Value Creation in Digital Application Marketplaces: A Developers' Perspective

Completed Research Paper

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Abstract

Digital application marketplaces are increasingly relevant for digital platform owners seeking to reap the benefits of distributing, brokering, and operating applications by third-party developers. Owners of such marketplaces have two vital goals: address the needs of heterogeneous end-users and attract third-party developers. A key element in simultaneously accommodating these goals is value creation. However, while there is emerging literature on digital application marketplaces, little empirical evidence exits about the value creation process for and by application developers. Drawing on a research study of third-party developers, we synthesize the value creation perspective and digital platforms literature to develop an understanding of value creation in digital application marketplaces from the perspective of third-party developers. Our study identifies and explores six different value sources and their associated value creation and realization. In doing this, our research extends and complements existing digital platform literature and contributes new knowledge about new forms of value creation.

Keywords: digital application marketplaces, appstores, digital platforms, third-party developers, value creation, value sources

Introduction

The main aim of marketplaces is to facilitate the exchange of products and services between different parties including buyers, sellers and market intermediaries (Bakos, 1998). In order to facilitate this and help in creating economic values, marketplace owners develop various solutions to transfer the associated information, products, and payments. The digital revolution and new technologies helped in the growth of digital marketplaces (Aldrich, 1999; Choudhury et al., 1998), where marketplaces owners can reach more global customers (Eng, 2004), with reasonable costs (Rask and Kragh, 2004) and "long tail" advantages (Brynjolfsson et al., 2011).

Digital marketplaces are powered across different domains: electronic commerce marketplaces (e.g., Amazon.com, AliBaba.com) (Mahadevan, 2000, Guo et al. 2006), online freelance marketplaces (e.g., oDesk.com, eLance.com) (Groysberg et al., 2011, Aguinis and Lawal, 2013), group buying marketplaces (e.g., Groupon.com, LivingSocial.com) (Edelman et al. 2011, Hughes and Beukes, 2012), online auctions marketplaces (e.g., eBay.com, eBid.com) (Eng, 2004, Quaddus and Xu 2006) and digital application marketplaces (e.g., Apple's AppStore, Google Play) (West and Mace, 2010, Hyrynsalmi et al., 2012). Our focus in this paper is on digital application marketplaces, referred to as "appstores", which are considered one of the most important types of digital marketplaces (Ghazawneh and Henfridsson, 2015).

The importance of digital application marketplaces is a result of transforming the focus of digital platforms owners from being software producers into providers of distribution channels through which they reap the benefits of distributing, brokering, and operating applications by third-party developers (Meyer and Seliger, 1998; West and Mace, 2010). Hence, the aim of digital platform owners is focused on creating and sustaining the distribution of applications via digital application marketplaces, while at the same time motivating third-party developers to tap into the digital platform and provide its marketplace with various types of applications (Ghazawneh and Henfridsson, 2015). In order to attract third-party developers, owners of digital applications marketplaces ought to provide all kind of value sources (Schumpeter, 1934; Moran and Goshal, 1996) that can facilitate the development, integration, sales and deployment of applications (Bergvall-Kåreborn et al., 2010).

Prior research has ascertained the growing importance of digital application marketplaces (Goncalves et al., 2010; Basole and Karla, 2012; Eaton et al., 2015), distinguished different kinds of digital application marketplaces (Ghazawneh and Henfridsson, 2015), or discussed opportunities and constraints for third-party developers in digital application marketplaces (Holzer and Ondrus, 2011). However, little has been done to understand the value creation process that takes place in digital application marketplaces and analyzes this from the perspective of third-party developers, users of digital application marketplaces or any other engaged party.

The focus in this paper is on third-party developer's perspective on value creation process in digital application marketplaces. Hence, the research question addressed in this paper is: *What characterizes the value creation process in digital application marketplaces for third-party developers?* In order to address this research question, we collected data from third-party developers from three Scandinavian countries: Denmark, Sweden and Norway.

The remainder of the paper is structured as follows. The next section provides an overview of related literature on digital platforms, digital application marketplaces, and a conceptual discussion of value creation and economic development. Then, the research method and processes of data collection and analysis are described. We later present our results demonstrating six value sources that provide the basis for combination and exchange processes involved in the value creation process. The analysis and discussion of the value creation process in digital application marketplaces from developers' perspective is presented in the discussion section. Finally, the paper illustrates the implications for research and practice as well as outlines key conclusions.

Related Literature and Conceptual Basis

Digital Platforms

The concept of platforms has been thoroughly developed by researchers in various overlapping research settings (Baldwin and Woodard, 2009). In product development literature, the concept of platform is

applied to describe products that are developed to meet the needs of core customers, but are designed to be easily modified into derivatives by adding, substituting or removing features (Wheelwright and Clark, 1992). Gawer (2009) classifies such type of platform as: (1) internal platform, which is observed within the firm boundaries and heavily situated in manufactured products such as consumer electronics. For example, the adoption of an internal platform enabled Sony to develop more than 250 models of its Walkman in the 1980s (Sanderson and Uzumeri, 1997). (2) Supply chain platform, which extends the internal platform into supply chains and allow the design of particular modules externally. Popular supply chain platforms are mainly found in the automotive industry. And the (3) industry platform, or referred to as external platform, which goes beyond supply chains and enables individuals/firms that are not necessarily part of the supply chain to develop complementary assets. The industry platform is defined as set of technologies that are "developed by one or several firms, and that serve as foundations upon which other firms can build complementary products, services or technologies" (Gawer, 2009, p.54).

Industrial platforms are often observed in software development (Baldwin and Woodard, 2009; Franke and von Hippel, 2003; Gawer and Cusumano, 2008; Morris and Ferguson, 1993; West, 2003), and can be found in settings such as personal computers (Bresnahan and Greenstein, 1999), video game consoles (Iansiti and Zhu, 2007; Romberg, 2007), smartphones (Tiwana et al., 2010; Yoo et al., 2010), web systems (Evans et al., 2006), automotive technologies (Henfridsson and Lindgren, 2010) and music industry (Tilson et al., 2013). We refer to this type of platform as "digital platform" and is defined as "the extensible codebase of a software-based system that provides core functionality shared by the modules that interoperate with it and the interfaces through which they interoperate" (Tiwana et al., 2010, p. 676). A digital platform incorporates various modules that are deployed to extend its functionality (Baldwin and Clark, 2000, Sanchez and Mahoney, 1996). These modules are "add-on software subsystems" (Tiwana et al., 2010, p. 676) in the form of applications, or "apps", that are developed by third-party developers.

Third-party developers and their contributions in the form of applications are central to digital platforms (Bergvall-Kåreborn et al., 2010; Bosch, 2009; Boudreau, 2012; Evans et al., 2006; Messerschmitt and Szyperski, 2003; Remneland et al., 2011). Their importance is continuously recognized as building and sustaining the platform innovations (Evans et al., 2006; Hanseth and Lyytinen, 2010; Messerschmitt and Szyperski, 2003). The economy of digital platforms is mainly based on the added value by third-party developers. The more applications and services are supplied, the more value is created for the whole ecosystem around the platform (Huang et al., 2009). The supplied applications and services will probably address the needs of heterogeneous end-users (Adomavicius et al., 2007; Evans et al., 2006), and extend the functionality of the platform. Further, the reviewed body of academic literature and data from real cases revealed that the growing number of developed applications and services act as an entry barrier for competing platforms (Ghazawneh and Henfridsson, 2013). This enabled owners of digital platforms to transform their focus from being a software producer into becoming a distribution channel and reap the benefits of distributing, brokering, and operating the developed applications (Meyer and Seliger, 1998; West and Mace, 2010). Thus, it is not surprising that one of the main aims of digital platform owners is focused on creating and sustaining distributions channels that are refereed to as "digital application marketplaces" (Ghazawneh and Henfridsson, 2015).

The Evolution of Digital Application Marketplaces

Much has been written in the beginnings of the current century about the new opportunities for value creation over the Internet. The phenomenon of e-business which simply describes business conducted over the Internet witnessed almost every business sector scrambling to use the Internet for creating economic value and boosting competitive advantage (Amit and Zott, 2001). They created websites and developed novel digital business models to market their products in new marketplaces and increase their customer reach out.

Nowadays, we are witnessing a similar phenomenon where digital marketplaces have increasingly become a source of wealth and value creation for businesses as well as individual developers and innovators. In this respect, Amit and Zott (2001) argued that the characteristics of digital marketplaces have a profound effect on how value-creating economic transactions are structured and conducted. These include extending products range, new forms of collaboration, improved access to assets such as resources, capabilities, and technologies, cost reduction, and many others. Digital application marketplaces represent epitome examples where these new effects and shifts in value creation are manifested.

Digital application marketplaces, commonly known as App Stores or app marketplaces, are located at the interface between the platform owner and all other actors in the digital ecosystem including third-party developers and platform's partners and users (Müller et al., 2011). Their main functionality is to distribute applications on behalf of third-party developers to the platform's end-users. They support basic functionalities of marketplaces such as payments and commissions, enabling platform's actors to be identified and their transactions to be executed (Amberg et al., 2010; Han and Ghose, 2012; Kazan and Damsgaard, 2013). Digital application marketplaces provide the platform's end-users with the ability to search, browse, download, use, rate, and review as many applications as they want. They provide third-party developers and other partners of the platform with the ability to publish, update, promote and market their applications (Kim et al., 2010; Magnusson and Nilsson, 2013). A digital application marketplace is defined as "*a platform component that offers a venue for exchanging applications between developers and end-users belonging to a single or multiple ecosystems*" (Ghazawneh and Henfridsson, 2015, p. 4). There are various factors that differentiate digital application marketplaces from other types of marketplaces. First, they offer platform users with a new experience of consuming applications where searching across thousands of apps and downloading them only takes a matter of seconds (Amberg et al., 2010). Second, they have high buyers (platform users) and suppliers (third-party developers) fragmentation that create a healthy environment for all engaged parties (Kim et al., 2010). Third, digital application marketplaces changed the economic of the digital industry, created an economic advantage and enabled all engaged stakeholders to root for success. Platform users receive a better price (e.g. 1.99$ is the average app price in iOS platform), third-party developers sell more for less (e.g. $18064.55 is the average income of third-party developers in iOS platform) and the platform owner shares part of the generated values and revenues (e.g. Apple cuts 30% of each app sale) (Kazan and Damsgaard, 2013). Lastly, digital application marketplaces have generally strong network effects that depend on various factors such as the number of users, third-party application developers, provided applications and the availability of the application marketplace (Basole and Karla, 2012).

Value Creation and Economic Development

It has long been known that organizations, in particular, business organizations are the drivers of economic development and value creation (Schumpeter, 1934). For Schumpeter, combination of resources is central in the process of value creation and constitutes the source of economic development. He defined economic value development as carrying out of new combinations, that is, to produce other things, or the same things by a different method or to combine these materials and forces differently. Drawing on Schumpeter's ideas, Moran and Goshal (1996) developed a theoretical framework that characterizes the value creation process. The framework involves two key value-creating processes: resource combinations and resource exchange.

The combination of resources provides the source of new potential value (Moran and Goshal, 1996). As Moran and Goshal further explained: "*Each time resources are deployed in making new combinations, a new source of 'potential value' is created and added to the economic system*" (p. 5-6). While Schumpeter sees new combinations as the source of economic development, Moran and Goshal (1996) believed that they do not necessarily add wealth to society and, as such, lead to no economic progress. For Moran and Goshal new combinations only enable the creation of new potential value which they described as value creation. They argued that economic progress is conditioned by at least some value realization, which is a process of generating, appropriating, and exploiting wealth. In other words, the realization of value means it is exploited and eventually handed on. While Moran & Goshal (1996) argued that the creation of potential values does not lead to economic progress, they did acknowledge that short-term development might be possible even without any value creation. Overall, value creation and value realization are needed to achieve dynamic balance for an economic system (Moran and Goshal, 1996).

With respect to the value creation process, Moran and Goshal explained that economic development enabled through potential value creation depends on which of the many possible resource combinations are made. They said: "*it should be obvious that no where near all potential value creating combinations that are possible, for a given set of resources and a given set of preferences at any given time, are ever actually made … many combinations that are made may actually destroy more potential value than they create.*" (p. 7). This is directly related to resource deployments of which, according to Moran and Goshal, new value creating combinations compose a subset. They outlined three conditions that must be

met for the possible realization of any potential value. First, the availability of opportunities or means to make deployment e.g. resources such as knowledge, goods, and services, second the parties e.g. developers, with the opportunity or means to execute the prospective resource deployment must be motivated to make the deployment, and third these parties must also perceive the opportunity and expect or otherwise hope for some value to be realized from the deployment.

Finally, resource exchange has a dual role in the value creation process (Moran and Goshal, 1996). Moran and Goshal argued that the exchange of resources is the primary mechanism through which potential value becomes realized. Here their emphasis is placed on the realization of value. They explained that "*exchange validates the value of resources exchanged and thereby promotes and sends a signal of the realization of some potential value ... It also assigns a value to and reorders the set of resources that are available for new combinations. Hence, exchange also influences the way in which resources are deployed and the path taken in creating value.*" (p. 14). In this respect, Moran and Goshal (1996) were careful in distinguishing intrinsic value in exchange from economic value. Intrinsic value is a potential value that is created through new resource combinations but not yet realized; hence it has no economic value. It only refers to the weight or priority that different parties assign to certain things (e.g., a service). Economic value is intrinsic value that is realized through exchange, such as the transfer of a service to others, which eventually generates wealth and drives economic development. Moran & Goshal (1996) thus argued that exchange is the path for value realization and the actual development of economic value.

Value Creation in Digital Application Marketplaces

The significant developments in digital network and communication technologies has led to the emergence of digital business (Bharadwaj et al., 2013). Organizations then started to scramble to develop new business strategies that align with their business objectives. But continued advancements in technology have enabled new dynamic organizational capabilities as well as transformed social structures and relationships (Bharadwaj et al., 2013). For this reason, it has been suggested that it is becoming increasingly difficult to separate digital products from IT infrastructure (Orlikowski, 2009). New forms of organizing emerge due to the confluence between IT and organizational capabilities resulting in new affordances for creating value in organizations (Zammuto et al., 2007).

Bharadwaj et al. (2013) argued that this perceived inseparability compels rethinking the traditional business-IT strategy alignment view and instead move towards their fusion in digital business strategies. They defined digital business strategy as "*organizational strategy formulated and executed by leveraging digital resources to create differential value*". One of the four pillars of their conceptualization of digital business strategy is the sources of business value creation and capture. In digital business, organizations continue to leverage IT infrastructures to create new sources of value creation and sustainable competitive advantage (Kohli and Grover, 2008; Yoo et al., 2010). Information is one key source for value creation. There is established recognition of increased value from information by using IT (Bharadwaj et al., 2013; Kohli and Grover, 2008). IT has enabled significant transformation in the ways information is created, exchanged, shared, remixed, and redistributed which in turn caused dramatic power shifts in market channels and disruption of traditional sources of economic profits. These transformations, Bharadwaj et al. (2013) argued, have created fundamentally new sources of value. This can be seen in digitization processes through which new combinations of resources result in novel product and service innovations. The encoding of analog information into digital format like in many contemporary newspapers that are shifting from physical creation and distribution of content into the digital arena is an example of the creation of new innovative digital sources of value. The shift into digitized information at Newsweek magazine, for instance, shows how the magazine started to explore new sources of value creation by balancing between subscription and advertising (Bharadwaj et al., 2013). Digital mobile platforms like Apple's iOS, Google's Android, and Amazon's Kindle are important examples of how the digitization of products and services has created new ecosystems of value that redefined the entrainment, music, and book publishing industries. In this respect, Yoo et al. (2010) discussed several new digital strategy frameworks to capture new sources of value creation in such marketplaces such as generativity, heterogeneity, creating digital product platforms and meaning-making capabilities.

Besides information-based value creation, there is also the integration of IT in physical artifacts. Yoo et al. (2010) discussed another dimension of value creation with IT. They explained that the value of IT lies in its integration with and expansion towards third-party components. They argued that the increasing

embedding of digital components into physical products has created novel layered modular architectures. An example of this was reported by Svahn et al. (2009) where they discussed the integration of service-based modularity into component-based modularity within the car infotainment industry. This kind of integration creates new forms of digital materiality which leads to the "*emergence of digital service architecture for previously non-digital products and services*" (Yoo et al., p. 14). Clearly, such innovative architectures have the potential to enable novel sources for value creation and competitive advantage for both organizations and developers.

Research Method and Process

The research method used in this study is the qualitative interview. We believe that choosing to use the interview method as a vehicle for our empirical investigation was best suited to understand value creation in digital platforms. Examining value creation in digital application marketplaces requires an understanding of developer's practices including exchanges, deployments, and strategies which makes for a qualitative problem. The interview method is often considered a powerful tool for collecting qualitative empirical data that provide "*nuanced and authentic accounts of participants' outer and inner worlds.*" (Schultze and Avital, 2011, p. 35). It was thus necessary to develop a rich base of qualitative data that helped us in obtaining an in-depth understanding of various developer's key practices that describe applications distribution strategies and payment and review handling. The qualitative data also allowed us the flexibility to discover further aspects which are crucial for a thorough understanding of the data.

The empirical data collection took place in Scandinavia mainly in Denmark, Sweden and Norway. Our research participants included junior[1] and senior[2] third-party developers from these three countries with varied levels of experiences. These developers work with various digital application marketplaces mainly Apple's AppStore, Google's Play, and Windows Phone Store. The range of developed applications by each individual developer is between 2 and 8. See Table 1 below for a summary of the characteristics of research participants. The total number of interviews was 27 including 14 interviews with developers from Denmark, 10 interviews with developers from Sweden, and 3 interviews with developers from Norway. The data was collected in the period between August 2014 and January 2015. All interviews were performed face-to-face at the participants' workplace and each interview took about an hour. A voice recorder was used with permission to record the interview for later transcription and analysis.

Table 1. Interviews and Research Participants				
Country	Number of developers	Applications Marketplaces	Average no. of applications	Experience
Denmark	7	Apple's Appstore Google Play	8	70% seniors 30% juniors
	4	Apple's Appstore	3	80% seniors 20% juniors
	3	Apple's Appstore Google Play Windows Phone Store	2	55% senior 45% junior
Sweden	7	Apple's Appstore Google Play	5	80% seniors 20% juniors
	3	Apple's Appstore	3	60% seniors 40% juniors
Norway	2	Apple's Appstore	3	50% seniors 50% juniors
	1	Google Play	2	100% junior

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[1] Junior third-party developer: A developer with less than three years of experience in app development.

[2] Senior third-party developer: A developer with more than three years of experience in app development.

Data Analysis

The analysis of qualitative data obtained through interviews was based on theoretical concepts extracted from literature on digital application platforms (Basole and Karla, 2012; Müller et al., 2011; Ghazawneh and Henfridsson, 2015) as well as value creation (Moran and Goshal, 1996). Our choice to focus on this literature, mainly Schupmeter's (1934) ideas and Moran & Ghoshal's (1996) framework, is because it breaks down key processes of value creation and highlights how value is both created and realized. This aligns with our aim and also provides us with a theoretical basis to answer our research question of what characterizes the value creation process in digital application marketplaces.

So in order to analyze the empirical data and explore how value is created for and by third-party developers, we used theoretical concepts introduced by Moran and Goshal (1996) that include resources combination and resources exchange. We also used concepts like value realization and value sources to support our theoretical analytical base. Applying these concepts was essentially iterative to enable more flexibility for both exploring the manifestation of the concepts in the data and also to discover any hidden but potentially intriguing and relevant dimensions to our main focus on value creation. An initial, spontaneous analysis was done simultaneously during the data collection, that is, during and immediately after each individual interview was completed. This was an important preliminary step for the formal analysis of data based on the theoretical concepts. It helped us in two ways: first, early recognition of key areas and data segments in each interview for later focused analysis, second, timely understanding of how the data might be framed and related with our theoretical concepts. This initial data analysis was documented by making notes in a separate document containing the theoretical concepts. For instance, during the actual interviewing process, we used this document to make notes of interesting parts or quotes from the interview and associate them to relevant theoretical concepts. Once the interview is completed, the same document was used to revise the already documented interview quotes and their relationship to the theoretical concepts. This can be described as 'on-the-spot' analysis based on fresh understanding of the interview that was just finished. The data collection and the initial analysis were both done by the first author of the paper.

Later, the formal data analysis was dealt with by the two authors of the paper. At the beginning, the two authors discussed the initial analysis by reviewing all the notes together with theory-relevant data segments (e.g., interview quotes) to initiate a focused interpretation of the data. Then, each of the authors analyzed the interview data separately but using the same analytical guide document. This document contained a simple table divided into three columns as shown in Table 2 below. The first column includes the theoretical concepts used for the analysis. The second column includes interview data segments that are basically central quotes identified from several interviews. The third column includes a descriptive interpretation of the quote relative to the theoretical categories.

Table 2. Analytical Guide Document (brief example)		
Theoretical concepts	Interview Quotes	Analytical description
Resources exchange	*"…more than 70% of users take their decision of downloading an app based on its review."*	Users' reviews represent an exchange of value (e.g., feedback on quality, comments on bugs), that is, validating and rating the app which forms a basis for signaling to the user whether to buy the app or not.

The actual analytical interpretation of data performed by each author was hermeneutic in nature (Cole and Avison, 2007). Emphasis was placed on explicating the meaning of data relative to the theoretical concepts. This involved iterative reading, interpreting, understanding and making sense of each interview transcript. The outcome from this iterative analysis was twofold: first finding out which interview data segments (e.g., quotes) correspond to certain theoretical concepts, second establishing appropriate associations between these segments and corresponding concepts based on our analysis of the meanings implied in each individual data segment. After relevant data segments were identified and the associations

established, one or more segments were organized under 'Interview Quotes'. In Table 2 above, for instance, we show an example of associated quotes on users' reviews to the concept of resource exchange. An analytical description is also provided to show the rational of this association as well as make explicit the meaning implied in interview quote(s) relative to the corresponding theoretical concepts. Each interview transcript was subject to the same analysis in terms of identifying relevant data segments, associating them with corresponding concepts, explaining them, and finally documenting all these items in the analytical guide document. When the analysis of all interview transcripts was completed by both authors, the tables were compared with emphasis on highlighting salient concepts and dominant themes. For instance, we looked at which data segments were most cited by each author, what are the most dominant associations, and key insights into value creation from the analytical descriptions. At this final stage of the analysis, a general table containing the most relevant data segments and their associations to theoretical concepts was developed. This table provided us with a basis for our discussion of the results, identification of potential value sources in digital application marketplaces, and the development of arguments about how these sources offer developers opportunities to create and realize value.

Results

Distribution of Applications and Services

The distribution of applications and services across digital application marketplaces is a major issue that concerns third-party developers. The distribution is affected by four main factors: the number of current available applications, the geographical area where the marketplace operates, the number of different devices that use the marketplace, and the total number of users. Table 3 below illustrates the distribution of applications and services across four major digital application marketplaces (Apple's Appstore, Google Play, BlackBerry World and Windows Phone Store).

Table 3. Distribution of applications across the four major digital application marketplace					
Digital application marketplace	Platform	Available applications	Geographical area	Devices	Users
Apple's Appstore	iOS	1,200,000+	154 countries	23	800,000,000+
Google Play	Android	1,300,000+	135 countries	8,580+	1,000,000,000+
BlackBerry World	BlackBerry	130,000+	171 countries	33	46,000,000+
Windows Phone Store	Windows Phone	300,000+	193 countries	132	50,000,000+

Many developers see a tremendous value of the current distributions strategy used by the owners of digital application marketplaces. Being able to choose the geographical area(s) in which the applications to be distributed are of a great value. A senior developer (Sweden) clarified:

> *We currently have two active apps in the Appstore and Google play. One of those apps is available worldwide, so it's international you know English based. The other app is local, only available in Sweden, I mean to everyone who uses the Swedish appstores. We also plan a new app this year but for the whole Scandinavian market…. You see this gives us control on who we are targeting with our apps and more focus I think.*

All of our participants agreed that the ability to make applications available in front of a large number of users and the different number of devices using a particular digital application marketplace are found to enhance the strategies of developers. A co-founder of a mobile startup (Denmark) explained:

The good thing about appstores is that millions use them. Just imagine, you put your app directly on the shelf in front of millions of visitors everyday. The fantastic thing is that we don't sell the app to users of specific taste who use one type of smartphone.......... This would be a problem if it were the case. We develop the app and it is downloaded on many devices especially for Android by all types of users. We have people downloaded our apps from Swaziland, a country I have never heard before, it turned out to be a state in Southern Africa.

The sheer volume of applications available in particular marketplaces such as Apple's Appstore and Google Play is seen a problem for most of our participants. This is due to the fact that it is challenging to become visible on marketplaces where a lot of applications are deployed on a daily base. However, a few numbers of developers see a huge potential. A senior developer (Denmark):

Developers are always worried about getting their apps in front of people. Look at Instagram and Snapchat in few months and very small team their apps get attracted by millions. Its not impossible thing, you need a strategy and an attractive app. So, I think the big number of users is an advantage for us, it tells us that this appstore is popular and there is users and money in. It is then our responsibility to make our app popular and have momentum.

The business of digital platform has shifted from producing software into distributing applications that are developed by third party developers. The distribution of applications requires that owners of digital application marketplaces publicize, market, and feature applications to users. All of our respondents agree that digital application marketplaces provide the right support to help developers market and sell their applications. One senior Swedish developer clarified:

I know that some developers might have hard time selling their apps. But, I think its not the appstore problem, appstores do their best helping us ' prompting our apps, showing them to users and some time we got featured. I think it's our job as developer to utilize all the opportunities the appstores are giving us. Every developer has to ask questions, like, how my app can be featured by Apple, Google or Microsoft? How my app can by listed in the top 100 apps in a particular country? Etc.. Knowing the answers and working towards them is the ultimate magic.

Another senior developer from Denmark commented on this:

Once an app gets featured expect 1 million sales that night! I'm serious, I have seen these numbers achieved by other developers even with apps that didn't require that huge efforts.

Payment Handling

Handling payments is a major issue that concerns most if not all engaged parties in digital application marketplaces. Developers see themselves as being the most affected in payment handling process. Owners of digital application marketplaces such as Apple and Google process and handle all marketplace financial exchanges and transactions and then pay out to developers on a scheduled basis. Many developers found a great value in not being part of the payment handling process. A senior developer (Denmark) that has been working with "apps" since 2009 stated:

I have been working with software development since more than 15 years and with apps since 2009. I can tell that selling your software online wasn't an easy task. I think what Apple does was great in the way they made my life just easier.

Another senior developer (Denmark) identified this value by stating:

You know, I feel very relax when it comes to getting my money from selling apps. Apple and Google do everything, they process users' orders, receive the payment, refund users, or charge them back, and pay me out monthly, around the start of the month. So, I don't have to worry about all this stuff, I just have my money when my total sales reach the minimum pay threshold.

Our findings revealed that developers tend to make choices about a particular digital application marketplace based on its payment handling process. Developers might avoid a particular marketplace if they don't process payments accurately or on time, and if they are not seen as a trusted marketplace. A senior developer from Denmark who has been involved in developing games for Asian markets explained:

> *We develop games, and they are very hot in Asia. Once, during a meeting we discussed the idea of targeting local Android platforms in Asia. The big question was, do we really trust those local stores when it comes to payment, do they send money oversees, etc... after this discussion we killed the idea.*

While respondents recognize the value of payment handling by the owners of digital application marketplaces, still many of them expressed concerns regarding fees charged by these owners for each transaction that takes place in their marketplace. The discontent regarding this fee that goes up to 30% and known as (30/70 revenue share) explained by a Swedish junior developer:

> *I think that taking 30% of our income from the apps is just crazy. This is a lot of money, Apple started this and Google, Amazon and others followed. They don't only share the revenues of selling our apps but also if the app is free and we want to sell services inside the app, like I have a free game on two appstores and I sell levels to gamers, they even share this with me. I think most developers don't like this but they can't do anything about it.*

Users' Review and Evaluation

Most digital application marketplaces have review systems that enable users to rate and provide reviews of applications that they have actually used. The main aim of these systems is to objectively measure the quality of applications and put these measurements in front of other users helping them to judge applications beforehand. The review system is generally straightforward, but this varies depending on the type of the application, e.g., whether the application is free or incurs a charge, the type of users and the development team.

For some developers this is an enduring problem. This is evident in a comment by a senior mobile developer from Norway describing his worries about how "review systems" of digital application marketplaces usually harm developers and their applications:

> *In my opinion the review is unfair at all and I can't see the value it provides to my apps or myself as a developer. I think most users who are adding their reviews are either angry users who didn't like the app and wanted to complain, or, users who have positive incentives to rate the app. But this is not enough and this problem not only in appstores but everywhere online when it comes to rating services or so. Maybe the only difference is that reviews only come from users who downloaded and used the app. All in all, these review systems in most occasions work against us not with us.*

Many participants in our study, however, described perceived values the "review system" is offering to their applications. Most of them believe that if the "review system" is utilized properly it would be of a great value for all actors in any digital application marketplace. This has been emphasized by co-founder of a mobile startup based in Norway:

> *Well, its tricky, but I'm sure that app owners can gain a lot from reviews. Many apps get attention because of the positive review they have on appstores ... Apple and Google even notice such apps and feature them. I do think, the review is a free tool provided to us, we have to be able to encourage and remind app users to add their reviews ... There are many studies showing that more than 70% of users take their decision of downloading an app based on its review.*

Application's Review Process

Owners of digital application marketplaces apply a review process on submitted applications to the marketplace. Third-party developers submit their application to the marketplace and wait for approval or rejection by the review team. Third-party developers of rejected applications receive comments and feedback from the review team on the reason behind the rejection of their applications. The review team gives third-party developers the chance to resubmit their rejected applications after being modified according to the review. The general aim of the review process is to ensure that applications are reliable, secure, perform as expected, and free of offensive and copyrighted material. The review process varies from being mandatory and strict in particular marketplaces to being optional and very loose in other marketplaces.

> *We as a development team has a lot of experiences with the app review process both with Apple's appstore and Google Play. There is a huge difference between both stores, Google's process is very quick, easy and they accept your app in a matter of hours sometime. But, the case for Apple's AppStore is different, they are hard, we have to wait for couple of weeks sometime and they have a tough review, the review team seems to look at every single detail. I remember Apple rejected one of our apps asking us to clarify our description of what the app is about.*

All of our respondents expressed several concerns regarding the review process of applications such as delays, irrelevant feedback, and bias. Still, many of them pointed out that the review process brings a lot of value that cannot be found in any similar development settings. Third-party developers see the review process as external quality assurance to their development. A Norwegian senior developer explained:

> *I look at the review process in a positive way. In terms of QA and testing, when we submit an app to appstores, we have people there testing our app, finding bugs, reading our descriptions, and making sure everything works fine. These people are our second eye that saves us time, money and efforts.*

A handful number of third-party developers consider the review process implemented by digital application marketplaces as a gifted quality assurance performed on their applications. A Danish developer explained this:

> *I know that many developers might told you already how lengthy the review process is especially for Apple. But lets face the truth; they are trying to protect their platform and us as well. I like the way they protect copyrighted material, trademarks and other stuff. Others are following Apple in their approach, Amazon, Google, and Microsoft. If you have a software that runs online, its hard to protect it, but if you have it on the appstore then you have always a controller who makes sure everything works under the law. At least that's my opinion.*

Availability of Development Resources

Digital application marketplaces provide third-party developers with all required resources to develop, exchange, maintain, and deploy their applications in the marketplace. This includes technical and social resources. Technical resources include Software Development Kit (SDK), Application Programming Interfaces (APIs), technical support, access to development centers and developers forums. Social resources include agreements, advertising and marketing support, account management and detailed activity tools. Our respondents described how those resources are essential to their development practices. One of our interviewees explained:

> *I have been working as a software developer for the last 10 years, I developed desktop applications, websites and recently mobile apps, and I can tell from my experience is that what mobile platforms are providing us is enormous. They give us all tools and help that we need and you know it's a win-win-win situation, appstores win, users win and we win.*

Other respondents agree but still think that there is a delay in proving resources. This delay is based on the strategies of digital application marketplaces and not on third-party developers needs. A senior Danish developer clarified:

> *Yea, they give us resources, tools, all help we need. But, they always release those tools when they want not when we want. I mean, in many cases we have great ideas for apps but we can't implement them because of a certain API not provided. I know they release those tools when they have a new device or when they fear a competitor and so. As a developer I want everything to be provided in advance, I don't wanna beg them.*

Availability and Reliability of Applications

Digital application marketplaces host all applications supplied by third-party developers and make them available to end users of the platform. The availability of applications and future releases depend on the consistency of the service provided by owners of digital application marketplaces. Most of our respondents view this of a great value to their business. One of our respondents explained:

Here we have a great value, they host our apps, they keep their servers running 24hours, 7 days a week and users can buy and download our apps anytime without experiencing any problem. Just imagine if we would host our apps internally, and suddenly a problem occurred in the server during peak hours (like for example Christmas eve for a greeting app) and we are unable to deliver our apps to users, we will have a great loss.

For developers, this value is associated with trustworthiness of having applications available to all users all the time. Our respondents refer to this as "reliability". One of senior respondents illustrated this:

Maybe not all developers might see the value here. Having my apps hosted by Apple or Google is far more than only having them available all-time. For me, it's about having reliable software. Ask yourself how many times users might hesitate before they download an app from untrusted sources. That's the point; users know that everything is taken care by Apple's or Google's so they don't question the reliability here, at least!

Discussion

Digital application marketplaces have emerged as an increasingly powerful conception of digital platforms due to transforming the focus of digital platforms owners from being software producers into providers of distribution channels (Meyer and Seliger, 1998; West and Mace, 2010). Here, we set out an empirical-based understanding of the value creation process from a developer's perspective (See Table 4) by illustrating six key value sources and describing value creation and realization based on data analysis.

Table 4. Value Creation in Digital Application Marketplaces (Developers' Perspective)					
Value Sources	Value Creation		Value Realization		
	Resource Combination	Resource Exchange	Opportunities	Parties	Perception
1. Distribution of Applications and Services	Marketplace Sales	Intrinsic Value	Logistics (downloads)	- Developers - Marketplace Owners -Users	Delivery of applications and services to users.
2. Payment Handling		Economic Value	Settlement	- Developers - Marketplace Owners - Payment Agencies	Transfer of payment to third-party developers.
3. Users' Review and Evaluation	Marketplace Review	Economic Value	Reputation	-Developers - Users	Applications ratings influence app sales.
4. Application's Review Process		Intrinsic Value	Legal	-Developers -Review teams	Contract law, intellectual property protection.
5. Availability of Development Resources	Marketplace Deployment	Intrinsic Value	Institutional infrastructure	-Developers -Marketplace owners.	Technical resource and social resources.
6. Availability and Reliability of Applications		Economic Value	Trust	-Developers -Marketplace owners.	Safety, and quality of applications.

Marketplace Sales: *Marketplace sales* combines two *value sources*:

Distribution of Applications and Services: is a *value source* that is seen by third-party developers as a logistic opportunity. This opportunity is exploited once third-party developers are able to target specific geographical area(s) to sell and market their applications. It is also exploited as an opportunity or means to make deployment (Moran and Goshal, 1996) of their applications in different number of devices and being able to make applications available in front of a large number of users. This value source is perceived as an exchange or delivery channel of applications and services to users where three parties are engaged in the value realization process: third-party developers, owners of digital application marketplaces and the users. Even though our data shows that the use of this value source varies from one third-party developer to another, the resource exchange entails a huge intrinsic value since it creates a potential value that can be later realized once for instance the app is delivered and purchased by users. This is combined with another value source that handles transactions and payment.

Payment Handling: is another *value source* that is provided by owners of digital application marketplaces to facilitate the transfer of payments between users and third-party developers and take the responsibility of handling all side transactions. Third-party developers realize this value source as an opportunity of transaction "settlement" (Moran and Goshal, 1996) and perceive it as having a direct *economic value* in terms of *resource exchange*. Our data analysis shows that third-party developers perceive a series of opportunities that incorporates: receiving payments from users, refunding them, or charging them back. In addition, choosing to work with a particular digital application marketplace based on its payments handling method can be seen as a validation measure of the marketplace itself (cf. Moran and Goshal, 1996). Nevertheless, third-party developers believe that this value source is of a high cost. This concerns the transaction fees that owners of marketplaces apply for each transaction that takes place in marketplaces when they directly cut 30% of each transaction.

Marketplace Review: *Marketplace review* combines two *value sources*:

The first *value source* is the *Application's Review Process.* Once third-party developers submit their applications they become subject to a review process by the review team in digital platforms for ensuring reliability and securing copyrighted material. The second *value source* is *Users' Review and Evaluation.* When the application is approved by the platform owner and is ready for download and use by platform users, users have the possibility to make review of the quality and features of the application. Hence, two different types of application reviews are done by both owners of digital application marketplaces as well as users for different purposes and intentions. These reviews represent important exchange processes among review teams, third-party developers, and application users. In both cases, however, the reviews done by review teams and users can be seen as validation measures that signal the value of the application (cf. Moran and Goshal, 1996). Such validation is essential to creating and realizing value for third-party developers. A new source of potential value is created once the application is approved to be available for millions of users in the digital platform. Value can then be realized when platform users start downloading, using, and reviewing the application which will generate economical revenues for developers. So while application reviews by platform owners and users are done with different intentions, there is still some sort of guaranteed value to be created for and realized by third-party developers.

Marketplace Deployment: *Marketplace deployment* combines two *value sources*:

Availability of Development Resources: is a *value source* in which digital platforms owners provide third-party developers with several means and tools that help them in developing and selling their applications. They make available a myriad of technical and social resources that are utilized and exploited by third-party developers to deploy their applications. These include software development kits (SDKs), application program interfaces (APIs), technical support, access to development forums, advertising and marketing support, account management, and others. Moran and Goshal (1996) discussed that the availability of resources is one of the conditions for the realization of value. Our empirical results show that third-party developers make use of all these different resources at various stages of the application development process. Without these resources, it is unlikely that third-party developers would be able to develop and deploy applications to platform users, hence no potential for value creation or realization. The idea of making such resources available to third-party developers can also be seen as one sort of resource exchange in the form of intrinsic value. It was shown in the results that platform owners control deployment and distribution depending, for instance, on competitive issues. Controlling resources is a

practice that assigns value to and reorders the set of available resources (cf. Moran and Goshal, 1996) for developing new applications by third-party developers. In other words, it is an exchange through which platform owners decide what potential sources of value creation can be available to third-party developers. As suggested by our research participants, the already available set of resources provides them with the means to create and realize value by developing applications. But platform owners' control of these resources, like in the case of Apple's AppStore, influences how third-party developers go about creating values, or in the words of Moran and Goshal (1996) "*influences the way in which resources are deployed and the path taken in creating value.*"

Availability and Reliability of Applications: is another *value source* through which owners of digital platforms provide third-party developers with hosting solutions for their applications and make them available directly through the platform to all end users all the time. Third-party developers realize the value as a trust opportunity where users see applications as safe to use and of quality. The resources exchange in the value source has an obvious *economic value*, as users will be able to buy and download their desired applications instantly and without any service interruption. Our empirical data shows that all engaged parties, third-party developers, users, platform owners perceive the opportunity of the availability and reliability of applications. This is inline with Moran and Goshal (1996) of how opportunities derived from new value sources can be perceived by all engaged parties.

Implications

There are a number of implications of our research. First, our perspective on value creation complements the literature on digital application marketplaces (Ghazawneh and Henfridsson, 2015; Holzer and Ondrus, 2011) and extends the literature on digital platforms (Ghazawneh and Henfridsson 2013; Tiwana et al. 2010; West 2003) by applying the value creation framework (Moran and Goshal, 1996; Schumpeter, 1934) to digital application marketplaces.

Second, our research provides a perspective on the character of the value creation agenda needed for digital application marketplaces in particular and digital platforms and ecosystems in general. Rather than position a particular value source towards a defined group (Moran and Goshal, 1996), our study shows how multiple value sources need to be provided and combined in practice to satisfy and meet the requirements of different parties in digital application marketplaces.

Third, the result of our study suggest that owners of digital application marketplaces need to advise set of value sources that can be provided to third-party developers.

Finally, we contribute to the research of digital innovation (Eaton et al. 2011; Henfridsson et al. 2009; Svahn et al. 2009; Yoo et al. 2010) by illustrating how value sources can be combined and exchanged to create a value that can be realized by third-party developers and other parties which is a useful starting-point for future studies of the dynamics of digital application marketplaces.

Conclusion

In this paper, we synthesized the value creation perspective (Schumpeter, 1934; Moran and Goshal, 1996), and digital platforms literature (Ghazawneh and Henfridsson 2013; Tiwana et al. 2010; West 2003) to study the value creation in digital application marketplaces. Based on an extensive research study of third-party developers we developed an empirically grounded understanding of value creation where we identified six value sources that are combined and exchanged to create values that can be realized by third-party developers.

Future studies could address several limitations in our work. It would be useful to compare our results with investigations of third-party developers from other countries. Another direction for future work would be to investigate value creation, and also potential value destruction, in digital application marketplaces from the perspective of users and owners of digital platforms.

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