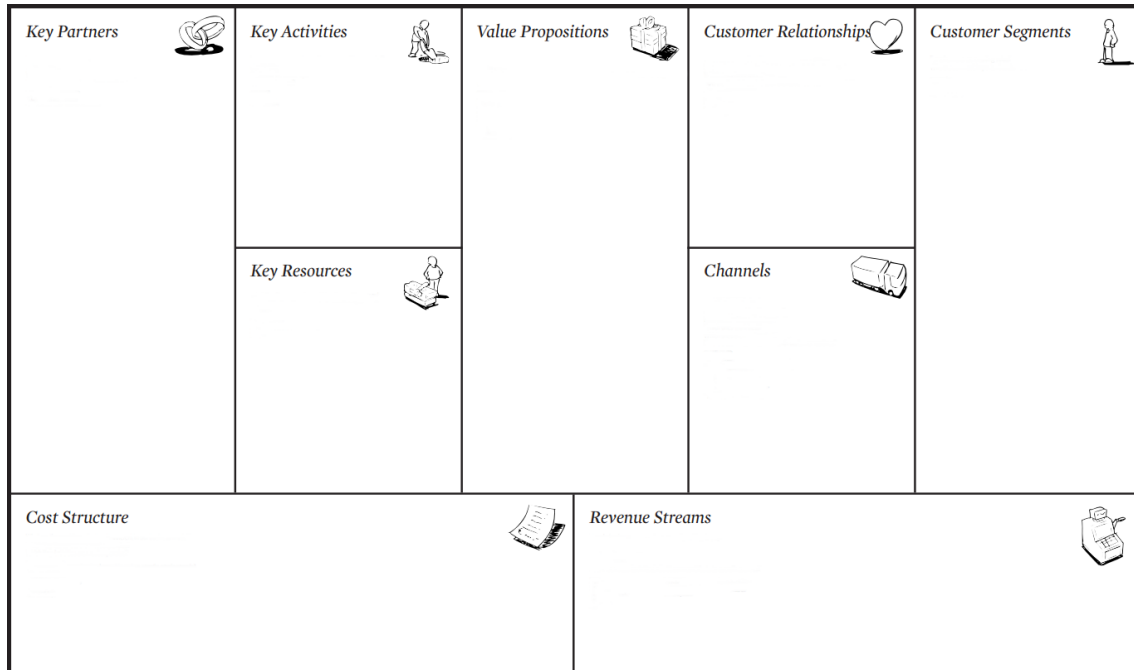
Figure 3 The business model canvas (Osterwalder & Pigneur, 2010)

However, it is stated in various studies, that the presented definitions of business model tend to be subjective to the scholar's discipline and the chosen perspective from which the concept is being observed. (e.g. Shafer et al., 2005; Morris et al., 2005; Seppänen, 2008; Nenonen & Storbacka, 2010; Zott et al., 2011). Although the above definitions have several similarities in both business model structure and content, the former argument is verified nonetheless.

2.1.3 Distinction between related concepts

In the absence of the generally accepted definition many scholars have adopted an approach of conceptual refinement aiming to delineate what a business model is not. The business model is closely related to the central ideas of business strategy and it could be described as an extension to them (Morris et al., 2005). However, it is generally accepted that a business model is not a strategy (e.g. Timmers, 1998; Shafer et al., 2005; Osterwalder et al., 2005; Zott et al., 2011). Instead, the business model has been referred to as a reflection of a firm's strategy (Shafer et al., 2005) and it has been suggested to be used as an integrative tool for strategy (Hedman & Kalling, 2003). In the recent years, business model has gained increasing attention from management scholars who have attempted to explain value creation and capture through the concept of business model (Amit & Zott, 2001). The means of value creation usually include actors external to the firm. (Zott et al., 2011). Thus, strategic approaches where focus is inside the firm's network or industry, such as Porter´s value chain (1985), can be seen as rather narrow approaches to value creation. Furthermore, when compared to

strategy, business model encompasses a more customer centric approach (Chesbrough & Rosenbloom, 2002).

Gordijn, Akkermans and Van Vliet (2000) further suggest that a clear distinction between the business model and the business process model should be made. While the business model concept can be seen as a firm's logic for value creation and commercialization, process modeling on the other hand describes how activities should be executed (Gordijn et al., 2000). Moreover, Afuah (2004, p. 75) notes that a business model is not a revenue model. While a revenue model is a framework for revenue generation, a business model is a framework for creating profit. Nevertheless, a revenue model is often considered a component of a business model (e.g. Osterwalder, 2004). Zott et al. (2011) further argue that a business model is not a revenue model, a value proposition or a network of relationships, but rather a combination of all of these.

2.1.4 Business model innovation

Given the aims of this study, a brief glance at business model innovation literature is also made. Ideas for business model innovation may emerge from anywhere. In their book, Osterwalder and Pigneur (2010, 138-139) distinguish four epicenters for business model innovation based on the nine business model building blocks. They further argue that innovations that start from the epicenters may have significant implications on other building blocks as well. It is also possible that business model innovation emerges from multiple epicenters simultaneously. The business model innovation epicenters are described in Table 6. (Osterwalder & Pigneur, 2010, 138-139).

Table 6 Epicenters of business model innovation (Osterwalder & Pigneur, 2010, 138-139)

Epicenter	Description
Resource-driven	Resource-driven innovations originate from an organization's existing infrastructure or partnerships to expand or transform the business model.
Offer-driven	Offer-driven innovations create new value propositions that affect other business model building blocks.
Customer-driven	Customer-driven innovations are based on customer needs, facilitated access, or increased convenience. Like all innovations emerging from a single epicenter, they affect other business model building blocks.
Finance-driven	Innovations driven by new revenue streams, pricing mechanisms, or reduced cost structures that affect other business model building blocks.

While business model innovation is vital for a firm in order to stay competitive, there are also real barriers and difficulties involved in the process. Chesbrough (2010) points out that managers may be reluctant to experiment on configurations which could threaten the already established value configurations and business models. An example of this could be a traditional book pub-

lishing company experimenting on digital publishing. Such configurations can induce resistance even if the disruptive innovation could be seen as complementary to the established business model.

Prahalad and Bettis (1986) propose that successful and stable firms develop a set of managerial decision models – the "*dominant logic*" - which can be described as the DNA of the organization. Organizations are shaped by the successful practices, business models and processes executed (Prahalad, 2004). Over time these practices embed into an organization's behavior forming its dominant logic. Prahalad and Bettis (1986) argue that dominant logic helps the organization steer its direction in stable competitive environments. In chaotic and rapidly changing markets, however, it can severely limit the view by which the new opportunities on business models and logics for value creation as well as emerging threats are being recognized. (Prahalad & Bettis, 1986; Bettis & Prahalad, 1995; Prahalad, 2004). Thus, the success of established business models affects strongly the decision making regarding emerging possibilities and innovations.

Chesbrough (2010) stresses that in order to achieve a successful business model change companies have to adopt a mindset where new business models are being experimented courageously. Possible failures should also be accepted as they might produce new approaches and knowledge providing positive future implications. Then again, in order for technological innovation to be successful it should fit well with the firm's existing business model. (Chesbrough, 2010).

2.2 Platforms

During the past decade platforms have emerged as a part of everyday life providing services and products to both consumers and businesses ranging from media and entertainment to retail and finance. Notable Internet platforms include, for example, YouTube, Amazon, Facebook, PayPal, and Google Play, out of which Facebook alone has over one billion registered users. Platforms in general play a key role in many industries, such as computer and video games, media, payment systems and mobile communication industries (Evans, 2003). Hidding et al (2011) identify four drivers that have affected the rise of platform businesses:

- Modularity – platforms are usually designed and built modularly in order to enable interconnectivity and compatibility
- Increased interconnectivity – systems and devices are becoming more and more interconnected
- Self-organization – significant value of group-forming in many-to-many networks

- Low marginal cost of production – platform businesses, or two-sided markets, exhibit low marginal costs of production making them more prevalent

The term platform has different meanings in different contexts. A typology by Gawer (2009) organizes and categorizes different kinds of platforms into four distinct categories: internal platforms; supply chain platforms; industry platforms; and multi-sided markets. *Internal platform* refers to a platform that is utilized within a single firm and which is utilized to enhance the firm's performance and productivity as well as to lowering costs. *Supply chain platforms* are similar to internal platforms but are used in cooperation by several firms within a supply chain. In an *industry platform,* on the other hand, there is no explicitly managed supply chain, but rather a network or an ecosystem consisting of co-operating firms within an industry producing components that form complete systems when combined. (Gawer, 2009). An industry platform can be seen as a foundation technology or service that is essential for the particular business ecosystem. Moreover, an industry platform is not in full control of the owner. Nevertheless, owners of industry platforms benefit from complementary products and innovations (Gawer & Cusumano, 2008). *Multi-sided markets or – platforms* act as an intermediary between activities and requirements for two or more groups of customers, either individuals or companies, who utilize the platform for transactions. (Gawer, 2009).

2.2.1 Two-sided markets

When a new user joins a network and it positively affects the value perceived by other users, the network is said to exhibit *network effects*, or *network externalities* (Katz & Shapiro, 1994). Most definitions of two- or multi-sided platforms focus on the distinct parties interacting with each other through a platform where network externalities are present. Rochet and Tirole (2003) mention that "*many if not most markets with network externalities are characterized by the presence of two distinct sides whose ultimate benefit stems from interacting through a common platform*". According to Hagiu (2009), a platform is two-sided when both consumers and third-party producers "*gain access to the same platform in order to be able to interact and the value of platform access to each side is higher, the more members are present on the other side*". Similarly, Rysman (2009) argues that in a two-sided market two sets of agents interact through an intermediary or platform and have effect on each other through externalities. Thus, a market with network externalities is a multi-sided market when the platform can serve as an intermediary for transactions between two or more groups of customers (Evans, 2003; Economides & Katsamakas, 2006; Gawer, 2009). By serving as intermediaries, platforms depend on the innovation and participation of other firms (Tee & Gawer, 2009). For example, in a mobile application store platform different shareholders might include a developer, an advertiser, and an end-user. In ad-

dition, mobile application store depends entirely on the contributions of the shareholders.

The basic distribution process of an app store is similar to a generic interaction in a platform market in which two actors transact through an intermediary. First, a developer publishes an app in an app store, which serves as an intermediary between the developer and the consumer, and usually by utilizing the developer tools provided by the app store. Then, a consumer downloads the app using her mobile device, after which the possible payment takes place. Finally, the app store retains its royalties and possible transaction costs, after which the rest of the app price is paid to the developer. (Holzer & Ondrus, 2011). The distribution process is demonstrated in Figure 4.
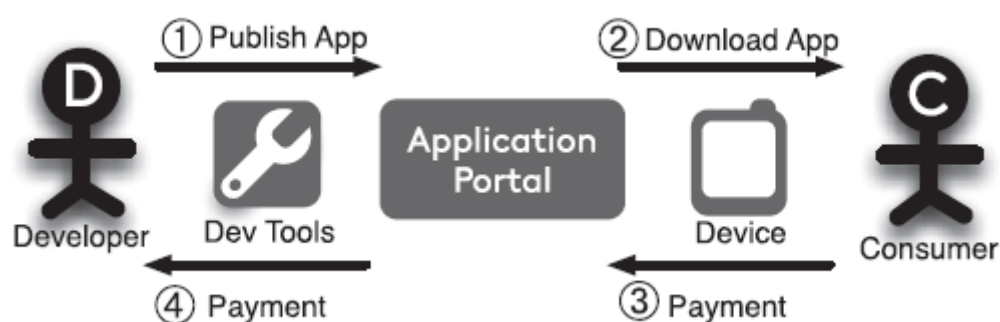
Figure 4 Mobile application distribution process (Holzer & Ondrus, 2011)

A platform creates value by reducing transaction and search costs between the agents (Evans & Schamalensee, 2007; Evans, 2009). Furthermore, the value of the platform largely depends on the number of its users and externalities derived from the network effects (Rochet & Tirole, 2003). For instance, in the case of mobile operating system platforms, as the number of users, developers, and device manufacturers utilizing the operating system increase, so does the value of the platform (Tilson et al., 2012b). Table 7 exhibits various examples of businesses in two-sided markets.

Table 7 Examples of platform-based markets (Zhu & Iansiti, 2012)

Market	Side 1	Platform(s)	Side 2
PC operating systems	Computer users	Windows, Macintosh, Linux	Application developers
Web browsers	Internet surfers	Internet explorer, Firefox	Plugin developers
Portable documents	Document readers	Adobe	Document writers
Online auction houses	Buyers	eBay	Sellers
Video sharing	Clip makers	Youtube	Clip watchers
Online dating clubs	Men	Match.com, AmericanSingles.com	Women
Credit cards	Cardholders	Diners Club, Visa, MasterCard	Merchants

Streaming audio/video	Content users	Windows media player, Real audio	Content creators
Search advertising	Searchers	Google, MSN, Yahoo	Advertisers
Stock exchanges	Equity purchasers	NYSE, NASDAQ	Listed companies
Home video games	Game players	Xbox, Playstation, Wii	Game developers
Recruitment sites	Job seekers	Monster.com, Hotjobs.com	Employers

However, Hagiu and Wright (2011) argue that while most multi-sided platforms exhibit significant cross-group network externalities, they are neither necessary nor sufficient for multi-sided platforms. By being a two-sided market, mobile application stores too are subject to network externalities (Holzer & Ondrus, 2011). Figure 5 demonstrates the functioning of positive network externalities in the mobile application store context.
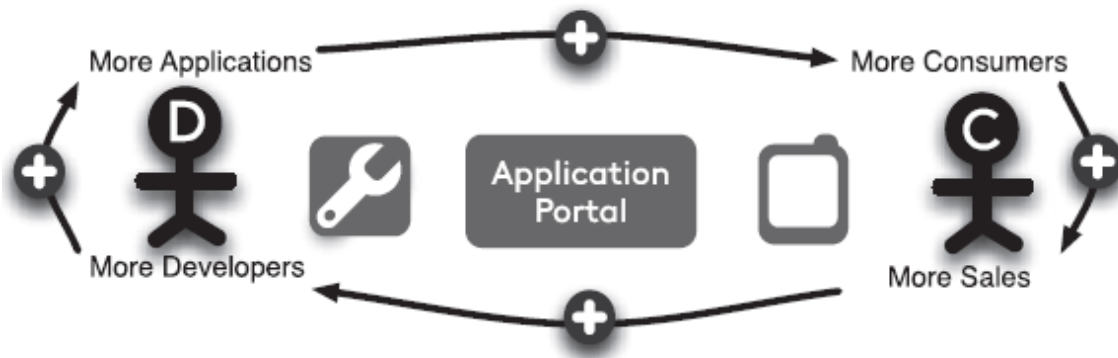
Figure 5 Positive feedback loop in the two-sided mobile application market (Holzer & Ondrus, 2011)

Moreover, negative network externalities may occur as well. For example, congestion on developer side leads to more competition, which may reduce participation among developers. Similarly, overflow in app offering may increase search and transaction costs on the consumer side and thus lead to reduced participation.

2.2.2 Platform pricing

The pricing structure of a platform usually leans on one side due to subsidizing of the quality- and price-sensitive agents (Eisenmann, Parker & Van Alstyne, 2006; Armstrong & Wright, 2007). Rochet and Tirole (2003) argue that the choice of business model, especially in terms of pricing structure and pricing level, and balancing between the different user groups are critical factors in success of a platform. Pricing of the platform is highly dependent on the exhibited network externalities (Rochet & Tirole, 2006). By regulating the interaction between the different sides, platforms aim at maximizing profits (Economides & Katsamakas, 2006). For example, in traditional TV networks, viewers are used to watching

TV for free. If such TV network started to charge viewers even a small amount, the number of viewers would plummet; thus viewers are really price sensitive. Advertisers, on the other hand, are the ones the profits are made from. Table 8 summarizes some conventional two-sided market business models and illustrates how the subsidizing dynamics function in the particular examples. Either side of the market may be subsidized and the decision which one to choose depends on the benefits extracted from the network externalities (Eisenmann et al., 2006).

Table 8 Examples of two-sided market business models (adapted from Rochet & Tirole, 2003)

Product	Subsidized segment	Subsidizing segment
TV networks	viewers	advertisers
Video games	consumers	software developers
Operating systems	application developers	clients
Newspapers	readers	advertisers
Credit and differed debit cards	cardholders	merchants
Mobile application stores	consumers	application developers

Like any markets, price elasticity of demand also affects two-sided markets. However, the effect is usually more drastic. Rysman (2009) states that "*pricing to one side of the market depends not only on the demand and costs that those consumers bring but also on how their participation affects participation on the other side and the profit that is extracted from that participation*". Thus, the pricing decisions in the two-sided markets take into account the elasticity of the response to the pricing choices on the other side in addition to the mark-up charged on the other side (Rochet & Tirole, 2003; Rysman, 2009). Low prices attract more customers to that side, which in turn makes the other side more attractive. Increased value attained from the other side may again lead to lower prices on the first side. (Evans & Schmalensee, 2007; Rysman, 2009). The loop at issue also works the other way around, as an increase in price on one side will lead to decrease in participation on that side (Evans & Schmalensee, 2007). Similarly, by undercutting the competitors' prices, platforms may not only steal customers from their competitors, but as the competitors' customer base reduces, the presence of the network externalities may lead to even more losses on that side (Hagiu, 2009). This self-inducing continuum may reduce prices below marginal cost and in the case of multiple competing platforms effects may appear even more substantial (Rysman, 2009).

Platforms also comprehend both economies and diseconomies of scale (Evans & Schmalensee, 2007; Müller, Kijl & Martens, 2011). Maintaining the platform usually entails significant fixed costs and thus platforms are also subject to economies of scale as the participation increases. For large platforms, diseconomies of scale might emerge when trying to get all the agents on board on a certain change, such as when imposing new features (Evans & Schmalensee, 2007). Drawing another example from mobile application stores; the average

cost of transactions decreases when the number of buyers and sellers increases, but on the other hand, the vastly increased number of applications on the market might make the search for the right application very difficult for the end users (Müller et al., 2011).

Armstrong (2006) proposes three main factors that affect the pricing in a platform: relative size of cross-group externalities; fixed fees or per-transaction charges; and single-homing or multi-homing. In addition, Hagiu (2009) identifies demand for product variety on buyer side as another notable factor affecting platform pricing structures.

Relative size of cross-group externalities refers to the situation where one side of the platform exerts large positive externalities on each member of the other side (Armstrong, 2006). The side whose participation has larger positive externalities on the participation of the other side is usually charged less (Rochet & Tirole, 2003; Armstrong, 2006). For example, advertisers are interested in reaching a large volume of viewers, while viewers might not necessarily be as intrigued about being exposed to the ads, and hence the advertisers are charged more. Due to competition intensifying and profit reducing effects of the cross-group externalities, platforms may be induced to mitigate the network externalities (Armstrong, 2006).

Platform pricing usually varies between *fixed fees* and *per-transaction charges* (Rochet & Tirole, 2003; Armstrong, 2006). By relying on fixed fees on one side, platforms are not dependent on the performance on the other side of the market. However, fixed fees can sometimes be tied to the performance (Armstrong, 2006). For example, TV channels may charge the advertisers based on the audience reached. Per-transaction charges, on the other hand, exhibit weaker cross-group externalities due to a reduced need of interacting with the other side (Armstrong, 2006). Proprietary app store platforms often use a combination of the two tariff forms. Platforms may charge developers a lump-sum for joining the platform and allow developers to publish applications. In addition, the published applications often have a per-transaction cut, usually around 30%, claimed by the platform owner (Kimbler, 2010). In the case of non-proprietary app stores, however, app stores tend to only utilize the transaction fee, while dismissing the registration fee for developers.

When an agent is connected to a single platform, the agent is said to "single-home" (Armstrong, 2006). Single-homing is likely for all the agents when both sides of the market exhibit strong product differentiation (Armstrong & Wright, 2007). However, in many markets, agents on one or both sides connect to multiple platforms at the same time (Evans, 2003). This is usually referred to as *multi-homing*. The either side's choice to single- or multi-home bears significant implications to market dynamics (Armstrong, 2006). Generally there are three possible configurations: (1) both groups are single-homing; (2) one group is single-homing while the other group is multi-homing; or (3) both groups are multi-homing (Armstrong, 2006). In mobile application markets, all of these configurations exist (Kouris & Kleer, 2012). For instance, single-homing is usual in proprietary configurations, such as in Apple's ecosystem. The second and

third configurations, on the other hand, are both plausible in the Android environment, where both the device users as well as the developers possess an option to multi-home in various application stores.

Multi-homing on one side may lead to intense price competition on the other side (Rochet & Tirole, 2003; Armstrong & Wright, 2007; Rysman, 2009). Furthermore, when one side is more likely to multi-home, the competition for that side will also be lower among platforms and thus higher profits may be extracted (Rochet & Tirole, 2003; Armstrong & Wright, 2007). However, platforms may form exclusive contracts with sellers to prevent multi-homing (Armstrong & Wright, 2007). Such settings are typical in PC and console gaming for example (Hagiu & Spulber, 2013). Some of the developers have exclusive contracts with a single platform forbidding them to publish on other platforms.

Lastly, Hagiu (2009) identifies the demand for product variety on buyer side as another notable factor affecting platform pricing structures. In a monopoly platform situation where there is a strong demand for product variety on the buyer side, the seller side profits more due to a lesser threat of substitutes. Consequently, as sellers have more market power over consumers, platforms will try to extract profits from them (Hagiu, 2009).

2.2.3 Platform launch

Platform providers have a number of market conditions to consider when plotting platform strategies. These factors will be covered subsequently. In order for platforms to function, the sides must first be brought together. Due to the nature of the network externalities involved, platforms are often subject to "chicken-and-egg" dilemma (e.g. Rochet & Tirole, 2003; Evans, 2009; Rysman, 2009; Hagiu & Wright, 2011). In other words, when the participation of one side is dependent on the participation of the other side, which side is brought to the platform first? Hagiu (2006) implies that usually most agents of one side, normally sellers, join the platform before the most agents of the other side.

 Evans (2009) refers to chemical catalysis when explaining the startup phase of a platform: in order to ignite the chain reaction, the compound must first contain appropriate proportions of needed substances. Similarly, platform startups must secure the so called critical mass of participation on both sides quickly enough in order to spark the growth of the platform; otherwise the platform will most probably fail.

Evans and Schmalensee (2010) consider early platform participation from direct- and indirect network externalities' point of view. From the point of view of the direct network externalities, the common problem concerns the interdependency between participation and the quality of product offered to participants. When the quality is low, the participation usually reduces. The lowered participation again makes the other side less attractive and thus leads to even lower quality. A similar loop phenomenon may occur with indirect network externalities. The participation by each agent on one side affects the quality of the product experienced by the agents on the other side and thus the possible

consequential participation below critical mass may lead to similar outcomes. (Evans & Schmalensee, 2010).

In his research, Spulber (2010) identifies three main methods of how firms address the "chicken-and-egg" dilemma, or "circular conundrum", as he refers to it: *reducing transaction costs* affecting buyers and sellers; lowering the risk of participation for buyers and sellers by *acting as market makers*; and *providing media content and consumer rewards* in order to entice participation by buyers and sellers. Hagiu and Spulber (2013) further research the use of incentives to increase participation by studying the utilization of *first-party content* in the two-sided markets. First-party content refers to the content that is usually aimed at the buyer side, and is being offered for free or as a part of a product bundle to entice participation. Furthermore, first-party content is usually external from the seller side. For example, in video game console markets Microsoft's Xbox 360 is known for its proprietary Halo game series, which was often bundled with the console.

Hagiu and Spulber (2013) suggest that the strategic use of the first-party content depends on its reception on the seller side, and the expectations that are set for the platform by buyers and sellers. If the first-party content is seen as a substitute to the seller side participation, investing further in the first-party content lessens the network externalities the buyers derive from the seller side. Thus, a platform should make profits from sellers and charge buyers less. Consequently, the situation is reverse if the first-party content is comprehended as complementary to the seller side. For example, PlayStation 3's PlayStation Network system can be seen as a complement to the seller side's offering of third party games. Alternatively, Sony's LittleBigPlanet gaming series is a substitute to the seller side offering. In order to attract sellers in such situation, the indirect network externalities derived from increased participation on the buyer side must exceed the hindrances resulting from the competitive juxtaposition. (Hagiu & Spulber, 2013).

Evans and Schmalensee (2007) identify five factors that influence the size of a platform: indirect network effects; scale economies; congestion; platform differentiation; and multi-homing. As three of the factors, namely indirect network effects, scale economies, and multi-homing were discussed above, the remaining two will be covered next. Congestion refers to increased search and transaction costs caused by increased number of customers, and is generally closely related to diseconomies of scale. In order to avoid congestion, platform owners may want to limit the size of the platform, which can be achieved, for example, by platform differentiation. Platform differentiation comprises vertical and horizontal differentiation within the industry. Vertical differentiation occurs when platforms try to differentiate by offering particular level of quality. In horizontal differentiation on the other hand, customers utilize several platforms due to compelling differentiated features provided by competing platforms. Thus, horizontal differentiation leads to multi-homing. The foregoing factors and their effects on platform size are summarized in Table 9. (Evans & Schmalensee, 2007).

Table 9 Factors affecting platform size and structure (Evans & Schmalensee, 2007).

Cause	Effect on size/concentration
Indirect network effects	+
Scale economies	+
Congestion	-
Platform differentiation	-
Multi-homing	-

Although having more participation in a platform is generally feasible, too much participation may cause congestion, as was discussed above. A large network might increase the network externalities, but Hagiu (2011) suggests that if buyers value quality over quantity, a platform in a monopoly position should try to shut low quality sellers out.

2.2.4 Platform competition

If a possibility of attaining significant profits exists, competitors may be enticed to fight fiercely to become the proprietary platform provider. Platform markets are likely to turn into winner-take-all markets when multi-homing costs are high, strong and positive network externalities are present, and the demand for special features is weak (Eisenmann et al., 2006). One of the most famous platform rivalries is the battle between VHS and Betamax, who both fought to become the leader in the video platform markets back in the 1980s. In the battle JVC's VHS ended up as the sole winner after the initial market dominance by Betamax. In their study, Gawer and Cusumano (2008) address the challenges of becoming a platform leader. They identify two distinct strategies which may be utilized to become a platform leader: coring and tipping. These two strategies, including business and technology aspects platform owners pursuing leadership need to consider, are illustrated in Table 10.

Table 10 Strategic options for platform-leader wannabes (Gawer & Cusumano, 2008)

Strategic Option	Technology Actions to Consider	Business Actions to Consider
Coring How to create a new platform where none existed before	• Solve an essential "system" problem • Facilitate external companies' provision of add-ons • Keep intellectual property closed on the innards of your technology • Maintain strong interdependencies between platform and complements	• Solve an essential business problem for many industry players • Create and preserve complementors' incentives to contribute and innovate • Protect your main source of revenue and profit • Maintain high switching costs to competing platforms
Tipping How to win platform wars by building market momentum	• Try to develop unique, compelling features that are hard to imitate and that attract users • Tip across markets: absorb and bundle technical features from an adjacent market	• Provide more incentives for complementors than your competitors do • Rally competitors to form a coalition • Consider pricing or subsidy mechanisms that attract users to the platform

Moreover, platforms often have overlapping user groups, which induce the utilization of envelopment. In an envelopment situation a company enters the market with a service similar to one that is already being provided by a competitor, but with an addition that it is being offered as a part of a larger service bundle. Thus, the company aims at taking over the established and shared user group by offering greater value. Such strategies are common especially in networked markets where technology is advancing rapidly. (Eisenmann et al., 2006).

Hidding et al. (2011) find that platform leaders utilize platform envelopment in order to achieve competitive advantage. Envelopers utilize two key patterns: *follower advantage* and *staircase strategies*. Follower advantage refers to perks that are achieved by following the antics of the early-entrants in new markets and reacting accordingly. Followers can, for example, create new products by imitating or improving existing products. Whereas early entrants must explain what their product is and make a name for their product, followers can focus on communicating why their product is superior to others. (Hidding et al., 2011). Moreover, followers may outperform early innovators by utilizing complementary assets upon market entry (Teece, 1986). Staircase strategies, on the other hand, comprise platforms exhibiting product portfolio management so that every new product expands the established portfolio of products by adding new functionalities and is compatible with the earlier products. Furthermore, by utilizing the compatibility on existing products staircase strategies aim at customer lock-in. (Hidding et al., 2011).

2.2.5 Platform openness and control

Open technology may increase innovation and momentum on the particular technology, but it also reduces the owner's control over how she can extract the realized value (Katz & Shapiro, 1986). To be successful, an open digital infrastructure requires at least some level of control to balance the distributed actors and keep the infrastructure from collapsing (Zittrain, 2008). Managing price settings and subsidies alone is not sufficient to attain the best possible performance for platforms ecosystems (Boudreau & Hagiu, 2009). This is due to externalities, information asymmetries, complexity, non-pecuniary motivations and uncertainty and these factors may be addressed by regulating access and interactions around the platform (Boudreau & Hagiu, 2009).

The structure of the mobile industry has been affected by the convergence of mobile and internet technologies and products. One of the current debates concerns the viability of open and integrated platform business models. Ballon, Bouwman and Yuan (2011) suggest that "open but not fully open" platform strategies have emerged as the most viable approach for mobile ICT companies. These strategies combine advantages of both open and closed approaches in terms of diversity and complementarities, as well as control and coordination (Ballon et al., 2011). By holding on to the "bouncer's rights", platforms have the control to force contracts, policies or other rule-setting instruments in order to

modify rights, freedoms and obligations (Boudreau & Hagiu, 2009). Parker and van Alstyne (2008) argue that granting open access to a technology can reduce incentives to participate due to consequent increase in competition. By regulating the access, platforms can acquire the right kind of participants on both sides (Boudreau & Hagiu, 2009). Ballon (2009) distinguishes four platform models based on the relative control the platform exerts over customer relationships and tangible and intangible assets that affect the value proposition. The platform models are enabler platform, system integrator platform, neutral and broker. The typology of the platform models and their brief descriptions are presented in Table 11.

Table 11 Typology of platform models (Gonçalves, Walravens & Ballon, 2010)

	No Control over Customers	Control over Customers
Control over Assets	*Enabler Platform*	*System Integrator Platform*
	The platform owner controls many of the necessary assets to ensure the value proposition, but does not control the customer relationship	The platform owner controls many of the assets to ensure the value proposition, and establishes a relationship with end-users. Entry of 'third-party' service providers is actively encouraged
	Examples: IMS, Intel, Windows Mobile, Android	Examples: Microsoft Windows ecosystem, iPhone, Ovi
No Control over Assets	*Neutral Platform*	*Broker Platform*
	The platform owner is strongly reliant on the assets of other actors to create the value proposition, and does not control the customer relationship	The platform owner is strongly reliant on the assets of other actors to create the value proposition, but does control the customer relationship
	Examples: PayPal, LiMo, Bondi	*Examples: eBay, GetJar, Handango*

Platform owners of open innovation ecosystems, such as mobile application stores, can increase platform profits and innovation by offering developers certain resources (Parker & van Alstyne, 2010). In general, mobile app store owners provide developers with application programming libraries (API) and software development kits (SDK). Moreover, APIs and SDKs are the main tools enabling and leveraging generativity in app stores. In his book, Zittrain (2008) introduces the term *generativity*. Zittrain (2008, 70) argues that "*generativity is system's capacity to produce unanticipated change through unfiltered contributions from broad and varied audiences*". In essence, generativity encompasses the ease of use perceived by users while generating and sharing content that utilizes the technology at issue. Rules of generativity also apply to platforms, such as app

stores (Tilson, Lyytinen & Sorensen, 2010; Tilson, Sorensen & Lyytinen, 2012b). Zittrain (2008, 71) identifies five pivotal factors that influence generativity:

1. Leverage – makes performing some task easier
2. Adaptability – flexibility to be used in various ways or to be built on
3. Ease of mastery – easy for broad audiences to use, adopt and adapt
4. Accessibility – can access tools and information necessary to use the technology
5. Transferability – can share innovations and results with others by enabling collaboration and transferability

3 Empirical research

This chapter entails the methodology used in the present study. The chapter starts with a literature review on case study research with a focus on multiple-case study in particular, forming research framework on the given subject. The choices regarding the methodology used in this study are reflected upon the findings presented in the literature review. The literature review is followed by an outline of case study protocol that is being utilized in this study in order to ensure internal validity and reliability. The case study protocol will serve as the guideline upon which the actual analysis of the case studies is being conducted. After the literature review on the case study research and the introduction of the case study protocol, demarcating from more general level literature on platforms and two-sided markets, the attributes and the features specific to mobile app stores are discussed briefly and the framework of the app store features and policies is presented. This framework is used to construct preliminary reports of the case app stores using the method presented in this chapter. These reports are then analyzed by utilizing the theoretical framework provided in chapter two. Each case is discussed and analyzed individually, followed by a recapitulating cross-case analysis.

3.1 Case study research

This section is largely based on a case study research book by Robert Yin (2003), with some input from few other related studies (Dul & Hak, 2008; Benbasat, Goldstein & Mead, 1987). While there is no standard definition for a case study, some definitions are used more often than others. For the purposes of this study a definition by Yin (2003) is followed. Starting with the scope of the research Yin (2003, 13) defines a case study as follows:

> "*A case study is an empirical inquiry that*

- *investigates a contemporary phenomenon in depth and within its real-life context, especially when*
- *the boundaries between phenomenon and context are not clearly evident."*

Furthermore, regarding the technical requirements of the case study methodology Yin (2003, 13-14) states that:

"The case study inquiry

- *copes with the technically distinctive situations in which there will be many more variables of interest than data points, and as one result*
- *relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result*
- *benefits from the prior development of theoretical propositions to guide data collection and analysis."*

A case study can consist of an inquiry of a single instance, *a single case study*, or alternatively of a small number of instances, *a multiple-case study* (Yin, 2003, 11). There are clear advantages and disadvantages in using multiple-case studies over single case studies (Yin, 2003, 46). For example, conducting a multiple-case study may require significant resources and time from the researchers (Yin, 2003, 47). Furthermore, replication logic should be used in multiple-case studies. Yin (2003, 47) further notes, that an important step in replication process is the construction of a rich theoretical framework. Compared to a single case study, a multiple-case study enables cross-case analysis and the possible extension of theory (Benbasat et al., 1987).

Data gathered through case studies is often analyzed in a qualitative manner whereas in surveys, for example, quantitative measurements are used (Dul & Hak, 2008, 5). Moreover, unlike experiments for instance, case studies are not manipulated (Yin, 2003, 1; Dul & Hak, 2008, 4). Benbasat et al. (1987) summarize eleven key characteristics of case studies. These characteristics are presented in Table 12.

Depending on the focus of the research and the formed research questions, case studies can be specified into three distinct types: exploratory case studies, explanatory case studies and descriptive case studies (Yin, 2003, 3). When choosing the optimal research strategy, the first step is the evaluation of the research question. Research questions can be categorized into a widely known litany: "what", "who", "where", "how", and "why". Yin argues that "what" questions can be divided into two types. The first type of "what" questions are exploratory, such as *"What can be learned from a study of an effective school?"* (Yin, 2003, 6). The second type comprehends "what" questions which are actually in form of a "how many" or "how much" type of enquiry, such as *"what have been out comes from a particular managerial restructuring?"* (Yin, 2003, 6). He further argues that "who" and "where" questions are usually associated with surveys or the analysis of archival records and are thus not utilized in case study research. However, "how" and "why" questions are of explanatory type and thus

Table 12 Key characteristics of case studies (Benbasat, Goldstein & Mead, 1987)

1. Phenomenon is examined in a natural setting.
2. Data are collected by multiple means.
3. One or few entities (person, group, or organization) are examined
4. The complexity of the unit is studied intensively.
5. Case studies are more suitable for the exploration, classification and hypothesis development stages of the knowledge building process; the investigator should have a receptive attitude towards exploration.
6. No experimental controls or manipulation are involved.
7. The investigator may not specify the set of independent and dependent variables in advance.
8. The results derived depend heavily on the integrative powers of the investigator.
9. Changes in site selection and data collection methods could take place as the investigator develops new hypotheses.
10. Case research links to be traced over time rather than with frequency or incidence.
11. The focus is on contemporary events.

also fit for case study research (Yin, 2003, 6). Hence, referring to preceding, it can be argued that the main research question of this study is explorative with the complimentary research questions being explanatory and thus, the use of case study as a research method is well justified.

Yin (2003, 39) identifies four distinct case study designs based on the number of cases and the number of units of analysis within the case. Based on the number of cases, case study designs can be categorized into single-case designs and multiple-case designs. Similarly, case studies can further be divided into holistic designs and embedded designs, depending on whether there is one or more units of analysis within each case. Thus, the four case study designs are holistic single-case design, embedded single-case design, holistic multiple-case design, and embedded multiple-case design. According to the foregoing categorization, this study can be identified as a holistic multiple-case study. (Yin, 2003, 39).

3.1.1 Data collection

In this study, all the data is gathered from Internet sources. A statement by Yin (2003, 15) supports this as a valid method for gathering data, implying that: *"You could even do a valid and high-quality case study without leaving the telephone or Internet, depending upon the topic being studied."*. Thus, it is not necessary to rely on ethnographic or participant-observation data when conducting case study research. Furthermore, no control or manipulation over studied instances is being exerted in this study.

Yin (2003, 86) identifies six sources of data that can be utilized in case studies:

1. Documentation

2. Archival records
3. Interviews
4. Direct observation
5. Participant-observation
6. Physical artifacts

For this particular study, three sources of data are utilized: documents, archival records, and direct observation. The choices of these data sources are dictated by the structure and the nature of this study. Firstly, no external persons are involved in this study, constraining the usage of interviews and participant-observation. Secondly, due to the openness and the accessibility of certain data sources, such as company websites, developer policies and forums of the app stores as well as news and blog posts in trustworthy media sources, they are utilized as the main data sources of this study. Moreover, these kinds of data are relevant and useful in this study as they bear remarks on the features and policies implemented by the app store. Finally, direct observation is utilized in terms of accessing the app stores at issue via end-user devices and by taking screen captures of the assessed features. The devices utilized in this thesis include Samsung Galaxy S2 and LG Google Nexus 4 smart phones as well as a PC. An example of a screenshot taken from an app store with a smart phone is presented in Figure 6.
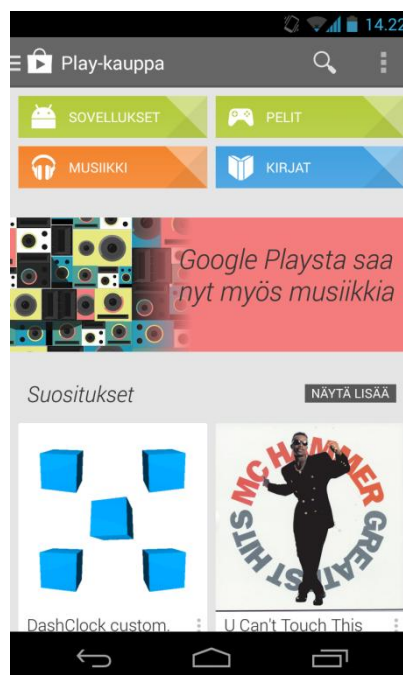
Figure 6 An example of a screenshot taken from a Google Play's storefront

As the features and policies implemented by the app store are visible to users and developers, the combination of these three types of data sources is sufficient for gathering the required data in order to successfully utilize the framework presented in the subchapter discussing the app store features and policies.

Finally, the characteristics of this particular study are summarized in Table 13 utilizing a categorization by Benbasat et al. (1987).

Table 13 Characteristics of this multiple-case study (Benbasat et al., 1987)

Theme	Research Thrust	Sample Selection	Units of Analysis	Data Collection Method	Level of De-scription About Units
Business models of Android app stores	Exploration	Six app stores, divided into two groups, based on their position in the ecosystem	App stores	Documentation, archival records, direct observa-tion	Low

3.1.2 Validity

A qualitative study must follow certain guidelines in order to meet an appoint-ed quality criteria in terms of reliability and validity (Morse et al., 2002). Quality assuring concepts associated with reliability and validity include trustworthi-ness, credibility, confirmability and data dependability. Addressing these fac-tors, Yin (2003, 34) proposes a set of design tests that help in evaluating design quality of a case study in terms of construct validity, internal validity, external validity and reliability. These tests are commonly used in social science research and are also acknowledged to be useful in case study research. The foregoing design quality tests and the tactics utilized in them are briefly introduced in Table 14. However, it should be noted that internal validity is not tested for ex-plorative case studies and is thus left out of the scope in this study.

Table 14 Case study tactics for four design tests (Yin, 2003, 34)

Tests	Case Study Tactic	Phase of research in which tactic occurs
Construct validity	• Use multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study report	data collection data collection composition
Internal validity	• Do pattern-matching • Do explanation-building • Address rival explanations • Use logic models	data analysis data analysis data analysis data analysis
External validity	• Use theory in single-case studies • Use replication logic in multiple-case studies	research design research design
Reliability	• Use case study protocol • Develop case study database	data collection data collection

Construct validity concerns the establishment of correct operational measures for the concepts that are being studied (Yin, 2003, 34). In this study, construct validity is addressed by relying on multiple sources of data whenever possible. Furthermore, when data is collected from a source, it is stored in the document database and referenced in order to enable backtracking to the original source and revising the data anytime.

External validity refers to the generalization of the research's implications beyond the boundaries of studied instances (Yin, 2003, 37; Dul & Hak, 2008, 47). To bolster external validity, replication logic is utilized in this study. Thus, the theory is tested on multiple cases in order to increase external validity. In the case of multiple-case studies, the researched instance should be chosen so that it either "*(a) predicts similar results (a literal replication) or (b) predicts contrasting results but for predictable reasons*" (Yin, 2003, 47). The choices of the instances are justified later in this study. Yin (2003, 47) further states that four to six cases is an ideal number when aiming at two different patterns of theoretical replications, as is the case in this study.

Reliability comprehends the replicability of the study. For example, if another researcher conducts the same study utilizing the same data, he should also achieve the same results. A theory should be replicated multiple times before it can be claimed as generalizable to a particular area (Dul & Hak, 2008, 43). Thus, reliability aims at minimizing the biases and errors (Yin, 2003, 37). In order to increase reliability of this study, a case study protocol is being used. This is effectively a documentation containing the procedures conducted in the case study and will be discussed in depth in the next section. The utilization of the case study protocol allows the investigator to follow the chosen procedures step by step in each of the studied instances. However, it should be noted that in theory building case study business research, the use of case study protocol is often disregarded (Dul & Hak, 2008). Furthermore, as was mentioned earlier, a case study database is being curated. All the gathered data is stored to the case study database before any further analysis.

3.1.3 Case study protocol

The case study protocol includes the procedures and general rules that ought to be followed during the use of the protocol and is formed in order to ensure internal consistency and increase the reliability of the study. Furthermore, in order to ensure internal consistency between the cases and that the same procedures are followed in all of the cases, the use of the case study protocol is particularly important in multiple-case studies (Yin, 2003, 67). Generally, the case study protocol should include the following sections (Yin, 2003, 69):

- An overview of the case study project
- Field procedures
- Case study questions
- A guide for the case study report

Next, following these guidelines, a case study protocol of this particular study is presented. The *overview of the case study project* should cover the basic background information and relevant readings for the particular study (Yin, 2003, 70). In this study, these matters are discussed in the previous two chapters.

Field procedures include the data collection and analysis procedures used in the particular case study project (Yin, 2003, 72). For this study, three different sources of data are relevant. For all of the cases, the data collection procedure is similar, with an exception of a handheld device that is being used in one of the cases. This is because the particular app store is only accessible through certain devices, and it does not bear any consequences on the results by any means. Firstly, the website of the case app store at issue is first examined to identify relevant documentation. Admissible data includes documentation, such as developer distribution agreements, user agreements, policies, documentation about the usage of the services, APIs, SDKs, and such. Once the admissible data source is acquired, it is immediately stored to the case study database before any further analysis. Secondly, once the researcher declares that a sufficient amount of data is gathered from the specific app store website, data gathering is switched to direct observation. In direct observation, the particular app store is accessed via an end-user device, and relevant data is being stored to the case study database in the form of a screenshot. However, it should be noted that due to the circumstances of this study it is possible to very effortlessly revisit the sources for additional information, should a gap or inconsistency occur in the gathered data, and the right to employ this opportunity is reserved. Finally, the researcher commences with the actual case study analysis starting with individual cases and following with the cross-case analysis. The gathered data is used to analyze the app store with the framework of the app store features and policies presented in the previous chapter resulting in an analysis table of each case app store and a cross analysis table. Each table of analysis is broken down in a form of an individual case study analysis, followed by a recapitulation in terms of cross-case analysis.

Case study questions should reflect the aims of the particular inquiry and may be used as reminders or a checklist for the researcher to indicate the objectives of the study (Yin, 2003, 74). Next, relevant general level questions for this study are presented utilizing the *levels of questions* by Yin (2003, 74):

- *Level 1:* How do the features and policies affect the business models and strategies? And vice versa?
- *Level 2:* What kinds of business models and strategies do the individual app stores utilize?
- *Level 3:* Are there any differences between business models and strategies in keystone and niche app stores?
- *Level 4:* Is there a pattern to be seen in these findings, and how do the findings relate to the preceding literature?
- *Level 5:* If there is a pattern, is there a need for further research before any conclusions can be made?

Yin (2003, 76) suggests that the researcher should plan a *guide for the case study report* before the actual study is conducted in order to outline the design of the final case study report beforehand. This particular study follows linear-analytic structure, which is a suitable case study structure for an exploratory multiple-case study and is a standard approach for research reports (Yin, 2003, 152). Linear-analytic structure starts with an introduction of the research problem and a review of relevant prior literature. These are followed by a presentation of the methodology being used, discussion on the findings based on the data gathered and analyzed, and ending finally with consequent conclusions and implications. (Yin, 2003, 153).

3.2   Mobile app store

Before the presentation of the case study reports, a brief glance at mobile app store specific literature is made. Furthermore, the connection between the literature discussed earlier and the research framework is clarified.

When compared to the vastly grown popularity of app stores, there is still a relatively low amount of academic studies published on app store markets. Hence, no universally accepted definition on an app store exists. Jansen and Bloemendal (2013) aim at addressing this gap by providing a definition based on an exhaustive study on 83 app stores. They define an app store as follows:

> "App Store: An online curated marketplace that allows developers to sell and distribute their products to actors within one or more multi-sided software ecosystems."

Following the antecedent definition, Jansen and Bloemendal (2013) identify seven requirements, which define an app store. An app store platform should:

- be available through Internet,
- be curated by a particular actor, usually by an owner,
- enable selling and buying of software applications,
- handle the financial transactions related to selling of applications,
- have two distinct user groups: developers and consumers,
- serve at least one software ecosystem, and
- implement a platform that handles the distribution of the software applications

Building on the foregoing requirements, Jansen and Bloemendal (2013) also provide a conceptual model of an app store, which is illustrated in Figure 7. The conceptual model consists of an app store, which serves as the intermediating platform between three distinct actors. The first two actors are end users and developers, who naturally serve as the main transacting actors of the app store. The third actor is the app store owner, who controls the features and policies of the app store. Features comprehend the parts of the app store that actors can

interact with, while the policies include the rules, regulations and governing processes subject to the app store. A more in depth discussion on the app store features and policies is conducted later in this thesis. App store characteristics include factors over which the owner has no direct control, but which are indirectly affected by the features and policies of the app store. Such characteristics include, for example, the quality of the applications, and the number of end-users and developers. (Jansen & Bloemendal, 2013).
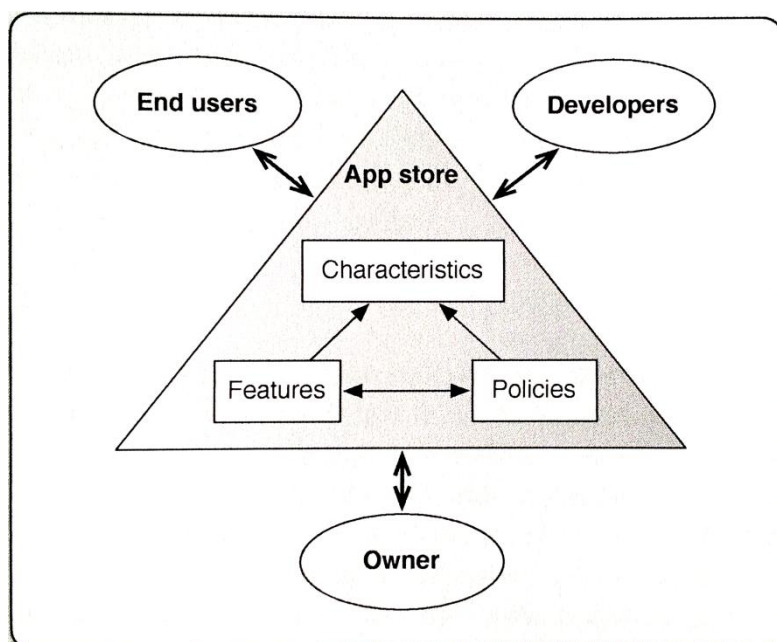
Figure 7 Conceptual model of an app store (Jansen & Bloemendal, 2013)

Kouris and Kleer (2012) argue that app stores are generally converging, but there is still room for niche and differentiating business models. As regards to the strategic actions by different app stores, they argue that incumbent players should try to consolidate further, while insurgents may have to rely on niches and differentiation. These strategic options refer to the coring and tipping strategies proposed by Gawer and Cusumano (2008). Furthermore, quality is an important factor alongside pricing in determining the success of an app store (Kouris & Kleer, 2012).

Being a multi-sided platform, an app store has two or more distinct value propositions – one for each side, users and developers (Osterwalder & Pigneur, 2010, 78). The pattern and the main building blocks of a multi-sided platform are demonstrated in Figure 8 using the business model canvas. Gonçalves, Walravens & Ballon (2010) propose a set of core competencies an app store type of platform should pursue. Naturally, the focus is on attracting both developers and end-users. The means of achieving this includes providing developers incentives to participate, developing attractive pricing for the developers and providing a user-friendly environment for the users. Furthermore, if a platform offers more sophisticated developer tools, extensive documentation and support should be provided. Moreover, if an app store platform utilizes distribu-

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
	Platform management	Value proposition 1		Customer segment 1
	Service provisioning			
	Platform promotion	Value proposition 2		Customer segment 2
	Key Resources		Channels	
	Platform	Value proposition n		Customer segment n

Cost Structure		Revenue Streams
Platform management & development	Possible revenue flow subsidy	Revenue flow 1 / Revenue flow 2 / Revenue flow n

Figure 8 Multi-sided platform pattern (adapted from Osterwalder & Pigneur, 2010, 87)

tion partnerships, maintaining relationships by managing the internal and external interests of these partners is essential. (Gonçalves et al., 2010).

As was mentioned earlier, platforms rely on the innovation of the participating actors (Tee & Gawer, 2009). This also holds true for app stores. In the app store context, developers serve as the content creators, and thus also as value creators. Developers also bear a significant strategic importance for app store owners (Schultz et al., 2011). Consequently, it is beneficial for app stores to look after developers (Gonçalves et al., 2010). Kim, Kim and Lee (2010) identify seven factors that have a positive impact on developer participation and satisfaction. Benefit-sharing attractiveness, market demand for applications, usefulness of development tools and review process fairness have positive impacts on the intentions to develop more frequently. Learning and set-up cost positively affect termination cost increasing the dependency of the developers, which again entails positive impact on the intention to develop more frequently. (Kim, Kim & Lee, 2010). All of these factors can be affected by governing the app store features and policies, which are discussed later.

3.2.1 Application pricing

Effectively all platform revenues come from sharing application provider revenues (Gans, 2012). Thus, it can be argued that providing tools for developers to monetize their apps is essential for an app store. There are multiple pricing

strategies developers utilize in their applications. Applications are typically monetized through paid downloads, advertising or in-app purchases (Gans, 2012). In Figure 9, Berman and Kesterson-Townes (2012) describe different kind of revenue models that appear in mobile games. When comparing different mobile application genres, mobile gaming has the widest array of revenue models that are utilized. These revenue models are also identified in other studies (e.g. Hyrynsalmi, Suominen, Mäkilä, Järvi & Knuutila, 2012).
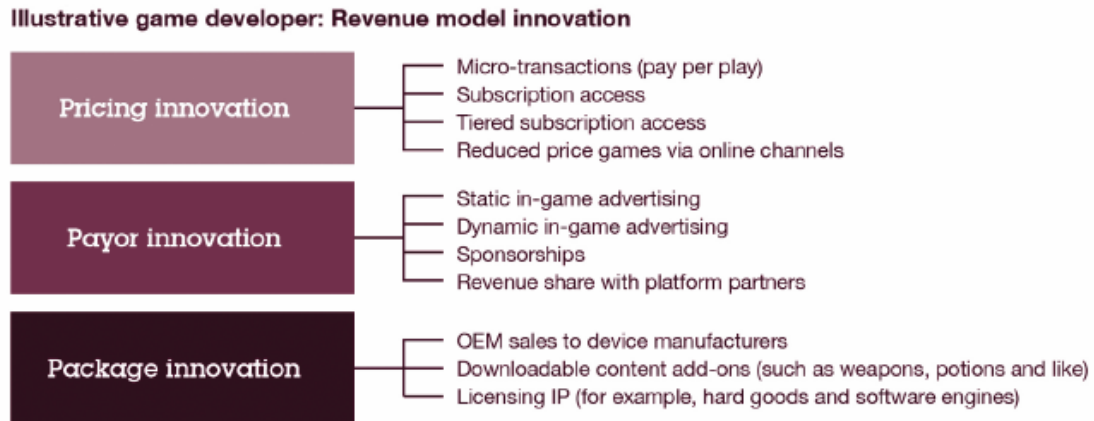
Figure 9 Revenue model innovation in mobile games (Berman & Kersterson-Townes, 2012)

Furthermore, application pricing depends on the platform ecosystem and the app store differentiation strategies. Developers often utilize multiple revenue models in their applications. Table 15 demonstrates the revenue model choices by developers in different platforms.

Table 15 Revenue model choices by developers (Vision Mobile, 2013)

	Android	iOS	HTML5 mobile	Windows Phone	BlackBerry 10
Contract work/ Commissioned app	22%	29%	29%	16%	12%
Freemium	20%	27%	16%	20%	22%
In-app purchases	19%	35%	14%	21%	18%
In-app advertising	30%	26%	19%	43%	18%
Pay per download	26%	36%	17%	40%	47%

Although application pricing is generally in the hands of the developers, app stores maintain some control over it in terms of regulations and policies, and differentiation strategies. Gans (2012) identifies three aspects of contractual and pricing terms set by platforms:

- Pricing control: the platform may withhold rights to set the price to final consumers for the application, or alternatively allow the application provider to do so.

- Most favored customer clause: after the final price is set by the application provider, the platform may restrict the selling of the application for a discounted price on the platform, or on competing platforms.
- Wholesale pricing structure: platform may require a unit price payment from application providers, or alternatively require revenue sharing.

3.2.2 App store features and policies

Features and policies determine the structure of an app store and include a number of factors that directly affect the business model of a particular app store, such as value propositions for both the users as well as for the developers, the policies an app store uses to control different actors, as well as the revenue streams and delivery channels (Jansen & Bloemendal, 2013). Moreover, by studying the features and policies of an app store, it is also possible to identify underlying strategic factors (Jansen & Bloemendal, 2013). The app store features and policies will serve as the analytical framework for the case studies discussed in the next section. Illustration of the framework is presented in Figure 10.
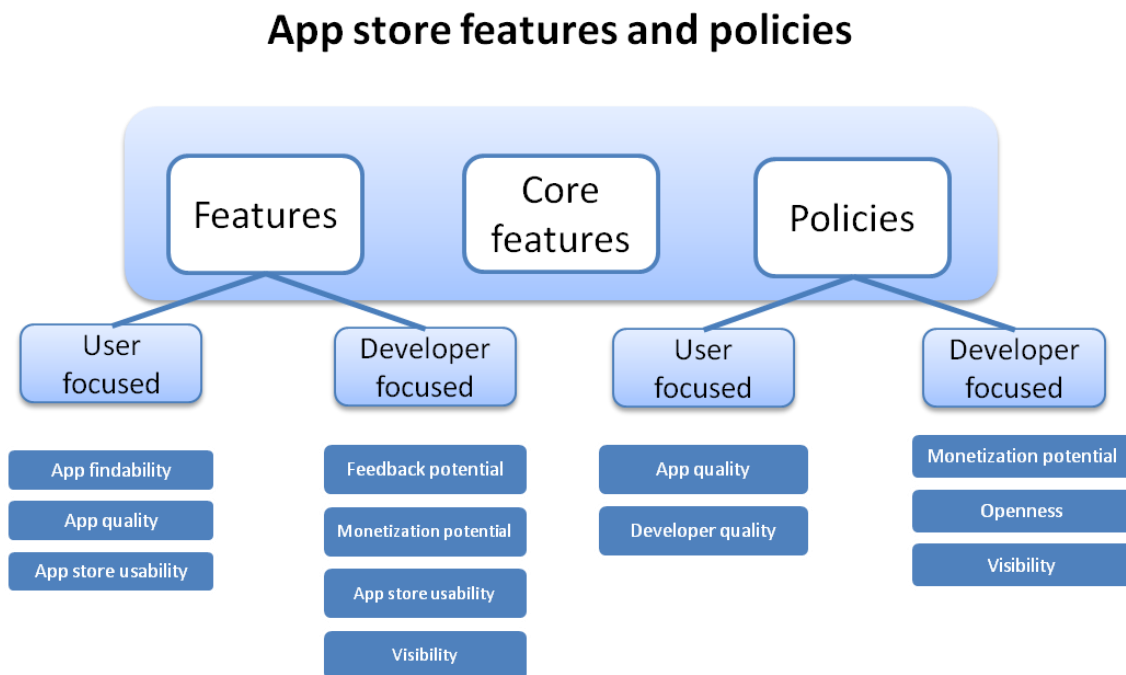
Figure 10 App store features and policies (adapted from Jansen & Bloemendal, 2013)

Jansen and Bloemendal (2013) divide app store features and policies to three main categories: core features, features and policies. Core features consist of a set of common features shared by effectively all app stores (Jansen & Bloemendal, 2013). These features include basic storefront usability focused features, as well as payment methods and common app monetization models supported by the app store. The fifteen app store core features are described in Table 16. The features and policies can both be categorized into two main groups,

user focused and developer focused features and policies. These four groups are further categorized into sub-groups. Features include the interactable parts of an app store for both the users and developers. Policies, on the other hand, comprehend the rules and regulations, as well as the governing and controlling processes implemented by the app store. While policies are categorized into both user focused and developer focused, in the end, effectively all policies affect developers. Lists and full descriptions of the app store features and policies are presented in Appendix A.

Table 16 Core app store features (Jansen & Bloemendal, 2013)

Core feature	Descriptions
app categories	Apps are listed in categories and subcategories
app listing	Apps are listed with full description, images, etc.
app lists	Apps are listed, e.g. top selling lists or latest additions
dev app management	Devs can manage their apps in a developer console
dev transaction list	Devs can manage their transactions
distribution integration	Distribution and installation happens through platform
featured apps	Apps can be featured to receive more attention
free revenue model	Apps can be offered for free
paid revenue model	Apps can be sold
pay out methods	Number of pay out methods
payment methods	Number of payment methods
platform comp. filter	Apps have information on their platform compatibility
ratings	Apps can be rated by the user
reviews	Users can read and write reviews of an app
search	Users can search for apps using search keywords

In order to justify the chosen framework as a viable tool for the data gathering and as a basis for further analysis, the interrelation between the framework and the pertinent literature is presented. Table 17 exhibits these interrelations. The first column comprises the app store features and policies. Based on the earlier multi-sided platform pattern by Osterwalder and Pigneur (2010), the business model canvas was chosen as a tool to indicate the link between the business model literature and the app store features and policies. Thus, the second column demonstrates the business model building blocks that are affected by the particular feature or policy. The third column indicates the interrelated platform/two-sided market specific attributes or phenomena presented in the literature review that may have implications on the choices and requirements on the business model. The table indicates that by utilizing the app store features and policies as a framework, it is possible to identify important factors of the practiced business model. The business model building blocks related to the app store features and policies appear to be associated with the value side of the business model canvas (Osterwalder & Pigneur, 2010, 49). Thus, these factors are analyzed, leaving the efficiency side out of the scope in this study. Moreover, by simply delineating whether a single feature or policy is implemented in the

Table 17 The interrelatedness between the app store features and policies, and the theoretical framework of this study

	Business model building block (Osterwalder & Pigneur, 2010)	Platform/two-sided market/app store literature
Features		
User focused		
app findability	• value proposition for users	congestion and search optimization (Evans & Schmalensee, 2007)
app quality	• value proposition for users	quality of the app store (Kouris & Kleer, 2012)
app store usability	• value proposition for users • channels	reducing transaction costs (Evans & Schamalensee, 2007; Evans, 2009); quality of the app store (Kouris & Kleer, 2012)
Developer focused		
feedback potential	• value proposition for developers • value proposition for users	quality of the platform (Hagiu, 2011)
monetization potential	• value proposition for developers • revenue streams	mobile application revenue models (Gans, 2012); developer participation and satisfaction (Kim, Kim & Lee, 2010)
app store usability	• value proposition for developers	developer focused APIs and SDKs (Parker & van Alstyne, 2010); developer participation and satisfaction (Kim, Kim & Lee, 2010)
visibility	• value proposition for developers	-
Policies		
User focused		
app quality	• value proposition for users	quality of the platform (Hagiu, 2011); controlling access and quality (Boudreau & Hagiu, 2009)
developer quality	• value proposition for users • revenue streams	quality of the platform (Hagiu, 2011); quality of the app store (Kouris & Kleer, 2012)
Developer focused		
monetization potential	• value proposition for developers • revenue streams	revenue share and pricing policies (Gans, 2012); platform pricing (Rochet & Tirole, 2003; Armstrong, 2006); protect your main source of revenue and profit (Gawer & Cusumano, 2008)
openness	• value proposition for developers	multi-homing (Evans & Schmalensee, 2007); protect your main source of revenue and profit (Gawer & Cusumano, 2008); platform openness and control (Boudreau & Hagiu, 2009)
visibility	• value proposition for developers	-

particular app store is not sufficient to indicate the utilization of a certain business model or strategy. Thus, the formed app store constructs are analyzed comprehensively and the actual implications are drawn by looking at the app stores as a whole.

3.3 Case studies

For the purposes of this study six distinct cases were chosen representing two different types of players in the mobile app market ecosystem: keystone players, and niche players. The selection criteria for the cases included three main factors: the app store has to be international; it has been relatively successful; and it is accessible through the devices in use. Thus, even when there are multiple notable app stores in Asia, they were left out due to difficult accessibility and an impenetrable language barrier. The choices for the keystone cases were easy: the chosen companies are among the top international players in the Android app store markets. For the choices of the niche players, on the other hand, an extensive research on third party app stores was conducted in order to find suitable units of analysis. The choices are motivated briefly in the next two paragraphs followed by in depth analyses of each case in the subsequent subchapters. Lastly, the case study analyses and the case study databases as well as the cross-case analysis table are presented in Appendixes B to H.

As for all the keystone players, namely Google Play, Amazon Appstore for Android, which will be later on referred to as Amazon Appstore, and Samsung Apps, their core business is outside the app markets. Google is in charge of the biggest advertisement engine in the world, Amazon runs probably the most well-known retail web store in the world, while Samsung makes an impact as the number one smart phone manufacturer. All of the chosen keystone companies are market leaders in their respective core businesses, and have noticed the potential of mobile app markets and decided to join the competition. However, it is worth mentioning that joining the app store business did not just emerge from nowhere and it is a logical and justified strategic move for all of them. All of the three are more or less tied to devices. Google is the developer and owner of the Android operating system and in addition it has its Google Nexus device brand manufactured by partner companies as well as its own wearable devices, such as Google Glass. Similarly, Amazon has its own Kindle Fire tablet family, and, as mentioned earlier, Samsung has its own device line as well, featuring all kinds of devices ranging from smart phones and tablets to TVs.

Neither SlideME, Soc.io Mall, nor Yandex.Store have their own devices, but they rather partner with ones who make them. All of the three have a number of original equipment manufacturer partners, also known as OEMs, who they are providing with either branded or unbranded app stores. As a number of considerably smaller OEMs is concerned, the leverage these niche players impose over them, or over the developers for that matter, is significantly lower than what the keystone players enjoy. Furthermore, the keystone players are

competing head-to-head with each other, while the niche players watch the fight from a distance. The above mentioned factors determine different premises for these two types of players, which naturally also have an impact on the business models and strategies practiced by them.

3.3.1 Google Play

Google Play, formerly known as the Android Market, is Google's own application store which is preinstalled as the main marketplace on the majority of the Android devices. Google Play's free applications are available in over 140 countries, whereas priced applications are available in over 130 countries. Google Play houses over one million application titles surpassing Apple App Stores' 900 000 applications in July 2013 and has thus become the largest app store in the world (Phonearena.com, 2013). Google Play is not only the largest app store in the world in terms of the application offering, but also in terms of the active user base. In May 2013 Google Play reached 2.5 billion monthly downloads making it by far the largest Android app store in the world (Venturebeat, 2013). By being the owner and the main developer of the Android operating system, Google enjoys a significant advantage and leverage in distributing its app store. Nevertheless, as Android is an open source based system it is possible for device manufacturers to dismiss Google Play and provide an alternative application store, should they want to.

Google Play retains the largest offerings in the world in terms of the number of the applications, as was mentioned earlier. In addition to mobile applications, Google Play offers various other forms of digital content including music, books, magazines, movies and TV shows. Most of the different content types are available only in selected geographical markets. Google Play features a generic application discovery system consisting of user reviews and ratings, category browsing, search functions, top charts and lists, as well as features and staff picks. Furthermore, Google has embedded its own Google Wallet payment system to the Google Play, providing easy and secure payment for consumers. In addition to credit card payment, available payment methods include direct carrier billing, gift cards, and stored value on Google Play. Options for application pricing include free, priced, subscription based, and in-app purchasing.

Google exhibits no application screening prior to publication, but rather scans the applications retrospectively utilizing its own search algorithms. This reduces costs but at the same time it has allowed low quality applications to its offering. As of late, however, Google has put in some effort to clean up its offering. In February 2013 Google cut over 60000 low quality applications from Google Play in an effort to reduce spam and ad placement abuse (Perez, 2013). While openness on the developer side certainly attracts more participants, it has also reportedly led to lower quality. However, a question has been raised if the algorithms used for application screening will improve over time and eventually bypass the need for human-made evaluation (Perez, 2013). In the meantime

consumers may still be overwhelmed by the huge offering, while suffering from low quality products.

Google Play charges a $25 registration fee from the developers. This is significantly low compared to, for example, Google Play's biggest cross operating system competitor, Apple's App Store, which charges its developers an annual fee of $99. Furthermore, the low entry fee and the above mentioned lack of pre distribution screening have been connected to the lower quality of products in Google Play. Nevertheless, Google Play is the only Android app store from the case study group that charges developer registration fees. Google Play's policies force developers to use Google Wallet in in-app purchases in products distributed through Google Play. This is evident given the popularity and profit opportunities generated by the free-to-play pricing model where most of the profits are made from in-app purchases. Google Play withholds 30 % transaction fee from all the payments including application purchases, in-app purchases and subscriptions. In addition to the payment solutions, Google has harnessed its powerful search engine and offers the utilization of AdMob mobile advertising system through an API.

However, probably the biggest strength of Google Play are Google's own proprietary applications and services it entails. If developers choose to leverage Google Services in their apps, they are effectively locked in to Google's domain, as they do not work outside Google's Android. Google manages its licensed Android partners through Open Handset Alliance (OHA). Members of OHA are prohibited to produce devices that run incompatible versions of Android, and only the members of OHA are allowed to install the Google's Android to their devices (Rubin, 2012). Thus, Google Play, among other Google's services, is not available for a large number of OEMs who are not licensed with OHA. As we are talking about immensely popular end-user services, such as Gmail, Hangouts, YouTube and Google Play, users of non-Google Android devices miss on a lot. Similarly, developer focused proprietary services include maps, in-app billing, wallet, Google+ social media, analytics, cloud platform, cloud messaging services, and multiplayer game services – all of which are able to bring significant value for developers and which will not work on non-Google licensed devices. Moreover, Google has brought its services available for iOS developers as well so they can be easily integrated with iOS apps.

Google's core business is advertising and Google Play is one cog in the machine as it offers a new channel to utilize the advertising system. As it happens, for the time being mobile advertising is the most popular form of monetization in the Android mobile applications and the advertising field is currently being dominated by Google services (Vallina-Rodriguez et al., 2012). Google has been staircasing its offering in the ecosystem level and the same applies in the product level as well. It has added complementary forms of monetization as well as features that developers can utilize in their apps. By intelligently creating more value for developers while at the same time locking them in, it has managed to create more value for the users as well.

3.3.2 Amazon Appstore for Android

Amazon is probably best known from its position as a world's largest e-commerce retailer. Amazon started off with focusing on books, but soon diversified to other consumer products as well. In addition to retailing, Amazon also offers cloud services. Following the success of its e-reader, Amazon Kindle that was introduced in 2007, Amazon launched its Android app store in March 2011 followed by the Android tablet line Amazon Kindle Fire in September that same year. While open for download to all Android devices, Amazon Appstore serves as the pre-installed exclusive app store in the Amazon Kindle Fire tablets dismissing Google Play. Amazon Appstore is currently available in nearly 200 countries.

Soon after the launch of Amazon Appstore in 2011, International Game Developers Association (IGDA) published an open letter regarding Amazon Appstore's distribution terms (IGDA, 2011). IGDA was concerned about Amazon Appstore's policy that prohibits developers from offering their applications for lower price on similar services (competing app stores) than in Amazon Appstore in countries that are served by Amazon Appstore. Thus, Amazon Appstore practices a kind of "price guarantee" strategy. According to IGDA, such policies are unfair towards developers and should not be exploited. Another controversial, but at the same time probably Amazon's most differentiating feature, is the Free app of the day feature, where a chosen paid app is offered for free and changes every day. In their distribution agreement, Amazon reserves rights to choose any submitted app to be featured in the Free app of the day campaign leaving no say to the developers. Nevertheless, the feature is a good reason for users to return to the store every day.

Following the de facto standard, Amazon pays the developers 70% of the marketplace list for all sales, including in-app purchases. Application pricing options include free and paid, with in-app purchases and subscriptions being supported. In addition to the traditional payment methods, Amazon has launched its own virtual currency, Amazon Coins, which can be utilized by the developers. Furthermore, Amazon offers a discount for Amazon Coins when bought in larger batches.

Leveraging its wide retail web store user base, Amazon app store was published as a kind of an extension to the main web store. Thus, all of the existing users and their payment information are transformed to the app store as well. Amazon's marquee 1-click purchase feature allows consumers to purchase a product with literally by one click only, making it apt for impulse purchases.

Unlike in Google Play, there is no registration fee for the developers, but the submitted application has to go through an approval process prior to being accepted to be published in the Amazon Appstore. For the developers, Amazon offers its own mobile developer SDK, which includes a number of APIs that developers can utilize, such as in-app purchasing, advertising, maps and cloud messaging APIs. In addition to the traditional app monetization tools, Amazon

offers the developers an option to sell Amazon retail products through their apps utilizing Mobile Associates API and to gain a revenue share of up to 6%.

The newest addition to Amazon's developer focused services is Amazon Appstore Developer Select program, where the selected developers are rewarded by getting visibility in the Amazon's ad network while the users of those apps get discount when purchasing in-app items with Amazon Coins. Moreover, selected developers get discount on the Amazon Web Services products. The program is targeted solely on high quality apps that utilize Amazon services and are compatible with Kindle Fire tablets. With this move, Amazon aims at providing high quality content and value to its tablet users while offering developers more visibility and a chance for better conversion.

3.3.3 Samsung Apps

According to a report by Gartner (2013), Samsung sold over 71 million smart phones during the first half of 2013 alone and is the number one manufacturer with over 30% market share. Samsung Apps is pre-installed alongside Google Play and Google Services on Samsung smart phones and tablets, and it is only available for the Samsung devices. Samsung Apps is available in 125 countries, but paid content is accessible in 65 countries. In addition to its applications, Samsung also has a service called Samsung Hub which offers videos, books and music content. Although exterior to the actual app store for the time being, it remains to be seen if Samsung will merge the Samsung Apps together with its video, book and music offering, similar to what Google Play has done.

Samsung is a Google licensed device manufacturer so all the Google's apps and services are available for the Samsung device users. However, that has not kept Samsung from developing its own set of products that are equivalent to Google's proprietary services and apps. While Samsung has not stated the reasons behind these actions, a rumor has it that they are done either because of fear of being detached, or because of hope of Samsung detaching itself from Google's Android at some point in the future.

Samsung Apps offers most of the basic user-focused functionalities, while lacking only a user-based recommendation system and a review quality curation. Samsung offers the basic app monetization options, including in-app purchases and advertisement. Moreover, Samsung gives away free gift certificates along with some of its high-end devices, so that users can buy applications from Samsung Apps for discounted prices.

Samsung Apps does not charge a registration fee from the developers, but it is also the only one of the case app stores that requires developer identification upon payout. Furthermore, all the submitted apps will go through an extensive manual reviewing process before they can be published. The latter two actions can be seen as efforts to improve application quality. Moreover, various developer tools and extensive documentation is provided. Like Google Play and Amazon Appstore, Samsung Apps too tries to make it as easy as possible for developers to adopt its tools. Furthermore, in order to market its new devel-

opment technologies and tools, Samsung has organized multiple developer challenges to leverage the new technologies introduced in its devices. The competitions have enabled Samsung to get developers invested in its new technologies. In addition, it has been able to offer applications that utilize the new technology upon the launch of the devices that support the particular technology. In addition to the competitions, Samsung also organizes its own developer conferences.

3.3.4 SlideME

By being one of the first Android app stores in the business, SlideMe claims to be the largest independent Android app store in the world and second after Google Play in terms of global reach. SlideME is partnering with over 140 OEMs, while targeting especially OEMs that leverage Android Open Source Project (AOSP) and cannot thus install the proprietary Google services in their devices. SlideME alleges to hold over 50% reach on non-Google Android devices.

SlideME is available worldwide and offers over 21000 applications in multiple categories. SlideME storefront is accessible from the web browser or through the native app. Like all case app stores, SlideME entails all the core functionalities and features of an app store. In addition to all the common features, users may invite their friends to join SlideME. Furthermore, users can also post questions and suggestions to developers, as each published app has its own dedicated discussion section. However, the discussion section is only accessible through the web browser version.

SlideME provides white label app store solutions for its partners, thus enabling them to use their own brand. Moreover, SlideME's partner app store solution can be integrated with a carrier billing system in addition to its own payment methods, which is a valuable option for mobile network operators, for example. The vast partner network is probably SlideME's most valuable asset in terms of its app store distribution and coverage.

SlideME offers all the common app monetization options, including paid, free with in-app purchases, and advertising. Developers are able to get detailed sales statistics as well as information about contracts from the developer console, but may also utilize an analytics API to fetch information, for example, about their app downloads and installs. Moreover, SlideME offers an option to apply for a SlideME MasterCard, a credit card aimed at developers to speed up the payment process and lessen transaction costs.

SlideME provides users a decent offering of apps and features with multiple payment options. For developers it offers a possibility to monetize their apps in various ways while reaching a vast audience in markets where Google Play is not available through its affiliate stores.

3.3.5 Soc.io Mall

Run by a Maltese company Giga Market Ltd., Soc.io Mall is an independent app store and is pre-installed on over five million Android devices worldwide. Similar to SlideME, the Soc.io Mall app store can also be downloaded through Soc.io Mall's website and can be installed to any Android device. Soc.io Mall houses 7000 apps, 3000 games, and 38000 free e-books that are accessible through Soc.io Mall's own e-reader app, Soc.io eReader. Furthermore, following the current trend of converging content, Soc.io Mall is looking to include music, video and audio books to its offering in the near future.

From a user's point of view, the app store's storefront is generic and offers the common functionalities including categories, app searching and top rated apps. When compared to other case stores, Soc.io Mall's app offering is rather small in terms of volume. Moreover, only a few blockbuster apps that are familiar from other big stores are published in Soc.io Mall. One possible reason for this is the lack of in-app payment system. Soc.io Mall is the only one of the case stores that lacks its own in-app purchase system. When enquired about the matter through email, the answer is that they still support third party payment systems and encourage developers to use the in-app billing system of one of their partners, Fortumo's. Likewise, Soc.io Mall does not offer any APIs or SDKs for its developers to use. Thus, the only monetization option Soc.io Mall directly supports is paid apps. However, developers may utilize third party systems at will.

Also similar to SlideME, Soc.io Mall offers its distribution partners a possibility to tailor the Soc.io Mall to best suit the partners' needs. Options for this include the co-branding and the localization of the app store. Soc.io Mall retains a share from the revenues produced by its OEM partners' app stores.

Soc.io Mall is a channel for developers to publish and offer their apps for niche groups using non-Google devices. Due to the relatively low amount of apps available, however, it is significantly easier for developers to get their apps featured in Soc.io Mall when compared to bigger stores, such as Google Play with its 900 000 apps. Moreover, with 80/20 revenue share in favor of developers, Soc.io Mall is the only case app store which offers better than the de facto 70/30 split in the revenue share. In addition, developers may use their own in-app payment systems, meaning they don't have to forfeit any revenue share gained from in-app purchases.

3.3.6 Yandex.Store

Launched in February 2013, Yandex.Store is the app store of the "Russia's Google", Yandex. Due to the fast growing smart phone usage in Russia and Russian speaking territories it may soon grow to be a force to reckon with in the app store markets despite its relative newness. Like Google, Yandex's best known product is its search engine. Similarly, Yandex's core business is advertising, with 97% of Yandex's revenues generated by its advertising network

(Yandex, 2013a). Yandex plays a significant role in search engine markets generating 62% of all search traffic in Russia and holds a spot as a top 5 search engine in the world. Yandex offers its device manufacturers and mobile operator partners an opportunity to preinstall the app store to their devices with no cost and to receive a share of the revenue produced. Furthermore, the device partners have an option to re-brand the store for their purposes. Yandex.Store is preinstalled on a number of partners' devices, including, for example, one of Russia's largest mobile operators, MegaFon (Yandex, 2013b).

Yandex.Store houses over 50000 apps for the time being, the app offering including many blockbuster apps from well known publishers. Furthermore, it is worth mentioning that Yandex.Store claims that all of the apps it is offering are scanned with Kaspersky security tools – a subtle value proposition regarding security not offered by none of the other case app stores. The end-user side of the Yandex.Store is polished and offers generally the same functionalities as all the other case app stores. Yandex offers two main payment options: credit card payment for international users, and Yandex.Money payment system for its Russian customers. Yandex.Store supports both free and paid apps, including in-app purchases.

The plain appearance of the developer console together with the lack of developer tools and documentation suggest that Yandex.Store is not joining the API war, but is instead settling for being a "just another channel". Given the situation, it might be an advised strategic choice. By relying on One Platform Foundation's app description file and open in-app billing API, Yandex aims at making the app publishing for developers as effortless as possible. While Yandex offers a wide array of service APIs, there is no direct documentation and support for its mobile developers. However, the reason behind this might be the fact that Yandex itself is developing and publishing mobile applications based on its own services, including maps, navigation, email, weather, and shopping apps among others. While Yandex.Store advertises itself as an international app store, Yandex's strong presence in Russia and its wide partner network makes it perhaps the best channel for international developers to access the emerging Russian app markets. The additional payment option for the Russian users and the Russian-only ad network add more value for its Russian users as well as for developers. Offering mobile apps that can utilize mobile advertisement, Yandex.Store can be seen as a new channel to bolster Yandex's core business.

3.4   Cross case analysis

In this subchapter, a cross-case analysis is conducted by combining and discussing the six case app stores presented earlier. The analysis and the comparison is conducted by pointing out anomalies in individual cases, as well as by identifying similarities between the two types of players, and between the case app stores altogether. The structure of the analysis roughly follows the order of the

app store features and policies presented in the analysis framework and the consequent cross case analysis table. The findings are contemplated from the business model point of view, while reflecting briefly on the associated strategic decisions. Moreover, differences and emerging patterns between keystone and niche players are discussed separately. A sample of the feature and policy evaluation in the cross case analysis is presented in Table 18.

Table 18 Sample of the feature and policy evaluation in the cross case analysis table

Developer focused: monetization potential	Google Play	Amazon Appstore	Samsung Apps	SlideME	Soc.io Mall	Yandex.Store
affiliate program	no	yes	no	no	no	no
affiliate stores	no	no	no	yes	yes	yes
component offering	no	no	no	no	yes	no
discounts	no	yes	yes	yes	no	no
in-app advertising	yes	yes	yes	yes	yes	yes
in-app billing	yes	yes	yes	yes	no	yes
licensing integration	yes	yes	yes	yes	yes	no
social media sharing	no	no	yes	yes	yes	no
subscriptions	yes	yes	yes	no	no	yes
volume pricing	no	no	no	no	no	no

Google Play entails the widest array of features and policies implemented among the cases, with Amazon Appstore, Samsung Apps and SlideME following close behind. The other two niche players, Soc.io Mall and Yandex.Store, have implemented a significantly lower amount of features and policies in general. While Yandex.Store lacks developer focused usability features, Soc.io Mall has deficiencies in developer focused usability and user focused app quality features. The number of the features and policies implemented by the case app stores are presented in Table 19. The green color indicates the number of features or policies in the certain category being closer to the highest number present in the particular category, while red indicates the number being closer to zero. The table only comprises the features and policies that are easily quantifiable in terms of the unit being implemented or not. Thus, for example the geographical availability is not included in the table. It should be noted that the above table includes merely the number of features and policies implemented by the case app stores. It does not take a stand on the quality of the features and policies implemented, or on the importance of the particular features and policies. Moreover, as was mentioned earlier, single features and policies alone are not enough to determine the degree of quality or the business model of the app store. It should also be noted that the above table is not sufficient to draw any conclusions on itself. Instead, the constructs were examined as a whole, while utilizing the literature and the sources of data in the case study databases. The cross case analysis table as a whole is presented in Appendix H.

Table 19 Features and policies implemented by the case app stores

Features and policies	Google Play	Amazon Appstore	Samsung Apps	SlideME	Soc.io Mall	Yandex. Store
Total	59	55	57	54	43	42
Core features	15	15	15	15	15	14
User focused features						
app findability	2	2	1	1	2	1
app quality	7	6	6	4	1	4
app store usability	10	8	8	7	5	6
Developer focused features						
feedback potential	2	1	0	2	0	0
monetization potential	4	6	6	6	5	4
app store usability	7	7	7	7	4	4
visibility	2	2	3	2	2	2
User focused policies						
app quality	4	4	5	4	4	2
developer quality	0	0	1	0	0	0
Developer focused policies						
monetization potential	3	1	1	3	2	2
openness	3	3	4	3	3	3

The core app store features are present in all of the studied app stores. Generally, all of the app stores have rather polished storefronts. Moreover, all of the app stores support at least two payment methods for the end-users and in multiple languages. The user focused features implemented are pretty similar in all of the case stores. Furthermore, the designs of the storefronts have significant similarities among several of the case app stores. All of the case stores have harnessed users to curate the apps by themselves in terms of rating apps, writing reviews and curating each other's reviews. That being said, providing the user focused features and functionalities is probably the easiest and cheapest way to improve the quality of an app store. Likewise, all of the app stores enable the use of tags and categorization for the developers.

What comes to the quality of the applications, manual curation is practiced in all of the app stores, except in Google Play and Yandex.Store. Google Play, however, automatically scans its apps for malware, spam, and overall non-compliancy. If criticized, it can be argued as being a reasonable and a cost efficient form of curation given the huge number of the submitted apps in Google Play. Yandex.Store, on the other hand, does not exert any form of app curation, other than scan for viruses and malware. The developer focused feedback related features are effectively non-existent among the cases. One reason for this could be the cost of curation of such systems. Furthermore, there is no evidence whether users value these kinds of features or not, and whether they would even be interested in making a contribution. Furthermore, the developer registration is free in all of the app stores, except in Google Play, which charges a one-time fee of $25. Similarly, no developer identification is required, except

for Samsung Apps, which requires an identification if the developer wants to sell paid apps.

Extended user profiles are provided by two of the cases, Google Play and Amazon Appstore, who both have connected the user profiles from other services, Google+ and Amazon web store respectively, to their app stores. Two of the case app stores, Google Play and Soc.io Mall, have bundled their app stores directly with additional content, such as e-books and music. However, Samsung and Amazon offer these kinds of services separately as well, but have not integrated them directly with their app stores. Just a few years ago, e-books were the only digital content Amazon provided, while Google was focusing only on the distribution of mobile apps. By bundling the services of their competitors, they are looking to utilize envelopment.

None of the app stores offer an option for volume pricing. This might be due to the popularity of free-to-play games and the recession of paid apps. Nevertheless, the absence of such feature stands out, since similar bundling pricing has been very popular in the PC gaming platform Steam and has even led to a whole business model, as is the case with Humble Bundle and Indie Royale, for example.

3.4.1 Channels

All of the case stores have their app stores pre-installed on some devices. It can be argued that it is also the most important channel in terms of user reach, and the device integration may also lead to customer lock-in (Gonçalves et al., 2010). As for Google Play, Amazon Appstore and Samsung Apps, they all have their own devices. While Google is not a device manufacturer per se, it still holds some of the same privileges and perks, because of its influence in the Open Handset Alliance, which is effectively the closed circle of companies that are allowed to use Google's Android. SlideME, Soc.io Mall and Yandex.Store, on the other hand, try to get more coverage by expanding their affiliate partner networks. Thus, it can be argued that in addition to the users and the developers, these app stores also have a third customer segment, affiliate partners, which is an important part of their business model. Although, it should be noted that Google also has its own affiliate network through the Open Handset Alliance, but for the most part the process is the opposite, as the device manufacturers try to get their devices licensed by Google. Furthermore, the data suggest that the case app stores accept the developer multi-homing, as none of the app stores prohibit it.

3.4.2 Revenue streams and related policies

The monetization options offered to developers are generally good. All of the app stores allow in-app advertising, with some of the stores offering their own advertising systems. Moreover, third party in-app advertising is also allowed by all of the case app stores. Generally, the developers may decide the prices for

their apps by themselves. Amazon Appstore is the only app store exerting any control over this, as it prohibits its developers from selling their apps for lower price in any other competing app store than what they cost in the Amazon's store. In addition to the traditional app monetization techniques, Amazon leverages its core business, the retail web store, and has introduced an additional source of revenues by offering the developers an option to sell Amazon's products in their applications through an affiliate program.

According to an app analytics firm App Annie (2013), in October 2013 7 out of 10 of the best grossing Google Play apps in the United States are free-to-play games, with two of the remaining three being gambling games. With most of the top grossing apps being free-to-play game titles, lacking an option for in-app purchases is a huge disadvantage as the app stores usually take the common 30% cut off of the in-app purchase revenues as well.

These revenue streams are guarded with a set of policies prohibiting or limiting the use of services that offer competing functionalities. For example, none of the app stores allow the distribution of competing app stores through their channel. Furthermore, most of the app stores have strict policies regarding the use of in-app billing system in the applications published in their stores. Google Play only allows third party billing systems when physical products are sold through the application, and thus, for example, free-to-play games still have to utilize Google's own in-app payment system. SlideME is an exception in this matter: even though it has its own in-app billing system, it does not force the developers to use it. Finally, Soc.io Mall is the only app store that does not offer any in-app billing system and thus also allows the use of third party systems.

3.4.3 Developer tools

The most significant watershed between the keystone players and the niche players is the utilization of the developer focused APIs, SDKs and services. Table 20 exhibits the differences of API offering between the case app stores. When compared to the niche players, the three keystone players offer a significantly wider array of tools for the developers. Some of the APIs are designed to offer such value that cannot be easily replicated by competing app stores and may thus possibly cause a lock-in. Oftentimes these tools are only to be used in applications published in the particular app store. However, it is arguable whether developers are interested in using such tools, especially if it eliminates the possibility of multi-homing. All of the keystone players offer an extensive documentation regarding the SDKs and APIs they offer. App stores try to make it as convenient as possible for developers to utilize their tools. For example, Amazon provides a detailed documentation on how to implement their in-app purchase system if the developers have previously used Google Play's in-app billing system. Furthermore, companies promote their SDKs and APIs various ways. For instance, Samsung organizes developer competitions with monetary

Table 20 Examples of developer targeted APIs, SDKs and services offered by the case app stores

	Google Play	**Amazon Appstore**	**Samsung Apps**	**SlideME**	**Soc.io Mall**	**Yandex Store**
In-app billing	x	x	x	x		x
Advertising	x	x	x	x		(x)
Analytics	x			x		(x)
Social Media	x					
Cloud platform	x	x				(x)
Cloud messaging	x	x				
Wallet	x		x			
Maps	x	x				(x)
A/B Testing		x				
Multiplayer games API	x	x				
Affiliate program		x				
Instant messaging	x		x			
Local device communication			x			

x = APIs targeted directly to mobile devs; (x) = APIs not targeted directly to mobile devs.

rewards and Amazon has its own developer program offering various incentives for the participating developers.

4   CONCLUSIONS

The purpose of this study was to explore the business models and strategies practiced particularly by the app stores in the Android operating system environment. An array of app store features and policies by Jansen and Bloemendal (2013) was used as a framework when gathering data for the case studies. The first research question aimed at discovering what kinds of business models are utilized by the Android app stores. This is answered in the following three paragraphs. The second research question concerned how the strategic choices in terms of openness and control reflect to the app store platforms. Implications on the second research question are discussed in the following five paragraphs, excluding the second.

While the general app store business model in itself is a rather generic adaptation of a platform business model and follows the core competencies proposed by Gonçalves et al. (2010) for the most part, a few patterns stood out. First of all, as app store revenues rely on the revenue share, app stores have tackled this by providing the developers multiple tools for monetization. Furthermore, this is fortified by controlling policies that prohibit the use of third party systems that could possibly lead to revenue losses for the app store. Protecting the main source of the revenue and the profit is a part of the coring strategy, as suggested by Gawer and Cusumano (2008). This is especially important in in-app payment systems as it may bear very distinct implications on the revenue streams. For example, a Finnish mobile game company Supercell reportedly made 2.4 million dollars per day with only two free-to-play games (Strauss, 2013). To be able to get a revenue share from such blockbuster applications is a very significant source of revenues for an app store. Moreover, app stores generally prohibit the linking to and the distribution of competing app stores. In addition to pricing, regulations and control both play a major role in app store business models. These are in line with the findings of Boudreau and Hagiu (2009).

Secondly, app stores naturally aim to provide convenience for the users. The user focused features aim at making the overall use of the app store, and the possible transactions, as frictionless as possible. These are tackled by, for

example, making the app installation process as easy as possible, and providing multiple payment options. In addition, app stores provide reasonable security features. However, a notable observation concerns the generic appearance and features of the user side storefronts and the in-efficiency of app discovery, which stands out particularly in the app stores which offer a very large number of apps. A similar observation in other study suggests that better app recommendation systems should be implemented (Petsas et al., 2013). This is further consolidated by the finding, that app markets are not necessarily effective long tail markets revenue wise, but are instead dominated by few blockbuster apps (Zhong & Michahelles, 2013). Improvements in the user focused app discovery could lead to increased revenues. These factors could be further examined in future research.

Thirdly, app stores try to reach more coverage through the device integration. While three of the keystone players have devices, all of the niche players compensate this by forming partnerships with OEMs. It can be argued that the device integration has a crucial part in achieving the customer lock-in in app store markets. Moreover, as all of the case app stores prohibit the distribution and marketing of competing app stores through their channels, alternative app stores are usually downloaded through websites. This is arguably not the most convenient way for the users to discover and download the app store application. It can be hypothesized that most of the smart phone users settle for the app store which has been pre-installed on their devices. However, no research exists on that subject. Thus, further research concerning the importance of device integration in app store adoption is suggested.

The third research question of this study concerned whether there any differences in business models between keystone players and niche players. This is addressed in the present and the subsequent paragraphs. Especially the keystone players have taken steps towards the envelopment strategy in terms of bundling different services together to attract more users and to compete with other players. For example, Amazon and Google are kind of criss-crossing with their offering; the known e-book retailer Amazon joined the app business while Google is consolidating its app offering with e-books, among other content. Then again, these strategic moves seem rather natural. Thus, they are utilizing *follower advantage* and *staircase strategies* as proposed by Hidding et al. (2011). However, these can be comprehended more as ecosystem strategies, even though they are connected to app stores.

Among the cases, the main difference between the keystone players and the niche players is the extent and quality of value proposition to developers in terms of SDKs and APIs offered. The extensive implementation of developer tools by app stores can be comprehended as both value creating and controlling actions. Developer tools simplify tasks for the developers and add functionalities that otherwise would be hard to imitate, and thus create value. On the other hand, app stores are trying to lock-in the developers by offering features that are only usable in the respective app store. Furthermore, app stores utilize incentives in order to attract more developers. In addition to the use of the devel-

oper tools, another notable difference between the two groups of the case studies is the partnerships formed by the niche players. Thus, it can be argued that the keystone players try to consolidate their positions through enveloping and implementing APIs and SDKs, while the niche players try to sell their products to niche markets. These findings are in line with those of Kouris and Kleer (2012). Moreover, it should be noted that effectively all of the controlling actions done by the app stores are focused on the developer side.

In addition, few outstanding observations regarding the app store markets were made and are discussed next. Firstly, it can be stated that the mobile app stores have emerged as important gaming platforms and in that regard challenge the traditional gaming platforms, namely gaming consoles and PCs. Thus, comparing these two might be feasible. Firstly, as was noted in the cross case analysis section, none of the app stores offer an option for volume pricing or a bundling option for the developers. The reasons behind this might include the pricing structure of the apps, namely the rising popularity of free-to-play games. Another possible reason for this is the fact that Android users are found to be less likely to pay for applications (Graziano, 2013). Then again, bundling has been proven to be a successful concept for software application distribution and, for instance, is utilized by the PC gaming platform Steam. However, Humble Bundle, for example, which has built its whole business model on bundling, has proven bundling to be feasible in the mobile environment as well.

Secondly, whereas first party content offered by the platforms is used as a competitive leverage by the traditional gaming platforms to attract more users, the utilization of first party content in mobile app stores is effectively nonexistent. One reason might be the lesser cost of development and the easier and more cost-efficient porting to other platforms. Moreover, the prices of the mobile applications are significantly lower than those of traditional gaming platforms. However, there might be agreements made between some app stores and developers regarding the publishing of certain applications, but at least the app stores do not utilize first party content in marketing and customer acquisition purposes to the same extent as it is utilized by the traditional gaming platforms. Nevertheless, more research on the subject is suggested.

Thirdly, the absence of the developer feedback possibilities offered by the app stores stood out. One reason for this lack could be that many developers host their own dedicated forums for their apps, so forums provided by the app store are not necessarily needed. Furthermore, given the large number of applications in the app stores, providing forums for every single application would entail significant curation and maintenance costs for the app stores. This too can be compared to the PC gaming platform Steam, where every game has its own dedicated forums. Then again, these are two totally different platforms, mobile and PC. The utilization of forums has been a part of the PCs since the beginning of the Internet, but has not translated to mobile environment. Furthermore, the difference in the number of applications in mobile app stores and PC platforms, such as Steam, is huge. However, all of the three examples have been successful

in other application platforms but have not quite translated to the mobile platforms.

Finally, due to the huge number of applications offered in app stores in general and the subsequent inconvenience in app discovery, a question arises whether so called premium app stores, where only a limited number of high quality applications would be offered, could emerge as a viable business model. Furthermore, two big messaging platforms, South-Korean KakaoTalk, Japanese Line and Chinese WeChat, have transformed from messaging services providing chat apps to game platforms utilizing the existing user base and leveraging the social aspects and network externalities provided by the core product. Further emergence of such players and their effect on app store markets remains to be seen.

As the limitations of this study, only six Android app stores were studied which is hardly enough to draw generalizations or to form waterproof theories. Furthermore, a qualitative case study is subjective to the researcher's observations by nature. Thus, replicating or complying research to confirm the findings of this study is suggested. However, auspicious patterns and consistency between the cases was noticed. As for the Android operating system and the competitive climate, more research on the niche app stores and their business models and strategies in general is needed. Furthermore, the reasons behind the gap between the keystone and the niche players regarding the implementation of developer tools are unclear and require more research.

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APPENDIX A: APP STORE FEATURES AND POLICIES

Core app store features (Jansen & Bloemendal, 2013)

Core feature	Descriptions
app categories	Apps are listed in categories and subcategories
app listing	Apps are listed with full description, images, etc.
app lists	Apps are listed, e.g. top selling lists or latest additions
dev app management	Devs can manage their apps in a developer console
dev transaction list	Devs can manage their transactions
distribution integration	Distribution and installation happens through platform
featured apps	Apps can be featured to receive more attention
free revenue model	Apps can be offered for free
paid revenue model	Apps can be sold
pay out methods	Number of pay out methods
payment methods	Number of payment methods
platform comp. filter	Apps have information on their platform compatibility
ratings	Apps can be rated by the user
reviews	Users can read and write reviews of an app
search	Users can search for apps using search keywords

User and developer centric app store features (Jansen & Bloemendal, 2013)

User focused: app findability	
recommendations	Apps are recommended based on user profile
store curation tags	Developers can tag and categorize their apps
User focused: app quality	
app security integration	An app platform security system is provided
app security reporting	Harmful apps and security threats can be reported
app test driving	Apps can be test driven before purchase
content rating filter	Apps are rated with a content rating
device compatibility	Apps can be filtered on device compatibility
remote app remove	Harmful apps can be removed by owner from device
user review curation	Users can curate each other's review
User focused: app store usability	
automated refunds	Users can apply for refunds
developer refunds	Developer can initiate refunds
device integration	Devices have the app store installed by default
multi language	App store is internationalized
multichannel dist.	Users can use multiple channels to acquire apps
multi-currency	Multiple currencies are supported
update integration	Automated updates are possible for the app
user app list	A list of apps downloaded or purchased by a user is available
user subscription list	A list of all content subscriptions of user is available
user transaction list	A list of all transactions made by a user is available
Developer focused: feedback potential	
app suggestions	Users can leave suggestions for new apps
app support forums	Each app has its own support forum
beta testing mgmt	Developers can invite beta testers for their apps
feature suggestion	Users can suggest features to apps

(Continues)

issue tracking	Users can report issues and track their progress
user profile	Users have extended user profiles
Developer focused: monetization potential	
affiliate program	Users can make money directing "traffic" to apps
affiliate stores	Apps are offered through other channels
component offering	Developers can also offer separate components
discounts	Apps can be temporarily offered at a discount
in-app advertising	Monetization can also be done through advertising
in-app billing	Users can purchase extra features and content in-app
licensing integration	License checking for illegally installed or acquired apps
social media sharing	Apps can be shared through social media
subscriptions	Developers can offer content subscriptions to users
volume pricing	Developers can offer volume pricing
Developer focused: app store usability	
data API	Developers can get data from the app store using an API
deployment integration	Developers can automate the deployment to the app store
dev contract mgmt	Developers can manage contracts with the app store owner
dev multi-user login	Multiple users can be added to a developer account
dev sales statistics	Developers have access to sales statistics
geographic targeting	Apps can be targeted to geographic regions
tax support	The app store applies legally required taxation
Developer focused: visibility	
cross selling	Associated apps are shown to the developer
developer app list	A list of apps made by each developer is available
developer profile	Developers have profile pages with details

User and developer centric app store policies (Jansen & Bloemendal, 2013)

User focused: app quality	
approval before publish	Apps are checked by the store owner for compliance manually
automated monitoring	The app store uses an automated system to check for apps that do not comply
code quality curation	The quality of the code of apps is checked
functional quality curation	The functional quality of apps is curated by the owner
interface quality curation	The owner checks apps for compliance with interface guidelines
review after purchase	Reviews for an app can only be posted by users that have downloaded or purchased the app
review poster verified	Users that are verified by the app store owner can post reviews
User focused: developer quality	
developer verification	Developers have to prove their identity to the app store owner before receiving payments
recurring fee	A recurring fee is required to be a developer at an app store
Developer focused: monetization potential	
pay-out delay	The delay between the payout and the last day of the scheduled date range
pay-out schedule	The schedule payment schedule of the revenue share of the sales to the developer
pay-out threshold	The minimum amount required to be eligible for a payout
price control	The party that can control the price of an app
revenue share	The percentage revenue share that goes to the developer
third party app stores	Apps are allowed to reference other app stores
third party in-app advertising	Apps are allowed to use third party in-app advertising
app store refunds	The app store owner has a clear refund policy and provides refunds on request of a user
third party in-app billing	Apps are allowed to use a third party system for in app purchases
Developer focused: openness	
competing functionality curation	Apps that have features that compete with the app store owner are not approved
custom licensing	Developers can provide their own custom EULA, not limited by the app store owner
guided licensing	The app store owner provides and enforces guidelines for EULAs
open source licensing	Developers can use open source licenses to publish their apps
Developer focused: visibility	
geographical availability	The number of countries an app store is available in

APPENDIX B: GOOGLE PLAY

Google Play Analysis

Google Play	Status	Sources	Notes
Core feature			
app categories	yes	6,31	
app listing	yes	6,32	
app lists	yes	6,31	
dev app management	yes	7,53	
dev transaction list	yes	9	
distribution integration	yes	13	
featured apps	yes	6,37	
free revenue model	yes	4,7	
paid revenue model	yes	4,7	
pay out methods	2	21,46	Bank Wire Transfer via Google Wallet Merchant Center and Google Checkout Merchant Center
payment methods	4	7	Credit card, direct carrier billing, gift card, Google Play balance
platform comp. filter	yes	45	Users are only shown content that is compatible with their mobile devices. However, the browser version of Google Play shows the platform requirements.
ratings	yes	6,34	
reviews	yes	6,34	
search	yes	6,35	
FEATURES			
User focused: app findability			
recommendations	yes	33	Recommendations are based on previous downloads and purchases.
store curation tags	yes	43	The tags are only shown while accessing Google Play through web browser
User focused: app quality			
app security integration	yes	52	Permission based security notification is prompted when downloading an app.
app security reporting	yes	4,38	
app test driving	partial	50	Developers may set a free trial period for subscription based apps.
content rating filter	yes	2,3	Users may define the level of content filtering
device compatibility	yes	8	
remote app remove	yes	5	
user review curation	yes	40	Users can vote reviews and comments up or down, or report them as spam
User focused: app store usability			
automated refunds	yes	5,21	After purchasing an app or game on Google Play, user can return it within 15 minutes for a full refund

developer refunds	yes	17	
device integration	yes	47,48	Google play is preinstalled on supported Android devices.
multi language	yes	10	
multichannel dist.	yes	32,43	Either through native app or web browser
multi-currency	yes	7	
update integration	yes	11	
user app list	yes	36	
user subscription list	yes	25	User can access his subscriptions through Google Wallet
user transaction list	yes	25	User can access his transaction history through Google Wallet
Developer focused: feedback potential			
app suggestions	no		
app support forums	no		
beta testing mgmt	yes	26	
feature suggestion	no		
issue tracking	no		
user profile	yes	51	Commenting is linked to user's Google+ account
Developer focused: monetization potential			
affiliate program	no		
affiliate stores	no		
component offering	no		
discounts	no		
in-app advertising	yes	15	
in-app billing	yes	9,12	
licensing integration	yes	14	
social media sharing	no	24	Google Play provides several link formats that can be utilized, but does not provide a fully functional social sharing
subscriptions	yes	12	
volume pricing	no		
Developer focused: app store usability			
data API	yes	27	
deployment integration	no		
dev contract mgmt	no		
dev multi-user login	yes	9	
dev sales statistics	yes	9,23,54,55	Sales statistics and reports can be accessed through Google Wallet Merchant Center
geographic targeting	yes	8	
tax support	yes	20	Tax-inclusive pricing is supported in some countries
Developer focused: visibility			
cross selling	yes	3	Listing of apps
developer app list	yes	39	
developer profile	no		Google Play only provides a listing of apps published by a developer

POLICIES			
User focused: app quality			
approval before publish	no		
automated monitoring	yes	17,28	Google's "Bouncer" service. Automated tests, such as performance benchmarks are being used
code quality curation	yes	28,29	
functional quality curation	no		
interface quality curation	no		
review after purchase	yes	41,42	
review poster verified	yes	41,44	Commenting and reviewing requires a Google account
User focused: developer quality			
developer verification	no		
recurring fee	no	22	Developers must pay one time $25 registration fee
Developer focused: monetization potential			
pay-out delay	2 days	21	
pay-out schedule	monthly	21	
pay-out threshold	$1	21,31	Minimum balance required depends on the country
price control	developer	17	
revenue share	70 %	18	
third party app stores	no	14,17	
third party in-app advertising	yes	14	
app store refunds	yes	49	After purchasing an app or game on Google Play, user can return it within 15 minutes for a full refund
third party in-app billing	partial	16	3rd party billing systems may be used in the case of physical product or service, or digital content that is used outside the app
Developer focused: openness			
competing functionality curation	yes	17	Developer distribution agreement prohibits developers to offer products whose primary purpose is to facilitate the distribution of software applications and games for use on Android devices outside of the Market
custom licensing	yes	14,17	
guided licensing	no	17	Google Play provides an EULA which can be used, but does not require it.
open source licensing	yes	17	
Developer focused: visibility			
geographical availability	134	8,19	Paid apps can be sold in 134 countries, while free apps can be distributed in 137

Google Play Case Study Database

ID	Document name	Source	Document type
1	Android-applications in Google Play	https://play.google.com/store/apps	Document
2	Soundhound	https://play.google.com/store/apps/details?id=com.melodis.midomiMusicIdentifier.freemium	Document
3	TuneIn Radio	https://play.google.com/store/apps/details?id=tunein.player	Document
4	Google Play Terms of Service	https://play.google.com/intl/en_en/about/play-terms.html	Document
5	Google Play Business and Program Policies	http://play.google.com/about/android-developer-policies.html	Document
6	Visibility for our apps	http://developer.android.com/distribute/googleplay/about/visibility.html	Document
7	Flexible monetizing and business tools	http://developer.android.com/distribute/googleplay/about/monetizing.html	Document
8	Distribution control	http://developer.android.com/distribute/googleplay/about/distribution.html	Document
9	Developer console	http://developer.android.com/distribute/googleplay/publish/console.html	Document
10	Localization checklist	http://developer.android.com/distribute/googleplay/publish/localizing.html	Document
11	Google Play Services	http://developer.android.com/google/play-services/index.html	Document
12	Google Play In-app Billing	http://developer.android.com/google/play/billing/index.html	Document
13	Publishing Overview	http://developer.android.com/tools/publishing/publishing_overview.html	Document
14	Application Licensing	http://developer.android.com/google/play/licensing/index.html	Document
15	Ads	http://developer.android.com/distribute/googleplay/policies/ads.html	Document
16	Developer content policy	http://play.google.com/about/developer-content-policy.html	Document
17	Developer distribution agreement	http://play.google.com/about/developer-distribution-agreement.html	Document
18	Transaction fees	https://support.google.com/googleplay/android-developer/answer/112622?hl=en&ref_topic=2897388	Document
19	Supported locations for distributing applications	https://support.google.com/googleplay/android-developer/answer/138294?hl=en&ref_topic=2365624	Document
20	Specifying tax rates	https://support.google.com/googleplay/android-developer/answer/138000?hl=en&ref_topic=15867	Document
21	Processing orders and receiving payouts	https://support.google.com/googleplay/android-developer/answer/137997?hl=en&ref_topic=15867	Document
22	Developer registration	https://support.google.com/googleplay/android-developer/answer/113468?hl=en	Document
23	Google Wallet Merchant Center	https://support.google.com/googleplay/android-developer/answer/3039702?hl=en&ref_topic=15867	Document
24	Promoting your apps	http://developer.android.com/distribute/googleplay/promote/index.html	Document
25	Digital content & subscriptions	https://support.google.com/wallet/answer/1663312?hl=en&ref_topic=3209989	Document
26	Beta-testing and staged rollouts	https://support.google.com/googleplay/android-developer/answer/3131213?hl=en	Document

(Continues)

27	Google Play Android Developer Api	https://developers.google.com/android-publisher/index	Document
28	Android and Security	http://googlemobile.blogspot.fi/2012/02/android-and-security.html#uds-search-results	Web Document
29	Launch checklist	http://developer.android.com/distribute/googleplay/publish/preparing.html#core-app-quality	Document
30	Receiving payouts for Google Play orders	https://support.google.com/checkout/sell/answer/2467571?hl=en	Document
31	Screenshot001	Device screenshot	Observation
32	Screenshot002	Device screenshot	Observation
33	Screenshot003	Device screenshot	Observation
34	Screenshot004	Device screenshot	Observation
35	Screenshot005	Device screenshot	Observation
36	Screenshot006	Device screenshot	Observation
37	Screenshot007	Device screenshot	Observation
38	Screenshot008	Device screenshot	Observation
39	Screenshot009	Device screenshot	Observation
40	Screenshot010	Device screenshot	Observation
41	Screenshot011	Device screenshot	Observation
42	Screenshot012	Device screenshot	Observation
43	Screenshot013	Web screenshot	Observation
44	Screenshot014	Web screenshot	Observation
45	Screenshot015	Web screenshot	Observation
46	Payouts FAQ	https://support.google.com/googleplay/android-developer/answer/173779?hl=en	Document
47	How to access the Google Play Store app	https://support.google.com/googleplay/answer/190860?hl=en	Document
48	Supported devices	https://support.google.com/googleplay/answer/1727131	Document
49	Return paid apps & games	https://support.google.com/googleplay/answer/134336	Document
50	Subscriptions	https://developer.android.com/google/play/billing/billing_subscriptions.html	Document
51	Screenshot016	Device screenshot	Observation
52	Screenshot017	Device screenshot	Observation
53	Screenshot018	Web screenshot	Observation
54	Screenshot019	Web screenshot	Observation
55	Screenshot020	Web screenshot	Observation
56	Google Services	http://developer.android.com/google/index.html	Document
57	Screenshot021	Device screenshot	Observation

APPENDIX C: AMAZON APPSTORE

Amazon Appstore Analysis

Amazon Appstore	Status	Sources	Notes
Core feature			
app categories	yes	3,26,30	
app listing	yes	1,3,22	
app lists	yes	37	
dev app management	yes	13	
dev transaction list	yes	14	
distribution integration	yes	23	Distribution and installation happens through the native app, but the installation prompts the user on the operating system level.
featured apps	yes	3,15	
free revenue model	yes	1,3	
paid revenue model	yes	1,3	
pay out methods	3	3	Pay out methods include direct deposit, wire, and check
payment methods	3	10,11,12	Credit card, gift cards, Amazon Coins virtual currency
platform comp. filter	partial	1,9	Only apps that are compatible with the user's device are shown
ratings	yes	17	
reviews	yes	27	
search	yes	15	
FEATURES			
User focused: app findability			
recommendations	yes	3,26	
store curation tags	yes	1,3	Tagging and categorization is required in developer agreement
User focused: app quality			
app security integration	yes	1	Permissions description is shown with each app.
app security reporting	yes	19	
app test driving	yes	3	Amazon provides its cloud-based Test Drive functions to all Android users
content rating filter	yes	31,32,34	
device compatibility	yes	3,9	Only compatible apps are shown to user.
remote app remove	no		
user review curation	yes	27	Users can vote whether the comment/review is helpful or not
User focused: app store usability			
automated refunds	no	4	All purchases via Amazon Appstore for Android are non-refundable
developer refunds	no	4	

(Continues)

device integration	yes	3	Amazon Kindle Fire family of tablets have the Amazon App Store installed by default, but the app store can be manually installed to any Android device
multi language	yes	3,8	
multichannel dist.	yes	1,3,22	Apps can be downloaded/purchased from web site or using the native Android application
multi-currency	yes	1,3	
update integration	yes	4	
user app list	yes	7,29,35	List of downloaded apps can be accessed through native app and Amazon web page
user subscription list	yes	6,28	Subscription list can be accessed through the native app and Amazon web page
user transaction list	yes	7	Transactions can be accessed through the native app and Amazon web page
Developer focused: feedback potential			
app suggestions	no		
app support forums	no		
beta testing mgmt	no		
feature suggestion	no		
issue tracking	no		
user profile	yes	6,7	Users use their Amazon accounts
Developer focused: monetization potential			
affiliate program	yes	3,39	Amazon Mobile Associates enables developers to offer physical and digital products in their apps and games, while earning up to 6% advertising fees on purchases made through their apps.
affiliate stores	no		
component offering	no		
discounts	yes	3,22,37	Amazon's Today's Free App of the Day feature
in-app advertising	yes	1,2	Developers can use Amazon's Mobile Ad Network. Furthermore, devs may utilize Amazon Mobile Associates API to sell Amazon products through their apps.
in-app billing	yes	1	Developers can also utilize Amazon's 1-click buy feature
licensing integration	yes	1,3	
social media sharing	no	21	Apps can only be shared through SMS or email
subscriptions	yes	4	
volume pricing	no		
Developer focused: app store usability			
data API	yes	3	Multiple APIs offered through Amazon Mobile App SDK
deployment integration	no		
dev contract mgmt	no		
dev multi-user login	yes	3	

dev sales statistics	yes	3	Sales reports can be accessed through Amazon Mobile App Distribution Portal
geographic targeting	yes	3	
tax support	yes	1,3	
Developer focused: visibility			
cross selling	yes	20	
developer app list	partial	36	Users can search for developers and retain a list of the apps developer has published
developer profile	no		
POLICIES			
User focused: app quality			
approval before publish	yes	3	Applications have to go through app review process before they are published
automated monitoring	no	3	Monitoring is done manually
code quality curation	yes	3	Included in the app review process
functional quality curation	no	3	
interface quality curation	no	3	
review after purchase	yes	16	
review poster verified	yes	16	In order to post reviews, user must have an Amazon account and have purchased the app
User focused: developer quality			
developer verification	no	1	
recurring fee	no	3	Amazon claims no registration fee from developers.
Developer focused: monetization potential			
pay-out delay	30 days	1	Amazon will pay royalties approximately 30 days after the end of the calendar month in which the applicable sale is made
pay-out schedule	monthly	3	
pay-out threshold	$10	3	Some restrictions may apply for developers outside US
price control	dev (limited)	1	Amazon prohibits developers from offering their apps for a lower price in any other app store if Amazon Appstore is available in the same country.
revenue share	70 %	1,3	
third party app stores	no	3	Amazon Content Guidelines does not strictly prohibit references to other app stores. However, Amazon reserves rights to determine the appropriateness of all apps and to accept or reject any app at their discretion. Furthermore, no app stores are found in the app offering, so it is assumed that publishing of third party app stores is prohibited.
third party in-app advertising	yes	1	
app store refunds	no	4	Amazon states that all sales are final and does not accept any returns nor provides any refunds
third party in-app billing	no	1	

Developer focused: openness			
competing functionality curation	yes	1,3	Amazon does not clearly prohibit the competing functionality in its Content Guidelines, but reserves rights to reject apps that do not meet Amazon's app acceptance criteria during the reviewing process. Furthermore, no alternative app stores can be found from the Amazon Appstore.
custom licensing	yes	1	
guided licensing	no	1,3,4	
open source licensing	yes	1	
Developer focused: visibility			
geographical availability	193	5	

Amazon Appstore Case Study Database

ID	Document name	Source	Type
1	App Distribution Agreement	https://developer.amazon.com/help/da.html	Document
2	Mobile ad network publisher agreement	https://developer.amazon.com/sdk/mobileads/publisher-agreement.html	Document
3	FAQs	https://developer.amazon.com/help/faq.html	Document
4	Amazon Appstore for Android Terms of Use	http://www.amazon.com/gp/feature.html?ie=UTF8&docId=1000667601	Document
5	Countries eligible to shop for apps	http://www.amazon.com/gp/help/customer/display.html/ref=hp_left_sib?ie=UTF8&nodeId=201146240	Document
6	Screenshot001	Web screenshot	Observation
7	Screenshot002	Web screenshot	Observation
8	Screenshot003	Web screenshot	Observation
9	Screenshot004	Web screenshot	Observation
10	Screenshot005	Web screenshot	Observation
11	Screenshot006	Web screenshot	Observation
12	Screenshot007	Web screenshot	Observation
13	Screenshot008	Web screenshot	Observation
14	Screenshot009	Web screenshot	Observation
15	Screenshot010	Device screenshot	Observation
16	Screenshot011	Device screenshot	Observation
17	Screenshot012	Device screenshot	Observation
18	Screenshot013	Device screenshot	Observation
19	Screenshot014	Device screenshot	Observation
20	Screenshot015	Device screenshot	Observation
21	Screenshot016	Device screenshot	Observation
22	Screenshot017	Device screenshot	Observation
23	Screenshot018	Device screenshot	Observation

24	Screenshot019	Device screenshot	Observation
25	Screenshot020	Device screenshot	Observation
26	Screenshot021	Device screenshot	Observation
27	Screenshot022	Device screenshot	Observation
28	Screenshot023	Device screenshot	Observation
29	Screenshot024	Device screenshot	Observation
30	Screenshot025	Device screenshot	Observation
31	Screenshot026	Device screenshot	Observation
32	Screenshot027	Device screenshot	Observation
33	Screenshot028	Device screenshot	Observation
34	Screenshot029	Device screenshot	Observation
35	Screenshot030	Device screenshot	Observation
36	Screenshot031	Device screenshot	Observation
37	Screenshot032	Device screenshot	Observation
38	Screenshot033	Device screenshot	Observation
39	Amazon Mobile Associates API	https://developer.amazon.com/sdk/mobile-associates.html	Document
40	Amazon Mobile App SDK	https://developer.amazon.com/sdk.html	Document

APPENDIX D: SAMSUNG APPS

Samsung Apps Analysis

Samsung Apps	Status	Sources	Notes
Core feature			
app categories	yes	23	
app listing	yes	23	
app lists	yes	25	
dev app management	yes	16	
dev transaction list	yes	15	
distribution integration	yes	47,48	
featured apps	yes	25	
free revenue model	yes	3,25,26	
paid revenue model	yes	3,25,26,34	
pay out methods	2	13	Bank Wire Transfer, PayPal
payment methods	2	5	Credit card, phone bill
platform comp. filter	yes	23	
ratings	yes	31,38	
reviews	yes	31,38	
search	yes	20	
FEATURES			
User focused: app findability			
recommendations	no		
store curation tags	yes	32	
User focused: app quality			
app security integration	yes	1,46	Permission based security system.
app security reporting	yes	30	
app test driving	yes	10,49	With Try & Play and Rent & Play features, developers may set a trial period for their applications
content rating filter	yes	23,29,38	
device compatibility	yes	23,38	
remote app remove	no		
user review curation	partial	36	Users can only report inappropriate reviews.
User focused: app store usability			
automated refunds	no	9	Samsung Apps does not provide automated refunds or cancellations.
developer refunds	no	9	
device integration	yes	14	Samsung Apps is only available for Samsung devices.
multi language	yes	20,21	
multichannel dist.	yes	29,37,40	Samsung Apps native Android app, Samsung Kies. Apps can be browsed through website, but they can't be bought.

multi-currency	yes	20,21	
update integration	yes	27,28	
user app list	yes	22,39	
user subscription list	yes	39	
user transaction list	yes	22,39	
Developer focused: feedback potential			
app suggestions	no		
app support forums	no		
beta testing mgmt	no		
feature suggestion	no		
issue tracking	no		
user profile	no		
Developer focused: monetization potential			
affiliate program	no		
affiliate stores	no		
component offering	no		
discounts	yes	19,49	Apps may be offered at discount. Furthermore, users may use integrated gift cards to get discounts on apps.
in-app advertising	yes	3	
in-app billing	yes	3,7	
licensing integration	yes	2	If the published application applies copy protection, it must use Zirconia (Samsung Apps' DRM solution).
social media sharing	yes	23	In website version of the app store, links to apps can be shared through embedded social media icons.
subscriptions	yes	7	
volume pricing	no		
Developer focused: app store usability			
data API	no		Samsung does not offer APIs that allows developers to fetch data from the app store.
deployment integration	no		
dev contract mgmt	no		
dev multi-user login	yes	11	Developers may register as a Corporate Seller allowing the utilization of multiple users on a developer account.
dev sales statistics	yes	1,11,15	
geographic targeting	yes	10,12	
tax support	yes	1	
Developer focused: visibility			
cross selling	yes	32	
developer app list	yes	24,33	

developer profile	yes	24	Developer may share information, their own home page, and policy. However, this information is only accessible through website version of the app store.
POLICIES			
User focused: app quality			
approval before publish	yes	4	
automated monitoring	no	4	Quality monitoring is done manually.
code quality curation	yes	4	
functional quality curation	yes	4	
interface quality curation	yes	4	
review after purchase	no		Samsung Apps allows posting reviews before purchasing or downloading the app as long as user is registered.
review poster verified	yes	38	Posting reviews requires registration to Samsung Account.
User focused: developer quality			
developer verification	yes	18	In order to attain Commercial Seller Status, a developer must verify his/her identity.
recurring fee	no	1	Samsung charges no developer registration fee
Developer focused: monetization potential			
pay-out delay	15 days	1	
pay-out schedule	monthly	1	
pay-out threshold	$150	12,17	
price control	developer	1	The price must conform to the application price points specified by Samsung.
revenue share	70 %	1	Revenue share percentage is negotiable during the app certification process.
third party app stores	no	8	
third party in-app advertising	yes	1,2	Samsung allows the use of 3rd party advertisement as long as it follows Samsung advertisement guidelines
app store refunds	no	9	Applications successfully purchased from Samsung Apps are not subject to refund or cancellation. In an app has a material defect, the app will b replaced, downloaded again or a coupon will be provided for an equivalent value to purchase.
third party in-app billing	no	7, 10	Developers must utilize Samsung's Plasma In-App Purchase API if they want to sell in-app content.
Developer focused: openness			
competing functionality curation	yes	8	
custom licensing	partial	1	Developers may provide their own EULA in some countries
guided licensing	partial	1	Samsung enforces its guidelines for EULA in selected countries.
open source licensing	yes	1	

Developer focused: visibility			
geographical availability	125	6	Samsung Apps is available in 125 countries in total. Paid contents are available in 65 countries.

Samsung Apps Case Study Database

ID	Document name	Source	Type
1	Terms and Conditions (Mobile)	http://seller.samsungapps.com/help/termsAndConditions.as	Document
2	Policy	http://developer.samsung.com/distribute/app-certification/policy	Document
3	Monetization guide	http://developer.samsung.com/distribute/monetization	Document
4	App certification	http://developer.samsung.com/distribute/app-certification	Document
5	Payment option	http://developer.samsung.com/distribute/samsung-apps/payment-option	Document
6	Global coverage	http://developer.samsung.com/distribute/samsung-apps/global-coverage	Document
7	Tools & SDKs - In-app pur-chase library	http://developer.samsung.com/android/tools-sdks/In-App-Purchase-Library	Document
8	Self-Check List	http://developer.samsung.com/distribute/app-certification/self-check-list	Document
9	Samsung Service Terms and Conditions	http://apps.samsung.com/venus/common/term.as?	Document
10	Application Registration Guide	http://seller.samsungapps.com/qa/downloadSupportFiles.as?type=10	Document
11	Certification Guide	http://seller.samsungapps.com/qa/downloadSupportFiles.as?type=2	Document
12	Seller Office User Guide	http://seller.samsungapps.com/qa/downloadSupportFiles.as?type=1	Document
13	Commercial Seller Request Guide	http://seller.samsungapps.com/qa/downloadSupportFiles.as?type=9	Document
14	Samsung Apps Mobile	http://content.samsung.com/us/contents/aboutn/appsMobileIntro.do	Document
15	Screenshot001	Web screenshot	Observation
16	Screenshot002	Web screenshot	Observation
17	Screenshot003	Web screenshot	Observation
18	Screenshot004	Web screenshot	Observation
19	Screenshot005	Web screenshot	Observation
20	Screenshot006	Web screenshot	Observation
21	Screenshot007	Web screenshot	Observation
22	Screenshot008	Web screenshot	Observation
23	Screenshot009	Web screenshot	Observation
24	Screenshot010	Web screenshot	Observation
25	Screenshot011	Device screenshot	Observation
26	Screenshot012	Device screenshot	Observation
27	Screenshot013	Device screenshot	Observation
28	Screenshot014	Device screenshot	Observation

29	Screenshot015	Device screenshot	Observation
30	Screenshot016	Device screenshot	Observation
31	Screenshot017	Device screenshot	Observation
32	Screenshot018	Device screenshot	Observation
33	Screenshot019	Device screenshot	Observation
34	Screenshot020	Device screenshot	Observation
35	Screenshot021	Device screenshot	Observation
36	Screenshot022	Web screenshot	Observation
37	Screenshot023	Web screenshot	Observation
38	Screenshot024	Program screenshot	Observation
39	Screenshot025	Program screenshot	Observation
40	Screenshot026	Program screenshot	Observation
41	AdHub	http://developer.samsung.com/adhub	Document
42	ChatON API	http://developer.samsung.com/chaton-api	Document
43	In-App Purchase Library	http://developer.samsung.com/in-app-purchase	Document
44	Samsung Wallet API	http://developer.samsung.com/samsung-wallet-api	Document
45	Samsung Chord	http://developer.samsung.com/chord	Document
46	Screenshot027	Device screenshot	Observation
47	Screenshot028	Device screenshot	Observation
48	Screenshot029	Device screenshot	Observation
49	Screenshot030	Device screenshot	Observation

APPENDIX E: SLIDEME

SlideME Analysis

SlideME	Status	Sources	Notes
Core feature			
app categories	yes	20	
app listing	yes	12	
app lists	yes	8,9	
dev app management	yes	29	
dev transaction list	yes	4	
distribution integration	yes	25,26,27	Distribution and installation happens through platform, but installation prompts Android operating system
featured apps	yes	4	
free revenue model	yes	8	
paid revenue model	yes	10	
pay out methods	3	1,3	PayPal, Bank Wire Transfer, Amazon Payments
payment methods	4	6	SlideME Wallet, PayPal, Amazon payments, Credit card
platform comp. filter	yes	35	The website version of the app store includes information about the platform compatibility.
ratings	yes	16	Five-star rating
reviews	yes	16	
search	yes	23	
FEATURES			
User focused: app findability			
recommendations	no		
store curation tags	yes	3,8,9	
User focused: app quality			
app security integration	yes	24,27,34	Permission based security system
app security reporting	yes	15	Apps can be reported including categorization of the report.
app test driving	no		
content rating filter	yes	30,36	
device compatibility	no		
remote app remove	no		
user review curation	yes	28	Reviews can be voted up or down, or reported as spam.
User focused: app store usability			
automated refunds	yes	39	User is applicable for refund within 48 hours from application install or completion of transaction
developer refunds	no		

device integration	yes	1	SlideME has partnerships with several device vendors and OEM's who offer SlideME as a default app store in their devices.
multi language	yes	7,8,32	Native app is automatically translated to the language used in the device. Web browser app store is in English by default. SAM application currently supports 31 languages.
multichannel dist.	yes	1	Native app, partner apps. Free apps can be downloaded from website.
multi-currency	no		However, SlideME partner channels may provide services in different currencies
update integration	yes	22	The native app store application notifies user when an update is available. However, no automated updates for downloaded/purchased apps are available.
user app list	yes	19	
user subscription list	no		
user transaction list	yes	5	
Developer focused: feedback potential			
app suggestions	no		
app support forums	partial	43	Each published app has its own discussion wall
beta testing mgmt	no		
feature suggestion	yes	43	Suggestions can be made through app discussion wall
issue tracking	no		
user profile	no		
Developer focused: monetization potential			
affiliate program	no		
affiliate stores	yes	1	Brandable SAM Android marketplace client is provided to device vendors, OEM's, application store partners, distribution partners and other parties
component offering	no		
discounts	yes	11	
in-app advertising	yes	1	
in-app billing	yes	1	
licensing integration	yes	1	SlideME's own SlideLock protection
social media sharing	yes	41,42	
subscriptions	no		
volume pricing	no		
Developer focused: app store usability			
data API	yes	1	SlideME Software Development Kit
deployment integration	no		
dev contract mgmt	yes	6	
dev multi-user login	no		
dev sales statistics	yes	1,38	Developer can opt in for email notifications whenever their app is purchased.

geographic targeting	yes	37	Apps can be targeted to a specific country or language.
tax support	yes	1	
Developer focused: visibility			
cross selling	yes	14,17	
developer app list	yes	18	
developer profile	no		
POLICIES			
User focused: app quality			
approval before publish	yes	1	Apps go through a manual approval process
automated monitoring	no		
code quality curation	no		
functional quality curation	yes	3	
interface quality curation	no		
review after purchase	yes	12,33	
review poster verified	yes	31	Using the SlideME requires registration, thus reviewers must also be registered users.
User focused: developer quality			
developer verification	no		
recurring fee	no	1	Signing up for developer account and publishing apps are both free.
Developer focused: monetiza-tion potential			
pay-out delay	n/a		
pay-out schedule	by request	1	Developer may request payment through devel-oper console when he has earned over $50.
pay-out threshold	$50	1	
price control	developer	1	
revenue share	70 %	1	
third party app stores	no	3	
third party in-app advertising	yes	1	
app store refunds	partial	1	User is applicable for refund within a month from application install or completion of transaction if the applications does not work on user's device
third party in-app billing	yes	1	SlideME does not restrict developers from includ-ing third party In-App-Payments SDK's within their freemium applications, providing such SDK's will work for non-Google Mobile Services devices too.
Developer focused: openness			
competing functionality curation	yes	3	
custom licensing	yes	1	
guided licensing	no	1	
open source licensing	yes	1	
Developer focused: visibility			
geographical availability	Worldwide	40	SlideME is a US company and thus due to US embargoes SAM is not available in Cuba, Iran, North Korea, Sudan, and Syria.

SlideME Case Study Database

ID	Document name	Source	Type
1	Developer Distribution Agreement	http://slideme.org/developers/dda	Document
2	SlideME Application End User Agreement	http://slideme.org/eula	Document
3	Frequently Asked Questions - For Developers	http://slideme.org/faq/-developers	Document
4	Screenshot001	Web screenshot	Observation
5	Screenshot002	Web screenshot	Observation
6	Screenshot003	Web screenshot	Observation
7	Screenshot004	Device screenshot	Observation
8	Screenshot005	Device screenshot	Observation
9	Screenshot006	Device screenshot	Observation
10	Screenshot007	Device screenshot	Observation
11	Screenshot008	Device screenshot	Observation
12	Screenshot009	Device screenshot	Observation
13	Screenshot010	Device screenshot	Observation
14	Screenshot011	Device screenshot	Observation
15	Screenshot012	Device screenshot	Observation
16	Screenshot013	Device screenshot	Observation
17	Screenshot014	Device screenshot	Observation
18	Screenshot015	Device screenshot	Observation
19	Screenshot016	Device screenshot	Observation
20	Screenshot017	Device screenshot	Observation
21	Screenshot018	Device screenshot	Observation
22	Screenshot019	Device screenshot	Observation
23	Screenshot020	Device screenshot	Observation
24	Screenshot021	Device screenshot	Observation
25	Screenshot022	Device screenshot	Observation
26	Screenshot023	Device screenshot	Observation
27	Screenshot024	Device screenshot	Observation
28	Screenshot025	Device screenshot	Observation
29	Screenshot026	Web screenshot	Observation
30	Screenshot027	Device screenshot	Observation
31	Screenshot028	Device screenshot	Observation
32	Screenshot029	Web screenshot	Observation
33	Screenshot030	Device screenshot	Observation
34	Screenshot031	Device screenshot	Observation
35	Screenshot032	Web screenshot	Observation
36	Screenshot033	Web screenshot	Observation
37	Screenshot034	Web screenshot	Observation
38	Screenshot035	Web screenshot	Observation

39	Frequently Asked Questions - For Users	http://slideme.org/faq/-users	Document
40	Partners	http://slideme.org/partners	Document
41	Screenshot036	Device screenshot	Observation
42	Screenshot037	Device screenshot	Observation
43	Screenshot038	Web screenshot	Observation

APPENDIX F: SOC.IO MALL

Soc.io Mall Analysis

Soc.io Mall	Status	Sources	Notes
Core feature			
app categories	yes	13	16 main categories, 118 sub-categories
app listing	yes	15	
app lists	yes	11	
dev app management	yes	23	
dev transaction list	yes	7	
distribution integration	yes	16,17	Distribution and installation happens through the platform, but installation prompts operating system level
featured apps	yes	20	
free revenue model	yes	11	
paid revenue model	yes	12	
pay out methods	2	2	PayPal, Bank Wire Transfer
payment methods	2	6,8	PayPal, Credit Card
platform comp. filter	yes	15	
ratings	yes	14,18	
reviews	yes	14,18	
search	yes	19	
FEATURES			
User focused: app findability			
recommendations	yes	4,21,22	
store curation tags	yes	24	
User focused: app quality			
app security integration	no		
app security reporting	no		
app test driving	no		
content rating filter	no		
device compatibility	partial	26	Filtering options only include: phone/tablet/both
remote app remove	no		
user review curation	no		
User focused: app store usability			
automated refunds	no		
developer refunds	no		
device integration	yes	1	Partnering device manufacturers and OEMs have Soc.io Mall preinstalled
multi language	yes	24	8 languages are supported

multichannel dist.	yes	1	Accessible either through website or mobile application
multi-currency	yes	2	US Dollar and Euro are supported.
update integration	no		
user app list	yes	9	
user subscription list	no		
user transaction list	no		
Developer focused: feed-back potential			
app suggestions	no		
app support forums	no		
beta testing mgmt	no		
feature suggestion	no		
issue tracking	no		
user profile	no		
Developer focused: moneti-zation potential			
affiliate program	no		
affiliate stores	yes	5	Soc.io Mall has partners who offer white labeled stores based on Soc.io Mall
component offering	yes	2	
discounts	no		
in-app advertising	yes	27,28	Soc.io Mall does not provide its own advertising system, but allows developers to use 3rd party systems.
in-app billing	no		
licensing integration	yes	2,3	Developers may utilize Soc.io Mall Licensing Library in their apps.
social media sharing	yes	14	
subscriptions	no		
volume pricing	no		
Developer focused: app store usability			
data API	no		
deployment integration	no		
dev contract mgmt	no		
dev multi-user login	no		
dev sales statistics	yes	7	
geographic targeting	no		
tax support	yes	2	
Developer focused: visibility			
cross selling	no		
developer app list	yes	25	
developer profile	yes	25	
POLICIES			
User focused: app quality			
approval before publish	yes	2	Apps are manually reviewed

automated monitoring	no		
code quality curation	no		
functional quality curation	yes	2	Manual review includes functional quality curation
interface quality curation	no		
review after purchase	yes	14	
review poster verified	yes	14	
User focused: developer quality			
developer verification	no		
recurring fee	no		Registering as a developer is free
Developer focused: monetization potential			
pay-out delay	n/a		
pay-out schedule	monthly	2	
pay-out threshold	€100/100€	2	
price control	developer	2	However, Soc.io mall prohibits developers to publish a paid app if it is offered for free in a competitor store.
revenue share	80 %	2	Soc.io Mall states that it offers best revenue share in the industry
third party app stores	no	2	
third party in-app advertising	yes	1,27	Soc.io Mall does not prohibit the use of 3rd party in-app advertising in its terms and conditions agreement. Furthermore, some published apps utilize 3rd party advertising.
app store refunds	no		
third party in-app billing	yes		Soc.io Mall encourages the use of third party in-app through their partner Fortumo, but does allow the use of any such systems.
Developer focused: openness			
competing functionality curation	yes	2	No competing app store applications, links to such apps/websites, or any similar content is allowed.
custom licensing	yes	1	Terms and conditions does not prohibit developers from using custom EULAs.
guided licensing	no		
open source licensing	yes		Use of open source licensing is not prohibited
Developer focused: visibility			
geographical availability	Worldwide		No restrictions in availability were found

SlideME Case Study Database

ID	Document name	Source	Type
1	Soc.io Mall Terms and Conditions	https://mall.soc.io/TermsUse	Document
2	FAQ	https://mall.soc.io/FAQ	Document
3	Soc.io Mall Licensing Library Manual v1.1.	http://hosted-downloads.gigastore.com/Socio_Mall_Licensing_Library_Manual.pdf	Document
4	Soc.io Mall - Features	https://mall.soc.io/static/features.jsp	Document
5	Partners	http://soc.io/our-partners	Document
6	Screenshot001	Web screenshot	Observation
7	Screenshot002	Web screenshot	Observation
8	Screenshot003	Device screenshot	Observation
9	Screenshot004	Device screenshot	Observation
10	Screenshot005	Device screenshot	Observation
11	Screenshot006	Device screenshot	Observation
12	Screenshot007	Device screenshot	Observation
13	Screenshot008	Device screenshot	Observation
14	Screenshot009	Device screenshot	Observation
15	Screenshot010	Device screenshot	Observation
16	Screenshot011	Device screenshot	Observation
17	Screenshot012	Device screenshot	Observation
18	Screenshot013	Device screenshot	Observation
19	Screenshot014	Device screenshot	Observation
20	Screenshot015	Device screenshot	Observation
21	Screenshot016	Web screenshot	Observation
22	Screenshot017	Device screenshot	Observation
23	Screenshot018	Web screenshot	Observation
24	Screenshot019	Web screenshot	Observation
25	Screenshot020	Web screenshot	Observation
26	Screenshot021	Device screenshot	Observation
27	Screenshot022	Web screenshot	Observation
28	Screenshot023	Web screenshot	Observation

APPENDIX G: YANDEX.STORE

Yandex.Store Analysis

Yandex.Store	Status	Sources	Notes
Core feature			
app categories	yes	8,23	
app listing	yes	10	
app lists	yes	23	
dev app management	yes	4	
dev transaction list	yes	1	
distribution integration	yes	19	Yandex.Store is preinstalled on partner OEMs devices
featured apps	yes	8	
free revenue model	yes	1,9	
paid revenue model	yes	1,2	
pay out methods	1	1	Bank Wire Transfer
payment methods	2	1,18	Credit card, Yandex.Money
platform comp. filter	no		No information about platform compatibility is asked when submitting an app, nor was any found in app descriptions.
ratings	yes	12	
reviews	yes	15	
search	yes	22	
FEATURES			
User focused: app findability			
recommendations	no		
store curation tags	yes	5	
User focused: app quality			
app security integration	yes	6,8	All published apps have been verified by Kaspersky anti-virus protection.
app security reporting	yes	21	
app test driving	no		
content rating filter	yes	1,3	
device compatibility	yes	1	
remote app remove	no		
user review curation	no		
User focused: app store usability			
automated refunds	yes	1,2	Applicable for refund within up to 15 minutes after transaction
developer refunds	no		
device integration	yes	1	Partner OEMs have Yandex.Store installed by default. However, it can be downloaded to any Android device.
multi language	yes	1	

multichannel dist.	no		Apps can be acquired through Android app only.
multi-currency	yes	1	
update integration	yes	17	
user app list	yes	24	
user subscription list	no		
user transaction list	no		
Developer focused: feedback potential			
app suggestions	no		
app support forums	no		
beta testing mgmt	no		
feature suggestion	no		
issue tracking	no		
user profile	no		
Developer focused: monetiza-tion potential			
affiliate program	no		
affiliate stores	yes	1	Yandex provides both standard as well as customized version of its app store to its OEM partners.
component offering	no		
discounts	no		
in-app advertising	yes	1	
in-app billing	yes	1	Developers may utilize Open In-App Billing SDK in their apps.
licensing integration	no		
social media sharing	no		
subscriptions	yes	1	Subscriptions are possible through Open IAB SDK
volume pricing	no		
Developer focused: app store usability			
data API	no		
deployment integration	no		
dev contract mgmt	no		
dev multi-user login	no		
dev sales statistics	no		
geographic targeting	yes	3	
tax support	yes	1	Developer must provide Yandex the total applicable tax rate.
Developer focused: visibility			
cross selling	yes	14	
developer app list	yes	13	
developer profile	no		
POLICIES			
User focused: app quality			
approval before publish	no		
automated monitoring	no		

code quality curation	no		
functional quality curation	no		
interface quality curation	no		
review after purchase	yes	11,16	
review poster verified	yes	15	Only registered users may post reviews.
User focused: developer quality			
developer verification	no		
recurring fee	no	1	Developer registration is free
Developer focused: monetization potential			
pay-out delay	30 days	1	
pay-out schedule	monthly	1	
pay-out threshold	$100	1	
price control	developer	1,2	
revenue share	70 %	1	
third party app stores	no	1	
third party in-app advertising	yes	1	Yandex allows the use of third party in-app advertising.
app store refunds	yes	1,2	User is applicable for refund within 15 minutes of the purchase.
third party in-app billing	no	1	
Developer focused: openness			
competing functionality curation	yes	1	Applications with app store functionalities and apps linking directly to other app stores are not allowed
custom licensing	yes	1	Yandex.Store allows developers to use their own licensing
guided licensing	no	1	
open source licensing	yes	1	Open source licenses are allowed
Developer focused: visibility			
geographical availability	Worldwide		No country restrictions were found.

Yandex.Store Case Study Database

ID	Document name	Source	Type
1	Agency Agreement	https://legal.yandex.com/store_developer_agreement/	Document
2	Yandex.store terms of use	https://legal.yandex.com/store_termsofuse/	Document
3	Screenshot001	Web screenshot	Observation
4	Screenshot002	Web screenshot	Observation
5	Screenshot003	Web screenshot	Observation
6	Screenshot004	Device screenshot	Observation
7	Screenshot005	Device screenshot	Observation
8	Screenshot006	Device screenshot	Observation
9	Screenshot007	Device screenshot	Observation
10	Screenshot008	Device screenshot	Observation
11	Screenshot009	Device screenshot	Observation
12	Screenshot010	Device screenshot	Observation
13	Screenshot011	Device screenshot	Observation
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19	Screenshot017	Device screenshot	Observation
20	Screenshot018	Device screenshot	Observation
21	Screenshot019	Device screenshot	Observation
22	Screenshot020	Device screenshot	Observation
23	Screenshot021	Device screenshot	Observation
24	Screenshot022	Device screenshot	Observation

APPENDIX H: CROSS-CASE ANALYSIS

App store	Google Play	Amazon Appstore	Samsung Apps	SlideME	Soc.io Mall	Yandex.Store
Core feature						
app categories	yes	yes	yes	yes	yes	yes
app listing	yes	yes	yes	yes	yes	yes
app lists	yes	yes	yes	yes	yes	yes
dev app management	yes	yes	yes	yes	yes	yes
dev transaction list	yes	yes	yes	yes	yes	yes
distribution integration	yes	yes	yes	yes	yes	yes
featured apps	yes	yes	yes	yes	yes	yes
free revenue model	yes	yes	yes	yes	yes	yes
paid revenue model	yes	yes	yes	yes	yes	yes
pay out methods	2	3	2	3	2	1
payment methods	4	3	2	4	2	2
platform comp. filter	yes	partial	yes	yes	yes	no
ratings	yes	yes	yes	yes	yes	yes
reviews	yes	yes	yes	yes	yes	yes
search	yes	yes	yes	yes	yes	yes
FEATURES						
User focused: app findability						
recommendations	yes	yes	no	no	yes	no
store curation tags	yes	yes	yes	yes	yes	yes
User focused: app quality						
app security integration	yes	yes	yes	yes	no	yes
app security reporting	yes	yes	yes	yes	no	yes
app test driving	partial	yes	yes	no	no	no
content rating filter	yes	yes	yes	yes	no	yes
device compatibility	yes	yes	yes	no	partial	yes
remote app remove	yes	no	no	no	no	no
user review curation	yes	yes	partial	yes	no	no
User focused: app store usability						
automated refunds	yes	no	no	yes	no	yes
developer refunds	yes	no	no	no	no	no
device integration	yes	yes	yes	yes	yes	yes
multi language	yes	yes	yes	yes	yes	yes
multichannel dist.	yes	yes	yes	yes	yes	no
multi-currency	yes	yes	yes	no	yes	yes
update integration	yes	yes	yes	yes	no	yes
user app list	yes	yes	yes	yes	yes	yes

user subscription list	yes	yes	yes	no	no	no
user transaction list	yes	yes	yes	yes	no	no
Developer focused: feedback potential						
app suggestions	no	no	no	no	no	no
app support forums	no	no	no	partial	no	no
beta testing mgmt	yes	no	no	no	no	no
feature suggestion	no	no	no	yes	no	no
issue tracking	no	no	no	no	no	no
user profile	yes	yes	no	no	no	no
Developer focused: monetization potential						
affiliate program	no	yes	no	no	no	no
affiliate stores	no	no	no	yes	yes	yes
component offering	no	no	no	no	yes	no
discounts	no	yes	yes	yes	no	no
in-app advertising	yes	yes	yes	yes	yes	yes
in-app billing	yes	yes	yes	yes	no	yes
licensing integration	yes	yes	yes	yes	yes	no
social media sharing	no	no	yes	yes	yes	no
subscriptions	yes	yes	yes	no	no	yes
volume pricing	no	no	no	no	no	no
Developer focused: app store usability						
data API	yes	yes	no	yes	no	no
deployment integration	no	no	no	no	no	no
dev contract mgmt	no	no	no	yes	no	no
dev multi-user login	yes	yes	yes	no	no	no
dev sales statistics	yes	yes	yes	yes	yes	no
geographic targeting	yes	yes	yes	yes	no	yes
tax support	yes	yes	yes	yes	yes	yes
Developer focused: visibility						
cross selling	yes	yes	yes	yes	no	yes
developer app list	yes	partial	yes	yes	yes	yes
developer profile	no	no	yes	no	yes	no
POLICIES						
User focused: app quality						
approval before publish	no	yes	yes	yes	yes	no
automated monitoring	yes	no	no	no	no	no
code quality curation	yes	yes	yes	no	no	no
functional quality curation	no	no	yes	yes	yes	no
interface quality curation	no	no	yes	no	no	no
review after purchase	yes	yes	no	yes	yes	yes
review poster verified	yes	yes	yes	yes	yes	yes

(Continues)

User focused: developer quality						
developer verification	no	no	yes	no	no	no
recurring fee	no	no	no	no	no	no
Developer focused: monetization potential						
pay-out delay	2 days	30 days	15 days	n/a	n/a	30 days
pay-out schedule	monthly	monthly	monthly	by request	monthly	monthly
pay-out threshold	$1	$10	$150	$50	€100/100€	$100
price control	dev	dev (ltd.)	dev	dev	dev	dev
revenue share	70 %	70 %	70 %	70 %	80 %	70 %
third party app stores	no	no	no	no	no	no
third party in-app advertising	yes	yes	yes	yes	yes	yes
app store refunds	yes	no	no	partial	no	yes
third party in-app billing	partial	no	no	yes	yes	no
Developer focused: openness						
competing functionality curation	yes	yes	yes	yes	yes	yes
custom licensing	yes	yes	partial	yes	yes	yes
guided licensing	no	no	partial	no	no	no
open source licensing	yes	yes	yes	yes	yes	yes
Developer focused: visibility						
geographical availability	134	193	125	Worldwide	Worldwide	Worldwide