사용자 관점의 모바일 앱 스토어 비교연구 : 구글 플레이와 T 스토어를 중심으로*

앤드류 델라 로사** · 이홍주**

Two App Stores in One Smartphone : A Comparative Study on Mobile Application Stores between Google Play and T-Store*

Andrew Dela Rosa** · Hong Joo Lee**

■ Abstract ■

The tremendous advancement of technology sparked a lot of opportunities for developers and consumers to pave way to a dynamic application market in smartphones. This study focuses on the users' perspective, that is, the preference between two application markets that varies in many perspectives of its features. Hence, the purpose of this study is to provide a comparative study on two mobile application stores in smartphones; Google Play and T-Store. A survey was conducted to compare the markets, and the results showed the different influencing factors on choosing and using each application store. In addition, the results somehow revealed the harmony of co-existence in smartphones.

Keyword : Application Stores, Google Play, T-Store, Smartphones, IS Success Model

1. Introduction

In the recent years, mobile devices dramatically increased in number that if ever a worldwide comparison of the usage between personal computers and mobile devices are conducted, the latter will be approximately 3.5 times more than the previous [14, 15]. Evidently, the research study wants to delve into the specific feature of smart mobile devices that garnered a lot of interest, that is, mobile application stores. The total current count for local and global app stores is hundred twenty [2]; among these numerous app stores, five big major platform app stores stand out. These major app stores are Google Play, iTunes Store, Nokia Ovi Store, WP7 Marketplace, and BlackBerry App World. Each of these app stores have different features and policies to meet the satisfaction of their respective consumers. In certain ways, these numerous app stores have revolutionized the distribution opportunities of various media and applications.

Traditionally, the development of mobile services is managed by mobile network operators (MNO), phone manufacturers, and some mobile application and content providers [21]. However, the arrival of innovative software companies with their own mobile phones and platforms tremendously changed the ground of competition and actors involved in the value chain [16]. The innovation made by Apple App Store with its significant role in the mobile application platforms created the standard for others.[1]

Amberg et al. [1] defined application stores as an intermediary platform for getting together the offer and demand for digital goods. Many studies identified important factors of utilizing app stores in terms of number of apps and app providers' perspectives such as motivations and environment for app developers. While there is only one app store on iPhones, there are more than one app stores on Android based smartphones. Google Play is a default app store provided by OS developer, Google, and MNOs also installed their own app stores such as T-store by SK Telecom and Olleh Market by KT. However, there is no study to our knowledge of users' selection of app stores even though there are more than one appstores in an Android smartphone.

Therefore, the goal of this study focuses on examining and exploring the motivating factors to use and choose app stores. First, this study wants to generally understand on how the different perspectives of app store providers in catering its services to respective users affect the preference and usage behavior of app stores. The comparative study on two different application stores, T-Store and Google Play, a case of local and global portal for the distribution of various applications ranging from games, videos, utilities, and many other things, totally creates the attraction of exploring the vast differences between them. But, the amount of related studies that endeavored to explore this area of interest is quite limited. More so, determine from this area the relevant aspects for a local and global application store provider to thrive. Second, we want to examine how the specific functionalities of application stores affect the usage pattern and satisfaction of consumers.

Section 2 summarizes relevant studies on mobile app stores and Section 3 provides our research model. Section 4 explains research meth-

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1) Chetan, S. Sizing Up the Global Mobile Apps Market. Chetan Sharma Consulting, March 2010.

odology and the analysis results are discussed in Section 5. Discussions and conclusions are provided in Section 6.

2. Research Background and Framework

2.1 App Stores

Smartphones are being adopted at a phenomenal pace but consumers get linked to a specific application store not because of their active choice but through the choice for a mobile device [1]. While there are studies on how people use these devices, how many applications a user runs, and how the user's attention is spread across them, there are not many studies to our knowledge about the choice of app stores in a smartphone. Unlike iPhones, an Android based smartphone can have multiple application stores operated by OS provider, network provider, and other content providers such as Amazon.com.

This paper focuses on Google Play of Google, and T-store of SK Telecom since these are most popular Android app stores in South Korea and there are many differences between the two stores as a global and local store respectively. The differences are summarized in <Table 1>.[2]

2.1.1 Google Play

In 2008, Google announced the Google Play, an online software store for Android devices, where it is preinstalled in the said device. In 2011, Google reached the 200,000 app milestone with an approximate of 3 Billion applications installed.[3]

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2) Adapted from App Store Report, 2011.
3) Leena Rao, Google http://techcrunch.com/2011/04/14/google-3-billion-android-apps-installed-up-50-percent-from-last-quarter/, Apr. 2011.

〈Table 1〉 Application Store Comparative Summary

Application Store	Google Play	T Store
Parent Company	Google	SK Telecom
Launched	October 10, 2009	September 9, 2009
Potential Device Base	~46 million (Aug 2010)	Undisclosed
Actual Device Base	~46 million (Aug 2010)	Undisclosed
Regional Availability	Worldwide	South Korea
Downloads	8 Billion (Sept 2011)	Undisclosed
Apps in Store	400,000+ (Nov 2011)	6500+
Apps categories	All	All
Apps Pricing	Free and Paid	Free and Paid
On device portal	Yes, and Web Portal	Web Portal
End User payment method	Google Checkout, In-app billing	Monthly phone bill
Runtimes supported	Dalvik, native	Undisclosed
OS Supported	Android	Undisclosed
Device Supported	All Android devices	Undisclosed
Revenue Share	70%	70%
Joining fee	$25	Undisclosed
App Signing fee	No	Undisclosed
Promised time to market	Immediate	Undisclosed
Regional Submission process	One time	Undisclosed

Intuitively, Google simply merged its Google Play and Google Music services, which they added in Nov of 2011, to emphasize that entertainment should be an experience of fun, which is basically something that is expected from an application store-thus, Google Play a digital en-

tertainment portal where music, movies, books, and importantly, applications can be enjoyed and shared by Android users.[4]

The Google Play's ranking of most apps per capita South Korea came in first followed by Hong Kong and Taiwan.[5] And the games category was the most popular with approximately 25.6% downloads overall. Application developers receive 70% of the price of application, and the remaining 30% are distributed between carriers and payment processors; the revenue earned by the developers in Google Play is paid through Google Check out merchant accounts, or Google Ad Sense in some countries.[6] Furthermore, an application store being an open-system is like a double-edged sword for developers since code change suggestions can lead to fragmentation that may create interoperability issues with other platforms and increase overhead [14]. Also, Lee et al. [20] considered that the Android platform poses some challenge due to performance consideration, quite difficult for integration for vendors, and it is too much Google dependent. More so, malicious applications have easier way to users because of the fluidity of application stores, especially Google Play, that basically translates to the easy point and click access to hundreds of thousands of applications [11].

2.1.2 T-Store

In 2009, SK Telecom, a South Korean mobile

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telecommunications operator, announced its local online application store to Android users, and the rapid development and popularity of T-Store was associated with the strong sales of the Samsung Galaxy S.[7] Similarly, T-Store is an open marketplace for developers who want to create and sell their applications and consumers who want to download (free or paid apps) from its vast selection and categories of mobile applications. One of the many competent strategies of SK Telecom to expand its market shares is offering the application platform to other mobile providers, specifically KT and LG, in South Korea.[8] Although, the latter mobile providers have their own application store platform, 'Show App Store' (which integrated into 'Olleh Store') and the 'Oz Store' respectively; it is still quite small compared to the size of T-Store's. Moreover, the attraction created by T-Store to smartphone users propelled SK Telecom to nurture its developers to create quality and Korean-inspired mobile applications, and thus, the establishment of 'T-Academy' and promotion of developer competitions. Unlike Google Play, T-Store took an extra effort in creating a harmonic and rich ecosystem of users and developers to achieve their goal of global reach.

A similar approach with Google Play's, the application developers in T-Store can set their application's price and take 70% of the sales revenue and the remaining 30% will be the commission of SK Telecom for infrastructure upgrade and marketing activities, which is one

4) Jamie Rosenberg, Google Play http://googleblog. blogspot.com/2012/03/introducing-google-play-all -your.html, Mar. 2012.

5) Chris Ziegler, Android Market status : South Korea uses most apps, games most popular category, http://www.theverge.com/2011/12/8/2621035/andro id-market-stats-infographic.

6) Android Market for Developer http://support.goo gle.com/androidmarket/developer/bin/answer.py?hl =en&answer=113468.

7) IT Times, http://www.koreaittimes.com/story/49 46/sk-telecom-opens-t-store-first-mobile-open- market-korea, Sept. 2009.

8) Sohn, J.-K. and S. Chung http://media.daum.net/ foreign/englishnews/newsview?newsid=201009051 82726911&cateid=1047, Sept. 2009.

evident difference of interaction between platform provider and developers in the two application stores[9]. As for the payment process of users in T-Store, they can pay through their monthly phone bill or 'e-Banking', where the payment for the applications and mobile services from T-Store are done electronically through their bank account.

2.2 IS Success Model

In the early 1990s, several studies focused on the adoption of mobile devices because of the pertinent implications it can bring to everyone's daily activities. The corollary perspective on the adoption of mobile devices includes all the attributes, from the software (applications, operating system, etc.) and hardware (memory card, display, camera, etc.), that could sum up its entirety. Several studies that explored the adoption of mobile commerce used the Unified Theory of Acceptance and Use of Technology (UTAUT), Technology Acceptance Model (TAM) or Theory of Planned Behavior (TPB) [6, 26] to have a concrete analysis to support their research [32].

The original model of IS Success [8] presented an integrated view of the concept of IS success and sparked considerable attention from various literatures, and was later on revised by the authors ten years after the original publication with the addition of a new construct, Service quality, as an additional dimension of IS Success [9]. Hence, to encapsulate the concept of the research study, DeLone and McLean IS Success model posed an impeccable academic

consistency and reliability to the purpose of the study. DeLone and McLean [9] explicitly proposed that Information quality, System quality, Service quality, and Usage affect the User satisfaction. Thus, the exploration of other related factors under these constructs will shape the research model for this comparative study of application markets.

User satisfaction, regarded as one important construct in Information systems [35], determines the subjective opinion and experience of users in the application market interaction in android smartphones, and one of the key constructs in IS Success model. Several researchers also determined the significance and appropriateness of User satisfaction [4, 5, 23]. The increasing importance of application markets triggered user satisfaction to be a critical construct in this research study, for it will be the immediate basis of preferential choice of application market users.

Another dimension that seemed to be important in this study is the Use dimension. IS Success model pointed out that Use measures everything from a visit, to navigation of the features, to information query, to download of the desired applications, and to execute any form of transaction with the application provider. Similarly, Use dimension affects the User satisfaction of application stores because of the consumer experience cycle. With all things equal, the Use and User satisfaction dimension influences the Net benefits which indirectly represents the better option between the two application stores.

3. Research Model

In line with the conceptual idea of IS Success

9) IT Times, http://www.koreaittimes.com/story/4946/sk-telecom-opens-t-store-first-mobile-open-market-korea, Sept. 2009.

model and other mentioned literatures, the study proceeded with different factors for each construct, and proposed a number of hypotheses in mobile application store usage. In this study, Information quality is defined as the information provided to the user in terms of its Scope and Usefulness of an application market. According to DeLone and McLean [9], Information quality should capture the content issue; and thus, it should be personalized, complete, relevant, easy to understand, and secure. Similarly, Lee et al. [20] defined Information quality as a variable that represents the quality of information content produced and offered, and it is a multi-dimensional concept like the other constructs; and thus, can be related with the following variables : accuracy, precision, relevance, completeness, timeliness, reliability, understandability, and scope [4, 8, 31].

The application store that is beneficial to users can be related with the completeness and exhaustiveness of available applications, and that is what makes it an application market at the first place. According to Pepper and Gronmo [27], Scope is closely related to the notion of context; thus, Scope covers a number of related but distinct concepts (applications) and that needs some form of structuring.

Application stores have various categories for their applications. On one hand, T-Store has classified its applications into 8 categories, namely : Game, Fun, Life/Location, Language/ Education, Music, VOD, Comedy, E-Book, and Shopping/Coupon. On the other hand, Google Play has classified its application into 27 categories, namely : Games, Books and Reference, Business, Comics, Communication, Entertainment, Finance, Health and Fitness, Libraries and Demo,

Lifestyle, Live Wallpaper, Media and Video, Medical, Music and Audio, News and Magazines, Personalization, Photography, Shopping, Social, Sports, Tools, Transportation, Travel and Local, Weather, and Widgets. Evidently, the huge difference in the Scope of the two application stores is expected since it's a competitive clash of a local and global application store in a smartphone.

According to Scheibehenne [29], in a market context, a large variety increases the likelihood of satisfying diverse consumers and because it facilitates competition, it eventually drives price down and quality up. Such is the case of Google Play because it has so many competitors for its application space that it needs to offer a lot of free applications for end users. Considerably, the position of T-Store against Google Play seems to be very small, yet it encompasses better strategic approach than Google Play.

Scope is the range of applications available and ready for download/purchase from the application market. Hence, the wide range of available applications in the application market will project to users that it is qualified and willing to provide applications. Therefore,

Hypothesis 1a : Scope of the application available will positively influence Use of Application Store.

Hypothesis 1b : Scope of the application available will positively influence User satisfaction with Application Store.

The application store with the most informative and valuable details when it comes to download and/or purchase of an application can be

surmised as useful to consumers. With the vast number of applications available over the application store space, the average user is not expected to spend most of the time in searching for the desired application. A serviceable application store, which is being of practical use for users, is very important feature that distinguishes it among others.

Generally, users tend to search one application first before looking on the alternative application store. In certain ways, Usefulness delineates the differences between the two application stores. Also, it shows the competency and reliability of application stores when immediate search of an application arises. The pricing strategies in both markets are different; Google Play application prices are in US Dollars and Korean Won, while T-Store application prices are in Korean Won only. Some users considered that the convenience offered by T-Store as more useful to them than Google Play. It is very important that the payment procedure or even the download procedure should be as simple as possible for them to consider it useful on their daily activities. The study dissected the concept into Ease of Purchase and Usefulness; the former concerns about the process of purchasing/downloading applications from the application store while the latter focuses on the overall value of the information and services provided by the application store.

According to Davis [7], Usefulness is the degree to which an individual believes that using a particular system would enhance his or her performance. The application store by its sole purpose provide a wide range of applications, which eventually poses as a channel of distribution that can improve the user's activities, and at the end of the day, application stores are essential and useful for finding the desired applications available for users. Similarly, the definition of Usefulness as being of use or service; serving some purpose; advantageous, helpful, or of good effect, comes close with the one provided by Davis [7].

Hypothesis 2a : Usefulness of the application store will positively influence Use of Application Store.

Hypothesis 2b : Usefulness of the application store will positively influence User satisfaction with Application Store.

System quality measures the desired characteristics and technical success of a system, which refers to the application market, and specifically, about the delivery of accurate and efficient information [9]. More so, the things that are valued by users are usability, availability, reliability, adaptability, and response time (download time). According to Petter et al. [28], System quality includes system reliability, ease of learning, customization, and system features of intuitiveness, sophistication, flexibility, and response times.

In this study, there is a thin line of difference between Navigation and Access, but still both concepts measure different things in the application store yet they have the same related concept of dimension (System quality). Navigation is defined as the act of browsing the application store's pages, categories, application list. Access is defined as the act of loading the application store's text and graphics, information request, and important details about applications. It must be noted that application stores don't show immediately the features of applications like de-

scription, reviews, developer, similar apps other users viewed or installed, and application store content. Users don't read the details of their applications except the ratings and number of downloads, but meticulous users consider it a very crucial feature for their smartphone's security.

Moreover, due to the limited screen interface of smartphones, the Access on information details is shortened unless clicked by the user. Also, it improves the browsing process of users much easier so that they can only access the information they want to know. In addition, Lee et al. [20] suggested that unique value factors of services are reachability and instant connectivity to users and information. In the case of application stores that use extensive data charges and huge application space, effective navigation and access to application purchase/download must be an important feature.

Navigation and Access is the quality of being responsive; loading quickly of the application store to user's request. Usually, the responsiveness can be observed in the duration delay and amount of accessibility to categories in the application store for quicker search or application information gathering. Therefore,

Hypothesis 3a : Navigation and Access to the application store will positively influence Use of Application Store.
Hypothesis 3b : Navigation and Access to the application store will positively influence User satisfaction with Application Store.

Service quality had been agreed by several researchers to have a positive influence on User satisfaction, and one of the reasons for the study to adopt the updated version of IS Success model [17, 34]; and captures the customer support provided by the service provider of application store [9]. Some of the researchers have measured the Service quality dimension by examining the characteristics of the support personnel [28], but in this study, the support provided by the application store comes when the user wants a refund for malfunctioning applications and support when the user purchases or downloads an application. Due to the complexity of determining the response from malfunctioning applications and it involves the developer's perspective, the study focused more on the convenience of purchase and download of applications.

Application stores have different pricing strategies with their applications. In Google Play, various developers from different countries are free to publish any applications in the Google Play space and can be accessed by users anytime, but prices aren't entirely converted in the local monetary of the country. Truly, Google Play has a wide array of cheap applications compared to T-Store, but, the priced applications complicate an average user's purchasing habits. In T-Store, applications are all focused in the Korean context or if not, something that fits with the Korean taste. Unlike Google Play, T-Store applications are priced in Korean Won that is quite convenient because users won't convert price anymore.

Moreover, all terms and condition in the application store should be clearly stated like canceling or purchasing applications, returning goods, taxes and refunds. Hence, it should be done properly by application providers to avoid frus-

tration in the part of users in the future. Additionally, return policies can be both bad and good for developers. On the part of the consumers, the ability to try out apps risk-free would be beneficial but could translate to abuse.[10]

Importantly, Ease of Purchase includes the learning process of the user once he/she decides to download or purchase an application. Both the application stores have language issues, and considerably, it is one of the barriers in any purchase transactions. The confusion in the details of a purchase can create serious problems in the part of users.

Google Play, due to its global coverage, is catered in the English language but mostly has localized counterparts in non-English speaking countries. Some users find this very easy, but some find it really troublesome. Google Play isn't completely in English language in South Korea, but the description of applications published by other countries' developers are in English, which defeats the purpose of using an application store if one couldn't understand fully the content. On the other hand, T-Store is in Korean Language, but SK Telecom also caters the service to foreigners that makes the service quite blurry in its purpose. Also, SK Telecom with its aggressiveness in the mobile marketing of Samsung Galaxy S Series impedes the wide acceptance of T-Store because of the language used. Thus, the Ease of Purchase is affected indirectly by the language employed in the application store.
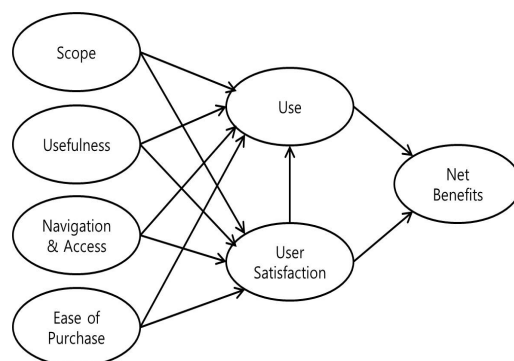
Ease of Purchase is the length and convenience of downloading/purchasing of applications and/or payments in the application market. In this study, the convenient procedure of purchase and download in the application store for applications will make the users utilize it more. Therefore,

Hypothesis 4a : Ease of Purchase of the application store will positively influence Use of Application Store.
Hypothesis 4b : Ease of Purchase of the application store will positively influence User satisfaction with Application Store.

The research model [Figure 1] illustrates all the factors and their relationships for the study. The four factors : Scope, Usefulness, Navigation and Access, and Ease of Purchase, are all hypothesized to have a positive influence on Use and User Satisfaction. Although the study did not hypothesize the relationship among Use, User satisfaction, and Net benefits, these relationships have been tested by other researchers in various Information system studies.

[Figure 1] Research Model

4. Research Methodology

The target participants of the study are Korean

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10) App Store Report, June 2011.

smartphone users, and whose service provider is SK Telecom; primarily because these two application stores, Google Play Store and T-Store, are preinstalled. The survey questionnaires are from existing studies as explained in <Table 2> and the questionnaires are presented in <Appendix A>.

<Table 2> Summary of Survey Questionnaire

Variable			# of items	Sources
Independent variables	Information Quality	Usefulness	3	[24]
		Scope	4	[24]
	System Quality	Navigation and Access	6	[24, 32]
	Service Quality	Ease of Purchase	4	[22, 25, 33]
Dependent variables	Use	Use	5	[19, 31]
	User Satisfaction	Satisfaction	5	[24]
	Net Benefits	Benefits	5	[37]

The questions in <Appendix A> are original questions in English and we translated the questions into Korean. The translated version was confirmed by other experts in this field. We surveyed in March 2012 and the participants answered the questionnaires for Google Play and T-Store.

164 (82 percent) among 200 surveys we gathered were usable and appropriate for statistical analysis, and the 36 surveys are omitted since there were missing answers and careless responses.

Most of the participants are university students and in their early 20s (86 percent); and in terms of gender distribution, the male group with 60.4 percent was greater than the female group with 39.6 percent. Lastly, most of them are un-

dergraduate students (96.3 percent) and only 6 are graduate students (3.6 percent) (See <Table 3>).

<Table 3> Demographics of Survey Participants

Demographics		Number	Percent
Gender	F	65	39.6
	M	99	60.4
Age	20	38	23.2
	21~25	103	62.8
	26~30	23	14.0
Education	Undergraduate	158	96.3
	Graduate	6	3.6

5. Analysis Results

The results of the Exploratory Factor Analysis (EFA) is presented in <Appendix B>. Use 4 and use 5 were not confluent with other Use measures and navigationaceess 3 and navigationaccess 5 were not confluent with other Navigation and Access. These four measures had to be removed because of the inconsistency with other measures and others were grouped in their respected factors.

Moreover, the reliability test showed that Scope (0.708), Usefulness (0.613), Navigation and Access (.601), Ease of Purchase (.620), Use (.803), User satisfaction (.877), and Net benefits (.767) garnered acceptable results of Cronbach's alpha. Furthermore, in the exploratory factor analysis, the minimum factor loading for cut-off for the components is .500, and in the factor analysis results, the lowest loading is .524 from Ease of Purchase component. Although, the factor analysis considered a minimum factor loading for each component, several research studies have used the same standard [12, 18, 36].

The summary of the preferences of the users

of the two application stores is quite interesting, simply because it is unexpected and definitive overall (See <Table 4>). Google Play was preferred by 122 participants (75.3%), while T-Store was preferred by 15 participants only (9.1%), and the number of preferences for the two application stores is 27 (16.5%).

<Table 4> Application Store Preference Summary

	No. of Preferred subjects	Percentage
Google Play	122	74.3
T-Store	15	9.1
Both	27	16.5
Total	164	100
	Duration of Usage	Average Apps
Google Play	25 mins.	26 apps
T-Store	15 mins.	10 apps

Based from the summary of usage of the two application stores, the average number of downloads per user in Google Play is 26 applications, while T-Store has an average of 11 applications. Intuitively, the duration of usage will be likely the same, and Google Play has an approximate of 25 minutes, while T-Store has 15 minutes.
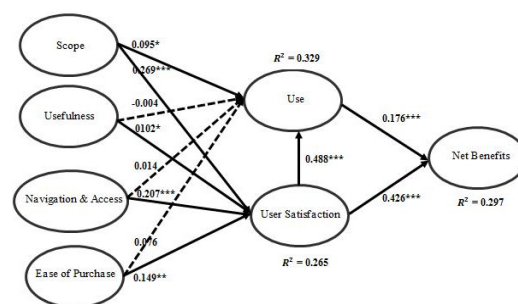
<Table 5> Descriptive Statistics

App store	Google Play		T-Store	
	Mean	Std.	Mean	Std.
Scope	5.15	.86	4.30	.87
Usefulness	4.67	1.00	4.45	.93
Navigation and Access	4.60	.96	4.27	.83
Ease of Purchase	5.00	.85	4.77	.94
Use	4.31	1.22	2.97	1.22
User Satisfaction	5.30	.79	4.44	1.05
Net Benefits	4.66	.93	4.07	.99

The results of the descriptive statistics <Table 5> showed that Google Play has a mean of 5.15 for Scope; 4.67 for Usefulness; 4.60 for Navigation and Access; 5.00 for Ease of Purchase; 4.31 for Use; 5.30 for User satisfaction; and 4.66 for Net benefits. In contrast to Google Play, T-Store has a mean of 4.30 for Scope; 4.45 for Usefulness; 4.27 for Navigation and Access; 4.77 for Ease of Purchase; 2.97 for Use; 4.44 for User satisfaction; and 4.07 for Net benefits.

In the descriptive statistics, all the factors of Google Play garnered higher mean than T-Store that is an implication that it is more favorable in the user's perspective. Surprisingly, the Use factor in T-Store is lucidly lower than the Use factor in Google Play. Evidently, T-Store is barely used compared to Google Play. In addition, the User satisfaction factor in T-Store is relatively smaller than Google Play that is really sufficient as the basis of the great difference of the two application stores.

For instrument validation, we conducted confirmatory factor analysis (CFA) using partial least square (PLS) and SmartPLS 2.0.
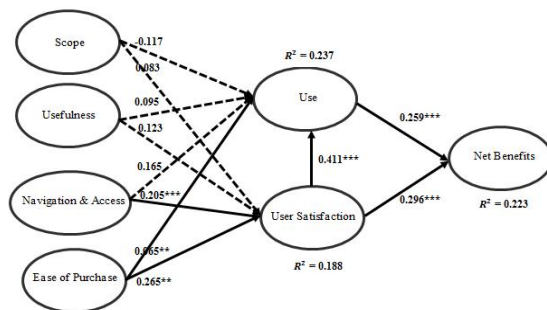

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

[Figure 2] Path Model Analysis(Combined Data Set, 328 Responses)

The path model analysis (See [Figure 2]) showed that Scope has significant effect on Use

and User satisfaction, but at different level of significance. Next, Usefulness was found to be significant to User satisfaction but not to Use. Then, Navigation and Access was significant to User satisfaction but not to Use. Finally, Ease of Purchase was found significant to User satisfaction, and like Usefulness and Navigation and Access, wasn't significant to Use. Although, the three factors, Usefulness, Navigation and Access, and Ease of Purchase didn't show any significant effects on Use, User satisfaction acted have a mediating effect of the three factors to Use. Importantly, it can be interpreted from the results that the combined data of the two application stores, Scope have significance in the usage and satisfaction of users, but when the combined were separated (164 Android data and 164 T-Store data responses), Scope didn't have any significance. Although, both application stores cater essential applications to Korean users, and the combined data sets revealed the importance of Scope in the combined data of application stores, it is not sufficient to say that it didn't have any importance in the separated data set. It basically means that due to few observed data the results for the separated data didn't show any significant effect for Scope.
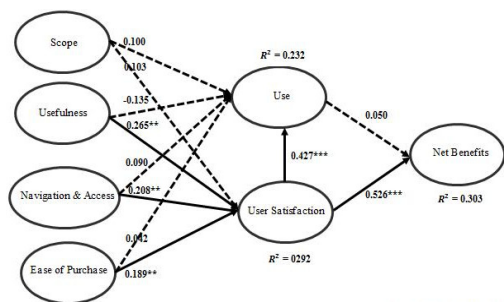
Use and User satisfaction have significant effects on Net benefits, and similarly the path between User satisfaction and Use is significant. Lastly, the results showed that application stores have benefits for users simply based from the usage and satisfaction effect.

The Google Play data set comprised of 164 observed data revealed that all the factors : Scope, Usefulness, Navigation and Access, and Ease of Purchase didn't have any significant effect on Use, but all except Scope had significant path effects on User satisfaction. Apparently, Scope didn't show any relevance in the path model for Google Play but in the combined data set showed significance.

Surprisingly, the Use didn't have any significant effect on Net benefits. But, User satisfaction has a significant path on Net benefits. Satisfaction in the Google Play path model analysis seemed to be the mediating variable of all factors to Net benefits. Hence, even if users are not using the Google Play, they are quite satisfied with how it manages all its content and application.

* p < 0.05, ** p < 0.01, *** p < 0.001.

[Figure 4] Path Model Analysis(Google Play Data Set, 164 Responses)

* p < 0.05, ** p < 0.01, *** p < 0.001.

[Figure 3] Path Model Analysis(T-Store Data Set, 164 Responses)

On the other hand, T-Store data set comprised of 164 observed data showed that two factors

(Navigation and Access and Ease of Purchase) have significant effect on User satisfaction. Navigation and Access only has significant on User satisfaction and Ease of Purchase has significant effect on both Use and User satisfaction.

Like the Google Play path model, Scope didn't have any significant effect on both Use and User satisfaction. Usefulness didn't have any significant effect on Use and Satisfaction. The simplicity and limited number of applications available in its application space made it insignificant even if the essential applications can be found in there. And, there is no question about the vast number of applications in Google Play and all the irrelevant applications in it, but still number of applications matter to users, hence, making it more informative and valuable to users. Obviously, the factor Ease of Purchase was significant to both Use and User satisfaction. Based from the respondents' answer in the last part of the final survey, since the price of all the application is in Korean Won purchasing applications was

relatively easier than Google Play. More so, since the provider is SK Telecom, the total amount of purchases are automatically added in their monthly phone bill, making all the purchasing and downloading process a lot convenient.

Use and User satisfaction have significant effect on Net benefits. In addition, they have the same significance level to each other. Similar to the result of the combined data, the Use and User satisfaction have the expected result to Net benefits.

The outcomes of the study regarding the hypotheses and differences between Google Play and T-Stores are summarized in <Table 6>.

6. Discussions and Conclusions

The application stores, Google Play and T-Store have a number of differences. And the results showed that the range of applications is one of the important features for application providers to consider. There is so much value in a concentrated area of Android users, and application providers need to understand that it couldn't tolerate any competition of its mobile application space.

T-Store has been able to meet the needs of Android users by creating a pool of specialized developers. And somehow, T-Store has been able to exploit the popularity of Android devices. The findings showed that the scope of the combined application stores is significant, but in the separated application stores, it is not significant. Possibly because of the small number of responses for the separated data, it resulted into an insignificant path. And, it is not sufficient to say that both application stores are complementary when they aren't and it was a matter

〈Table 6〉 Data Analysis Results

Hypo thesis	Path coefficient	Result	Path coefficient for Google Play	Path coefficient for T-Store
H1a	0.095*	Accepted	0.100	−0.117
H1b	0.269***	Accepted	0.103	0.083
H2a	−0.004	Not Supported	−0.135	0.095
H2b	0.102*	Accepted	0.265**	0.123
H3a	0.014	Not Supported	0.090	0.165
H3b	0.207***	Accepted	0.208**	0.205***
H4a	0.076	Not Supported	0.042	0.065**
H4b	0.149**	Accepted	0.189**	0.265**

* p < 0.05, ** p < 0.01, *** p < 0.001.

of number of responses that could affect the path analysis. But the final survey emphasized that the number of applications is the best criteria for the usage of application stores.

Interestingly, Google Play must be able to attract developers from other mobile application platform to maintain its position as one of the top application provider. Since, application stores are seen as two-sided platforms [10], it is essential that at least one side is nurtured to achieve stability and survivability. The study focused more on the consumer's perspective, yet it somehow showed that the role of developers in the application store is highly regarded. T-Store shared the mobile application space of Google Play because it cultivated its own developers through academy/schools, competition, and promotions.

Surprisingly, despite the huge number of applications available in Google Play, users still didn't see it as a platform with quality package of various applications. In the final survey, they also supported the fact that the best thing in Google Play is that it has many applications that are mostly free compared to T-Store. The findings somehow translated that the quantity of applications doesn't immediately amount to quality of applications. And clearly, Google Play made its strategy of free applications alongside with its numerous applications as its prime attraction to users.

Apparently, the usefulness of application stores is also based from the impression of available applications. Google Play seemed to be more useful than T-Store because of the number of applications available in its space. It is considered that application stores widely used by other users tend to have more useful applications because of the collective effort in improving the mobile platform. Also, two or more application stores sharing a smartphone's features create an undeniable attention and appreciation of a favored application store's structure.

Presumably, the organization of a large number of applications in the application space can be tremendously cumbersome. And, that is one of the reasons that it is easy to stumble on unrelated applications in any category of the Google Play. When developers have the freedom to publish applications at their own will, there is a possibility of positioning applications in mostly viewed categories. And just like a double-edged sword, navigation and access could turn to a good or bad result. The classification of applications in Google Play isn't as organized as T-Store's, and most application overlaps to other categories. Since Google Play has too many categories for its numerous applications, it simplified its content navigability into eight lists : Categories, Featured, Top Paid, Top Free, Top Grossing, Top New Paid, Top New Free, and Trending. Hence, the good thing about the classification of Google Play is that it makes the navigation much simpler for users despite having a large pool of applications. On the other hand, T-Store is more sophisticated than Google Play. The strong position of T-Store, primarily because of the language, makes the communication much easier. Although it has a relatively small pool of applications than Google Play, the classification and review process for applications is much feasible and manageable. Also, T-Store's navigation and access is more challenging than Google Play but since it is in Korean language, it equalizes things out and makes the application store easy to navigate.

One of the barriers in the purchase of goods in application stores is the monetary value used. The difference in the pricing of applications greatly affects the purchasing behavior of users. On one hand, Google Play's varied pricing hindered a significant path to use of application stores. On the other hand, T-Store's uniformed pricing strategy caused two significant paths to use and satisfaction of application stores. Since Google Play is providing applications to various countries, it is understandable that the convenient way for pricing would be in dollars. However, doing such strategies will allow local application providers to thrive and share its potential earnings.

Since Usefulness, Navigation and Access, and Ease of Purchase have no significant effect on Use, the role of User satisfaction was greatly emphasized. The increase in User satisfaction of application stores will positively affect the usage behavior of users in the process. And the findings showed that it is the crucial factor that needs tremendous attention and consistent performance as an application space platform.

The study is limited in a number of ways : First, although the survey was conducted in a comprehensible language for the participants, the translation made from English to Korean language caused some change in contextual meaning. One of the plausible explanations why the result of the factor loadings and Cronbach's alpha test garnered low values from the Exploratory Factor Analysis could be accounted for this translation change. Lastly, since the survey participants are usually Korean college students in their early 20s, it is hard to generalize our findings in other countries. Thus, it should be careful when our findings are applied in other situations.

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⟨Appendix A⟩ The Final Survey Questionnaire

- **System Quality**

Navigation and Access

1. It is easy to go back and forth between the pages of the Application Store.
2. The Application Store provides few clicks to locate an application.
3. In general, the Application Store is easy to navigate.
4. The Application Store is responsive to your request.
5. The Application Store quickly loads all the text and graphics.
6. In general, the Application Store provides good access.

- **Information Quality**

Scope

1. Application Store covers a wide range of applications.
2. Application Store contains a wide variety of categories/applications.
3. Application Store contains a number of different selections.
4. In general, the Application Store covers a broad scope for your purchase/download decision.

Usefulness

1. The Application Store is informative to your purchase/download decision of applications.
2. The Application Store is valuable in making a purchase/download decision of applications.
3. In general, the Application Store is useful in your purchase/download decision.

- **Service Quality**

Ease of Purchase

1 Purchasing an application from the application store would be easy.
2. For me, purchasing/downloading easily from the Application Store is.
3. Learning how to purchase applications from the Application Store would be easy.
4. For me, learning how to purchase/download applications easily from the Application Store is.

- **Use**

Usage

1. How many times do you believe you use the Application Store?
2. How many minutes per week do you believe you use an Application Store.
3. How frequently do you believe you use an Application Store?

4. If the Application Store were not mandatory, I would still use it.

5. I have ____ applications from the Application Store.

User Satisfaction

1. After using the Application Store, I am ⋯ (very dissatisfied vs. very satisfied).

2. After using the Application Store, I am ⋯ (very displeased vs. very pleased).

3. Using this Application Store, I am ⋯ (frustrated vs. contented).

4. After using this Application Store, I am ⋯ (terrible vs. delighted).

5. Using this Application Store, I ⋯ (will not recommend it to my friend vs. will recommend it to my friends).

6. After using the Application Store, I ⋯ (will never use it again vs. will definitely use it again)

Net Benefits

1. After using the Application Store, it helped me acquire new knowledge and innovative ideas.

2. After using the Application Store, it helped me effectively manage and download applications that I need.

3. After using the Application Store, it enabled me to accomplish things more efficiently.

4. After using the Application Store, my performance was enhanced.

5. After using the Application Store, it improved the quality of my life.

〈Appendix B〉 The Result of Exploratory Factor Analysis

| | Component | | | | | | | Cronbach's Alpha |
	1	2	3	4	5	6	7	
UserSatisfaction 3	.792							
UserSatisfaction 1	.786							
UserSatisfaction 2	.759							.877
UserSatisfaction 5	.657							
UserSatisfaction 4	.647							
NetBenefits 5		.774						
NetBenefits 4		.691						
NetBenefits 2		.655						.767
NetBenefits 3		.639						
NetBenefits 1		.570						
Scope 2			.685					
Scope 1			.680					.708
Scope 4			.675					
Scope 3			.599					
Use 1				.822				
Use 3				.796				.803
Use 2				.657				
EaseofPurchase 4					.708			
EaseofPurchase 3					.699			.620
EaseofPurchase 2					.532			
EaseofPurchase 1					.524			
NavigationAccess 1						.723		
NavigationAccess 2						.608		.601
NavigationAccess 4						.593		
NavigationAccess 6						.578		
Usefulness 2							.825	.613
Usefulness 3							.808	

Extraction Method : Principal Component Analysis.
Rotation Method : Varimax with Kaiser Normalization (rotation converged in 6 iterations).

◈ 저 자 소 개 ◈

Andrew Dela Rosa (drews.delarosa@gmail.com)

University of Philippines를 졸업하고 가톨릭대학교에서 경영학 석사학위를 받았다. 주요 연구 관심분야는 통신산업환경, 모바일 서비스이다.

이 홍 주 (hongjoo@catholic.ac.kr)

KAIST 산업경영학과를 졸업하고 KAIST 경영대학원에서 경영정보시스템으로 석사와 박사학위를 받았다. 현재 가톨릭대학교 경영학부 교수로 재직 중이며 주요 연구 관심분야는 웹 개인화, 온라인 협업, 인공지능 기법 응용이다.