

## An Empirical Study on Commitment Factors for Application Developers & Application Market

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### ABSTRACT

In recent years, mobile application market will be expanded rapidly because a smart phone has been diffused in the rapid pace. Mobile application market opened a new market as an intensive and innovative business model in supply. Moreover it changed in consumption mobile phones into market places for mobile applications that have not been experienced in the past. Now that mobile phones are changed the media for communication into the media for smart living that support all of people's activities. It is an important to get more users for success in app store business but it is more important to get many application developers for developing right applications with right skills. This paper aims to investigate causal relationship within mobile app store maintenance between application developers and application market. In order to achieve our research aim, this paper used application market success factor, dual model, relationship marketing, and e-market place relationship solidarity, conceptual framework to grasp institutional relationship.

**Keyword:** applications, developers, App Store, applications market, smart phone

### 1. INTRODUCTION

#### 1.1 Background of Study

Shockwave of the smart-phone market, initiated by iPhone of Apple company, is not ended at the seismic change of the cell phone market, but led to change of communication market, which is expansion of the wireless internet market focusing on data communications, and like PC market, it introduces new competition environment in the whole industry like competitions of OS, search and contents, and creating new ecosystem that is unpredictable [11].

Leading IT companies, incited by the tremendous growth of Apple App Store are opening application markets, and application developers and contents firms are competing to develop mobile application to hit the jackpot. For iPhone users, application market (AppStore) is regarded like a used-to service like voice conversation, and other smart phone users are also being used to usage of AppStore. Likewise, application market (AppStore) is transforming from that for only early adaptors to universal service like Web [23].

Hence, the focus of this research study is to investigate the casual relationship between mobile application market and application developer. Diverse application markets emerge and competition becomes more intense due to shockwave of smart phone market initiated by Apple's iPhone, and emergence of conditions for growth by changed

environment of mobile communication service industry. Therefore, interest on not only the market but also the application developer is growing. Likewise, the reason of growing interest over application market and application developer is threefold.

First, smart phone market is expected to growth rapidly. Among the characters of smart phones, users can install and delete diverse applications, expansion of smart phone market, therefore, can be interpreted as expansion of application market. Secondly, it is expected that open platform market based on 2-sided markets for application sales will grow rapidly. Prospect of application market growth is as follows. According to the Gartner's recent report, in 2013, total of 15.8 billion applications will be sold worldwide, and an application market with 4.7 billion USD commission fee would be available [23]. Thirdly and lastly, to succeed in application market business, it is important to secure many users, but also important is to secure a number of developers and supplied by high-quality applications for sustainable market [22]. Apple's AppStore combines app store's open nature and Apple's distinctiveness, so application supply is rapidly expanded that tends to hundreds of new applications are registered every day. Through such expansion of supply, customers are able to receive diverse and new applications that they have not experienced before, and from customer's perspective, it is led to increased attractiveness of Apple AppStore. Increased attractiveness from customer's perspective in turn resulted in fast increase of application demand, such as influx of new users of AppStore and increased interest of existing users. As a result, developers gained prospect of more profit, and it led to expansion of application supply. As such, a positive cycle of expansion of supply and demand is built, and this is the reason of success of Apple's App Store [23].

For application market business' success, utilization of outside assets, in other words external app developers, rather than the company's internal resource is important. Indeed, to succeed in application market business for companies, it is important to own many users who use the company's platform, but in the end, the power to attract users and maintain existing users is applications that satisfy their diverse tastes. Only with the company's ability, there is a limit to develop such applications. Diverse applications developed and supplied by participation of external developers can satisfy diverse taste of application users and this can lead to continued usage of the application market. Therefore, outside developer's participation (development activities) could be the basis of success of application market business [22]. Although an importance of application market is still growing, research study on application market that is newly emerging from 2008 is lacking. Moreover,

some research works are only preparatory ones. There are some documents on success of the service/ technology based on its purpose from user's perspective. However, there are few research studies from application market supplier's perspective, and there is a research on platform business vitalization factors for Apple's iOS based application developer [23]. Thus, the importance of this research that studies the factors of causal relationship between application suppliers, developers and application market is our research focus.

## 1.2. Purpose of Study

Application market provides new opportunity of profit by using Two-side Business Model that creates value by application sales and transaction between developers and customers [31]. Cell phone producers, mobile platform business and communication firms already have perceived an importance of application market within the mobile business value chain, and moving toward into the application market [8].

According to Wikipedia and UCC phenomena, effective usage of external IT and knowledge, while not possessing or controlling everything by the company, could influence the success of business. For success of application market business, as well, it is important to use external assets or that of external developers', rather than the company's internal resource, is important. Therefore, sustained and frequent development activities of application development are basis of success of application market [23].

Morgan and Hunt [35] argued that desire and constraint are important factors to form and maintain relationship. The core of this argument is that the reason of maintenance of transaction between A and B, and customer keeps using a certain service provider's service is 'have to' and 'want to'. The essence and fundamental of relationship marketing is maintenance and development of relationship with customers with absorption and maintenance power that intensify the relationship by starting from interest for individual customer, to making new basis for relationship commitment between customer and company [14].

Trust building between sales participants in electronic transaction is the most important matter in transaction with a party with which transaction experience is lacked. For e-market place, which is similar to application market, trust building causes cooperation among companies, leads open communication, incites adaptation of organization and decreases transaction cost through reduced conflict, and in opposite, the result of lack of trust acts like barriers of overall e-commerce by preventing a number of companies from participation [2]. Therefore, for company to company transaction, understanding the degree of trust on the website and transaction relationship is very important to adopt and promote the e-commerce [32] [42].

Similarly, for core factors for vitalization of application market based on the internet, concept of solidarity of relationship and relational trust between transaction participants and economic satisfaction are raised in this research study. In the previous studies on company to company transaction, it is known that through relationship solidarity real transaction is promoted, as well as

cooperation, and long term transaction willingness and inclination for successful relationship are increased. [4][35]

High solidarity of relationship for certain application market means higher desire to participate in continued transaction in long term perspective and is on the assumption that actual transaction is continued to occur, it is, therefore, very important to realize and strengthen the solidarity level between participants of application market and developer. From the current situation, application market business companies (application market service providers like Apple Inc., NOKIA) provide SDK to developers for free, and seem to encourage continued development through reward policies. In other words, the developers who get psychological and material benefit through development and sales of application continue to develop for their sake.

Hence, it is important to investigate the overall factors that influence frequent development of application. Developing application means transaction and relationship with application market service provider, for developers. Therefore, for relationship building and maintenance, many documents argue for importance of study of two sides (dedication and constraint), but since the number of application market that current developers can choose increases and application market is open innovation model, trust building between developers, who are application provider, and market is more important that constraint factors. Application market business companies also seem attracting developers and encouraging continual development, so in this research, following the previous researches, study is to be undertaken by using dual model framework and relationship marketing theory.

Therefore, the purpose of research is threefold: First, it is to clarify causal relationship between diverse independent variables that determine the continued relationship maintenance between application developers and application market and dependent variable and parameter. In order to clarify such independent variable, by accepting research results on application market success factor, dual model, relationship marketing, and e-market place relationship solidarity, conceptual framework to grasp institutional relationship and subtract main variables that influence the actual relationship between application developers and market is suggested and verified. Secondly, as a condition precedent to developer satisfaction, market demand, development frame, usability and influence of alternative attractiveness are deducted based on the previous studies on existing applications' success factor and verified by positive analysis. Thirdly, as a condition precedent for trust, mutual action and influence of impartiality, suggested by this research are to be verified through positive analysis. Based on previous research on trust, trust building factors suitable for application market situation are deducted, and measurement's validity is reviewed. Through this, importance for each concept of satisfaction and trust building factors to be provided by application market firms to developers are confirmed, and strategic points to reflect in actual situation are presented.

## 2. LITERATURE REVIEW

### 2.1 Success Factors of Application Market

Existing research studies mainly analyze application market's state and user acceptance of application market, and there is few analysis of application developer and mobile communication companies' application market. Previous studies on application market's success factor are as shown in table 1.

Table 1 Study on Success Factor of Application Market

Researcher	Application Market Success Factor
Yang(2009)[45]	Mobile Company's unique strength (+), development incentive(+), increase of alternative route and dual mode cell phone (+), building ecosystem(+)
Kim(2009)[22]	Attractiveness of sales profit distribution policy (+), market demand (+), development frame's usability (+), impartiality of evaluation process (+)
Ryu Han Seok (2009)[41]	Supply of diverse smart phone devices (+), cheap data communication fee system (+), application ecosystem building (+)
Lee Sang Don (2009)[28]	Simplified registration process (+), providing clarified profitability (+), using developer network (+), expansion of mass market (+), creating low price level (+).
Kwon(2009)[26]	Convenient development environment (good SDK), platform influence (+), exiting customers (+).
Kim(2009)[23]	Innovative device (+), unified development environment (+), wireless connection environment (+), unlimited data payment system (+), SDK (+), application protection (DRM)(+)
KT Economy Institute (2009) [31]	Motivation and development support system for developers (+), marketing and sales support (+), building store to use diverse terminals (+), improving convenience of users considering UI (+), diversified data fixed fee (+), terminal/OS cooperation (short term)(+), 4 screen based sales, purchase environment (+)
GDNet Korea (2009)[27]	Color contents (+), cheap price (+), easy development device (+), assured target selection (+), initial customers (+), high function device evolution (+)
Asia Economic Daily (2009)[9]	Expansion of customers basis through combined app store (+), differentiated contents (+), improvement of UI (including app search) (+)
ATLAS(2010)[6]	Disclosing mobile company's own assets (API, etc.) (+), combined payment :operator billing (+)

For the success factor study of the application market so far, as in the table 1, it deals mostly with economic perspective and market expansion.

### 2.2 Dual Model

Social exchange theory provides theoretical basis while analyzing long term relationship building and maintenance process. According to the social exchange theory, people make relationship with others because they want, on one hand, and on the other hand, they do so because of lack of alternative [44]. In other words, there are two mechanisms present in people's minds. From conceptual perspective, there are two types of commitment for maintenance of relationship. There are dedication commitment and constraint commitment [7]. The former commitment is one that continues relationship by sincerely thinking the relationship as beneficial. In contrast, constraint-based commitment is a commitment to continue relationship reluctantly, because of economic, social and psychological investment as constraint factors.

### 2.3 Relationship Marketing

The fundamental and core concept of relationship marketing is to maintain and develop relationship with customers and make new basis for relationship promise between customer and company with strong charm and maintenance power that strengthen the relationship with them, starting from interest over individual customer. [14].

In the changing environment, existing marketing has

become difficult to play the role to improve competitiveness of company, and importance of relationship with customers is being notices, in order to develop more meaningful relationship with customers for understanding their taste and desire and respond to them. Especially for the service sector, transaction between service provider and customer is not ended in an one-time only transaction but continues through correlation, so the importance of relationship in service industry is getting more.

### 2.4 Proposed Research Model and Hypothesis Development

From application developer perspective, the factors that influence the solidarity of relationship between application developer and market are classified into satisfaction and trust perspectives based on dual model and literatures on relationship marketing to summarize in Figure 1

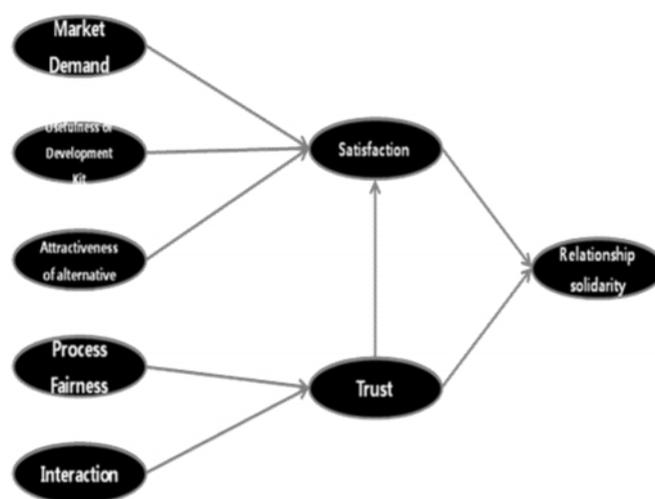


Figure 1 Research Model

If the demand of specific producer to products is expected to be large, wholesalers or retailers buy the relevant producer's products, because they expect huge profit by selling the producer's goods. Therefore, producers attempt to prove that their products' demand is large or could be large [13]. Thus, if developing application for application market that sells the application with developer's current demand large, it is possible to expect that they would be satisfied with such situation. Thus, the following hypothesis is set.

#### H1: Application's market demand would have positive influence on application market satisfaction

Usability has been proven as antecedent variable of the satisfaction in many internet business related researches [1] [24]. In the IS literatures, usability is used as a main standard to measure the user satisfaction of IS [43]. When developing application, development tool is require, and if such necessary development tool is useful, the developer must feel satisfaction to develop the market's application. Thus, the following hypothesis is set.

#### H2: Perceived Usefulness of Development kit will have positive influence on application market satisfaction

The alternative's attractiveness, which could be that of competitor, influences the judgment of customers whether to continue to use the current service provider. While searching for alternative, whether there is alternative or not has meaningful influence on decision making of continued relationship, and if there is an alternative to expect better outcome than now, the motivation to continue the current relationship is lowered [3]. In addition, if the customers do not recognize that the alternative service provider's differentiated image or service providing capability is not better than existing providers, the possibility of defection to other alternatives is lowered, and there is a tendency to maintain the relationship with existing providers [3]. Research on attractiveness of alternative can be found in an area that includes individual relationship and employment and transfer rate [16] [40], and in channel relationship [38]. Based on previous research, we can find that from customer's perspective, compared to the current service provider, as the attractiveness of other service provider is higher, the satisfaction of current service provider is lowered, and based on this, we can set the following hypothesis.

**H3: As the attractiveness of alternative is higher, it will have negative influence on application market satisfaction**

In marketing area, impartiality is a main variable in company to company relationship [5][15][18][25]. Dwyer et al. [15] argue that impartiality of mutual relationship in sales transaction is critical factor in trust building between two companies, suggesting relationship development model. Anderson and Weitz [5] describes that providers that are rated as having impartiality have more trust and form willingness to continue relationship. Gundlach and Murphy [18] clarifies that as someone realizes that the partner is fair, his/her relationship inclination and satisfaction to the partner increases, and if recognizes the partner as unfair, dissatisfaction increase. When transacting through the Internet, a new technology, by e-Marketplace participants, fairness of transaction process is an important factor that influences the trust, and securing transparency in transaction of online environment will have positive influence on trust. Fairness in transaction process works as positive factor in relationship with partners, and works as an incentive to allow the partner to focus on the joint goal. Therefore, the following hypothesis could be set.

**H4: Review Process Fairness recognized by developer will have positive influence on market trust.**

Interaction means mutual conversation between participants and a process of communication [39]. Interaction in off-line is limited to human interaction, but for e-commerce, interaction with websites could be done simultaneously, and e-commerce provides on-time communication via computer [19]. Companies, by participating in B2B e-marketplace, participate in actual transaction or gain purchase related information by interacting with managing and participating firms. Therefore, the degree of interaction of B2B e-Marketplace plays important role as an antecedent variable for e-commerce of companies. The degree of interaction in e-Marketplace website solves many problems between transaction partners

and allows them to share information. In addition, it reduces incongruity between expectation on partner and realization, providing friendliness and psychological stability, so it strengthens the trust of the relevant website [3][5][15]. Therefore, the following hypothesis could be set for an application market similar to e-Marketplace.

**H5: Interaction with market recognized by developer will have positive influence on market trust.**

Satisfaction means evaluative judgment caused by relationship benefit. Such satisfaction is recognition of concurrence of expected benefit and actual benefit from the relationship. Such evaluative judgment is in line with dissatisfaction and satisfaction. On the other hand, existing studies discuss the role of trust in relationship from three perspectives; firstly, it is to see satisfaction and trust as a factor that consists relationship quality [10][15]. Secondly, it is to see satisfaction as antecedent factor of trust [17][35], and thirdly, it is to see trust as antecedent variable of satisfaction [3]. Likewise, relationship between trust and satisfaction is argued with different direction of causal relationship, depending on researches, and in this research, following the third perspective, trust is regarded as antecedent variable of satisfaction. The reason is that even if one is satisfied with the service outcome, one may not trust the provider, but it is unlikely to expect service satisfaction from untrustworthy provider. From this perspective, the following hypothesis can be set.

**H6: As market trust on developer is higher, it will have positive influence on market satisfaction.**

Morgan and Hunt [35] argues that as satisfaction status continues, trust is increased, and by doing so, relationship solidarity increase. In addition, Lee and Gong [29] argues that as service fairness is satisfied, relationship solidarity increases. Jang and Jeong [20] find that recognized service quality, value and fairness have positive influence on customer satisfaction and trust, and as customer has high satisfaction, trust relationship increase. Hence, by considering the result of such preceding studies, in this study, the hypothesis of relationship between market satisfaction and relationship solidarity is set as follows.

**H7: As satisfaction rate on developer is higher, it will have positive influence on intention to continue relationship with the market.**

Dwyer [15] argues that if both parties trust each other, they can solve difficult problems like power, conflict and low profit, so because of the role of trust, trust leads the highest level of relationship transaction, solidarity. Morgan and Hunt [35] argue that relationship characterized by trust is valued, so it plays important role in relationship transaction. In addition, solidarity is followed by variability, so transaction parties will seek trusted partners, and trust plays important role of decision making in relationship solidarity. Ganesan [17] analyzes the effects of mutual dependence and trust as decisive factor of long-term orientation between purchaser and seller. They analyze the effect of trust-forming factors, which are credibility and good will, and their effect on trust, and as a result of analysis, veracity has

influence on trust, but good will does not. Mooman [33] verifies that trust of marketing research users have meaningful influence on solidarity of the users on the survey result.

**H8: As market trust on developer is higher, it will have positive influence on relationship continuance intention with market.**

### 3. RESEARCH METHODS

#### 3.1 Design

In this research, ‘Market Demand’, ‘Perceived Usefulness of Development Tool’, and Alternative Attractiveness will be selected as independent variables of economic side. For intermediary variable, ‘satisfaction’ will be selected, and for dependent variable will be expected that satisfaction has influence, commitment will be selected. For independent variable from relationship perspective, ‘Review Process Fairness’ and ‘interactivity’ will be selected. For the influenced intermediary variable, trust will be selected, and for dependent variable that will be expected to influence the trust, commitment will be selected. Based on the used measurement items derived from related literature studies and each variable’s operating definition, three to four items will be measured as shown in Table 2.

Table 2. Composition of Survey Questions and Variable’s Operational Definition

Variable	Operational Definition	Item	Researcher
Market Demand	Level of application demand on sale in application market	1.1 In [A market] demand of users on diverse application is large.	[21]
		1.2 In [A market] many people download applications.	
		1.3 In [A market] demand for application is growing rapidly.	
Perceived Usefulness of Development Tool	Degree of usability of development frame supplied by application market.	2.1 SDK supplied by [A market] is effective to make application with functions desired by me (our company)	[12]
		2.2 SDK provided by [A market] increases the productivity of the work that produces application with my desirable function	
		2.3 SDK supplied by [A market] increases the work outcome that produces application with desirable function of me (our company)	
Alternative attractiveness	Degree of attractiveness on other application market	3.1 Other application market’s profit distribution policy is more attractive than [A market].	[36]
		3.2 Other application market provides more desirable service than [A market] for me (our company)	
		3.3 Other application market is easier to sell application than [A market]	
		3.4 Other application market is more satisfactory than [A market]	
Review Process Fairness	Degree of fairness of application review	5.1 [A market]’s application review process is fast.	[25]
		5.2 [A market]’s application review process is objective.	

	process	5.3 [A market]’s application review process is fair.	
Interactivity	Easy communication with application developer	4.1 [A market]’s communication with me (our company) is active.	[3] [19] [34]
		4.2 [A market] reflects my (our company) opinion actively.	
		4.3 [A market] responds our (our company) opinion or complaint quickly	
Satisfaction	Degree of satisfaction on application market experience	7.1 For me (our company), development of [A market] application is fun thing	[30]
		7.2 [A market] is a good place to sell application	
		7.3 I (my company) am satisfied with overall relationship with [A market]	
Trust	Faith in trustworthy and effective play of the role by application market managing firm	6.1 [A market] works hard for my (our company) benefit	[33] [35]
		6.2 [A market] keeps the contract with me (our company) correctly	
		6.3 [A market] is generally trustworthy	
commitment	Continued desire to maintain valuable relationship with application market	8.1 There is favorable opinion to [A market]	[35] [33]
		8.2 There is affection on [A market]	
		8.3 [A market] is an important business partner	
		8.4 Relationship with [A market] is important	

#### 3.2 Data Collection Method and Characteristics of Samples

The purpose of this study is to find the factors that influence the relationship solidarity between application market and developer, basis of success factors of application market, so the research objective can be developer who are developing or have developed common OS-based smart phone application or who understand it.

Questions will be measured by 7 point Likert scale, and from operational definition of this research, the scales that are proved of validity in previous studies will be used. For data collection, online and offline method will be simultaneously used, and online method will be used by Google’s web survey, and for offline, data will be collected from developer conference, developer center, partner companies and friends.

#### 4. CONCLUSION

Solidarity of relationship can be viewed as application transaction with market and continued development of application by application developers. In this research, considering this point, for variable to measure the success of application market, relationship solidarity between application developer and market is selected, and the relationship between them will be verified empirically, by clarifying the necessary factors of relationship solidarity. As application market is diversified and competition got intense, there will be a situation in which one must select a market to transact continually, among many application markets. The standard in this regard shall be diverse and useful application. There is a limit for application market firms’ ability to secure such application. Through

applications developed and supplied by a number of developers, various demands of users can be satisfied, and this can be connected to continued market usage by smart phone users. Therefore, participation of external developers (development activities) can be a basis of application market business success [22].

On the other hand, while not only terminal platform firms which realized the importance of securing developers, but also application market like terminal producers and mobile firms are trying to attract developers through diverse support policies like development education, supply of development frame and conference, but there is no practical outcome, as expected.

In this research, success of application market will be interpreted as continuation of relationship between application developer and market, and satisfaction in terms of profit side and trust in terms of relationship side are separately identified. Especially, it will be meaningful that the relationship marketing theory, which is mainly applied to marketing area, will be applied to application market, a typical 2-sided market. In addition, there will be a practical meaning since it will clarify main variables that can result in successful application market business. Relevant personnel can lead each result activities by using the factors to meet the need. If the independent variables stipulated in this research are used effectively, success in application market will be closer. Since there are few research in importance of solidarity of relationship between application developer and market, the research is expected to be a huge help for application market business personnel. In previous research studies, the focus has been mostly application market status or application purchaser side. This research will fill the research gap with necessity of developer (seller) perspective, which is few, so it will provide more mutual understanding on social phenomenon of managing application market.

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