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Converting Online Service to Mobile Service: Using Kano Analysis and Online-Mobile Relationship Matrix

온라인 서비스의 모바일 서비스로의 전환: **Kano** 분석과 온라인-모바일 관계 매트릭스를 중심으로

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이 현 정

Abstract

Converting Online Service to Mobile Service: Using Kano Analysis and Online-Mobile Relationship Matrix

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Along with growing enter of online service to mobile market, conversion of online service to mobile service is becoming an important topic in service innovation area. Accordingly, a number of researchers have studied on conversion of service to mobile with topics such as interface design, decision of business model and structure design of mobile service. However, they have focused only on technical implementation of service system rather than considering user's aspect. As result, they have succeeded in overcoming technical constraints, but failed to include the functions which are required from the users. In response, this paper suggests the framework which considers both user and technical aspect in converting process of online service to mobile. Firstly, in the user module, the user satisfaction levels of mobile service according to its functions are evaluated with Kano analysis. Secondly, in the technology module, the online-mobile relationship matrix is derived from two dimensions of service functions and mobile quality

criteria. In the next step, the functions chosen to be converted with the scores from user and technology module are classified on the synergy-constraint map. Strategic and technical information for the implementation is derived from the process.

Keyword: service innovation, mobile service, online service, Kano, online-mobile relationship matrix
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Chapter 1. Introduction

Along with the growing of mobile application market size, the interest in mobile services is rapidly growing. For example, online services are launching their mobile applications or mobile sites as shown in Figure 1. As existing online services are more entering to the mobile market, conversion to mobile service becomes an important subject in service innovation area. Accordingly, research on service conversion to mobile has been widely conducted in various fields (Wang et al., 2006).

However, most of past works such as interface design in mobile commerce (Tarasewich, 2003; Cyra et al., 2006), business model selection in mobile commerce for value creation (Yuan and Zhang, 2003; Leem et al., 2004), and architecture design of mobile service (Lee and Benbasat, 2004; Wasserman, 2010) have been focusing only on technological aspect, trying to implement mobile system. Despite they succeeded to solve technological constraints emerging from mobile environment, it failed to meet requirement of users by not considering user's aspect. For example, some of the applications did not convert functions that the user wants, and some implemented unnecessary function in mobile with extra cost.

To include required functions in mobile service, it is important to consider how the user perceives each function in mobile environment. It is required to consider user satisfaction depending on presence of functions in mobile.

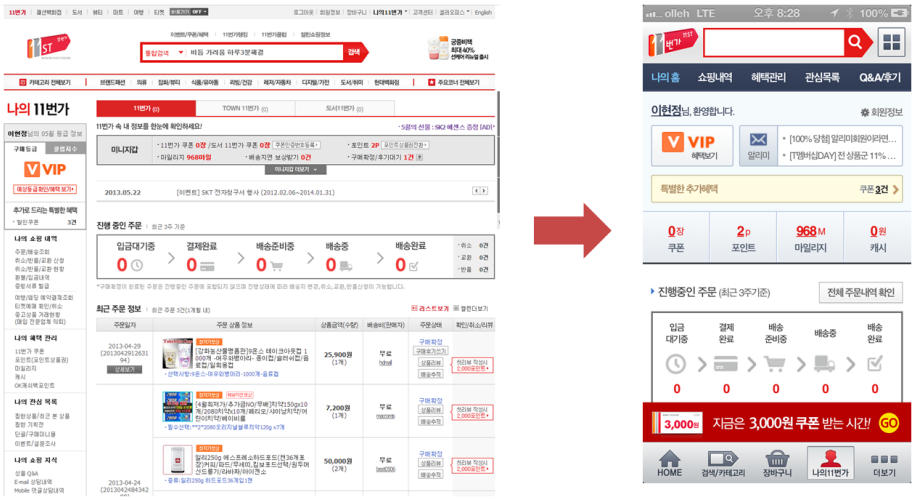

Figure 1 Example of online and mobile service 11st

However, it is not sufficient to only consider user aspect for effective service conversion. There are possibilities that certain functions cannot be included in the mobile service because of the characteristics of mobile devices. On the other hand, there can be functions which utilize the characteristics of mobile environment effectively and achieve higher utility than the user has expected. To summarize, it is needed to consider difference between online and mobile environment. Therefore, it is essential to consider both aspects of user and technology comprehensively to convert online service to mobile service.

In response, this paper suggests the framework which consists of four stages considering both user and technology perspective in conversion of online services to mobile. In the user perspective, Kano analysis is imported to evaluate the user satisfaction according to each service function (Kano, 1984). Kano analysis is a method which reflects user requirements into the design of product or service. Because Kano analysis measures satisfaction and dissatisfaction separately, it is utilized to evaluate user's feeling depending on

the presence of each function.

In the technology perspective, the online-mobile relationship matrix is composed with two axes of service functions and mobile service quality criteria, to find new opportunities and constraints in the mobile environment. The online-mobile relationship matrix is effective in that it offers intuitive information through its matrix form.

The remaining part of this paper is organized as follows. Firstly, the literature on mobile service is reviewed for deriving information related to mobile environment. To be more specific, mobile service quality criteria are derived from relevant literature. Secondly, derivation of user and technology score are suggested. Then, synergy-constraint map is suggested for deriving information about implementation. Thirdly, case study of social commerce service Coupang is given to show the application of the proposed framework. Finally, the paper concludes with a discussion of the contribution and limitation of the research.

Chapter 2. Related Works

2.1 Kano analysis

Kano analysis was introduced by Japanese scholar Kano in early 1980s. Kano analysis is an effective model which is widely used for reflecting customer's requirement to design of new product and service or to evaluate the quality of product and service (Shen et al., 2000; Lai et al., 2004; Tontini, 2007; Baki et al., 2009). Kano distinguishes requirements which influence customer satisfaction in different ways when they are met: must-be(M), one-dimensional(O), attractive(A), indifferent(I), reversal(R) and questionable(Q) requirements. First three of these requirements can be seen in Figure 2.

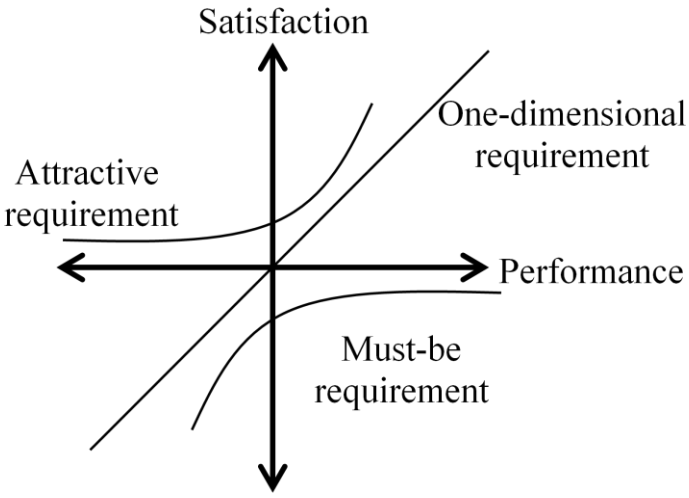

Figure 2 Kano diagram

Must-be (M) requirements are defined as the basic attributes for

service quality in terms of customer satisfaction. Accordingly, if these requirements are not met, the customers will experience big dissatisfaction. In other words, customers will only feel 'not satisfied' when fulfilling these requirements (Matzler and Hinterhuber, 1998; Baki et al., 2009). One-dimensional (O) requirements create customer satisfaction when they are met, and dissatisfaction when they are not met. As these requirements become more functional, customer satisfaction increases more. This means that "they are both a necessary and sufficient condition for customer satisfaction" (Busacca and Padula, 2005; Baki et al., 2009). Attractive (A) requirements bring customer satisfaction when they are met, but no dissatisfaction when they are not met (Berger et al., 1993; Baki et al., 2009). Therefore, these service attributes are known to have great influence on customer satisfaction level with a given service (Matzler et al., 1996; Baki et al., 2009). These requirements are not expected to the customers, but when properly delivered, they create satisfaction. Attractive attributes can be used as an element of an aggressive marketing strategy to attract competitors' customers (Busacca and Padula, 2005; Baki et al., 2009). Indifferent (I) requirements do not affect customer satisfaction. These requirements are not expected from customers, and they do not affect dissatisfaction from the customer when they are not met. Reversal (R) requirements bring dissatisfaction when they are met and satisfaction when they are not met. Questionable (Q) requirements are requirements with contradicting customer reaction. They give inconsistency in the result, for example, both presence and absence of attributes lead to customer satisfaction.

2.2 Mobile service

Mobile service is defined as “a service that is consumed by the end-user with a mobile handset” (Verkasalo, 2009). The extant research topics in mobile service area has been mostly focusing on mobile quality, such as evaluating service quality of mobile commerce with user behavior (Gerpott et al., 2001; Turel and Serenko, 2006; Lu et al., 2009), deriving service quality measures from literature review and evaluating services (Kim et al., 2004; Lim, 2006; Lu et al., 2009), and measuring service quality of various mobile services (Rao and Minakakis, 2003; Yun et al., 2005; Kar et al., 2006; Lu et al., 2009). In the work of Lu et al., the service quality is composed of three major dimensions; interaction, environment and outcome (Lu et al., 2009). These dimensions are described in Table 1.

Table 1 Service quality dimension

(Lu et al., 2009)

Quality dimension	Description	Sub-dimension
Interaction	The quality of a customer’s interaction with the mobile service provider during the service delivery	Attitude, expertise, problem solving, information
Environment	How the service is effectively transmitted from service providers to consumers	Equipment, design, situation

Outcome	Quality which significantly affecting the perceived service quality	Punctuality, tangibles, valence

The first dimension is defined as interaction quality. This dimension reflects the quality of an interaction that the customer forms with the mobile service provider during the service delivery, and has four sub-dimensions; attitude, expertise, problem solving and information. According to Lu et al., employee attitude and expertise was shown to influence customers' perception of service quality on the interview and in relevant literature (Czepiel et al., 1985; Grönroos, 1990; Brady and Cronin, 2001; Martinez Caro and Martinez Garcia, 2007; Lu et al., 2009). Also, problem solving of employee was shown to be important in service quality (Westbrook, 1981; Kim and Jin, 2002; Martinez Caro and Martinez Garcia, 2007; Lu et al., 2009). Lastly, information was included as fourth sub-dimension because the mobile brokerage service was target of the paper, and was information-based.

The second dimension is environment quality, which is defined as how the service is effectively transmitted from service providers to consumers. Both many authors and interviewees considered environment quality to have an important influence on the evaluation of service quality (Grönroos, 1984; Zeithaml et al., 1988; Brady and Cronin, 2001; Lu et al., 2009), and Lu defined three sub-dimensions; equipment, design and situation. The equipment refers to technical environment, such as both the wireless telecommunications network that the service provider uses and the mobile device that the consumer owns (Parasuraman et al., 1985; Dabholkar et al., 1996; Tarasewich, 2002; Lu et al., 2009). Design refers to interface design of

the system and includes elements such as navigation, color, shapes, font type or music (Tarasewich, 2002; Lee and Bensbasat, 2004; Cyr et al., 2006; Lu et al., 2009). The last sub-dimension is situation, which reflects that mobility depends on the context in which consumers use the mobile service (Perry et al., 2001; Mallat et al., 2006; Lu et al., 2009). This sub-dimension includes elements such as context, location and purpose (Tarasewich, 2002; Kar et al., 2006; Pura, 2006; Lu et al., 2009)

The last dimension is outcome quality, which is considered as quality which significantly affects the perceived service quality (Grönroos, 1984; Carman, 1990; Fullerton, 2005; Rust and Oliver, 1994; Lu et al., 2009). This quality consists of three sub-dimensions; punctuality, tangibles and valence. Punctuality, which is similar with waiting time, was argued to be an important predictor of service quality (Parasuraman et al., 1985; Houston et al., 1998; Brady and Cronin, 2001; Kleijnen et al., 2007; George and Jones, 2000; Lu et al., 2009). Also, tangibles, which is used as a proxy to assess the outcome quality, was included as second sub-dimension as a result of interview and literature (Brady and Cronin, 2001; Lu et al., 2009). Lastly, valence, which reflects "attributes that control whether customers believe the service outcome is good or bad, regardless of their evaluation of any other aspect of the experience" (Brady and Cronin, 2001), was included based on customer interview.

Among these dimensions, the environment quality, which consists of sub-dimensions of equipment, design and situation, is chosen as mobile service criteria in this paper. As it reflects technological environment of mobile, content of the service and user situation, it encompass various elements as synergies and constraints in mobile environment.

Chapter 3. Suggested framework

3.1 Overall framework

This paper proposes research framework composed of four stages. In the first stage, the target online service is decomposed into function levels.

In the second stage, the user score for each function is estimated by measuring the level of satisfaction according to the presence of function in mobile service. The Kano analysis is incorporated for the assessment.

In the third stage, the technology score of each function is measured by online-mobile relationship matrix. Before constructing the matrix, evaluation criteria for measuring affordance of each function are derived from the literature.

In the last stage, the functions to be converted are determined and the synergy-constraint map is constructed for deriving strategic information for implementation.

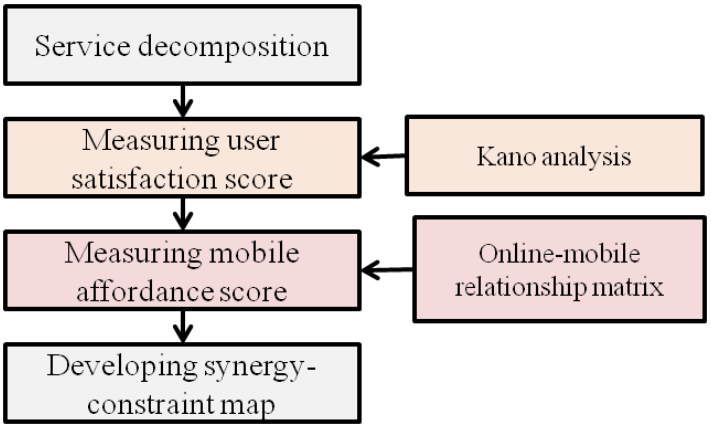

Figure 3 Research framework

3.2 Detailed framework

3.2.1 Service decomposition

The first step for the analysis is to select target online service and to decompose the service into function level. In this step, the functions of target online service are collected from its website. The functions can be scrapped from sitemaps or collected from the site.

3.2.2 Derivation of user score

In the user module, Kano analysis is conducted to examine how users feel about each function in the mobile service. For this analysis, Kano questionnaire is designed to be asked to the expected users of converted mobile service. The questionnaire consists of two major parts. The first part, named functional form, identifies how the user feels when the function is present. The degree of satisfaction is expressed in five responses. The second part, named dysfunctional form, identifies how the user feels when the function is absent. The degree of dissatisfaction is also examined in five responses. An example of Kano questionnaire is shown in Table 2.

Table 2 An example of question form for Kano analysis

(Berger et al., 1993; Baki et al., 2008)

	Functional form	Dysfunctional form
Question	How do you feel if your parcel is delivered to receiver in time?	How do you feel if your parcel is not delivered to receiver in time?
Response	1. I like it that way 2. It must be that way 3. I am neutral 4. I can live with it that way 5. I dislike it that way	1. I like it that way 2. It must be that way 3. I am neutral 4. I can live with it that way 5. I dislike it that way

After the survey, each function is classified into different requirement types. In specific, the function may be classified as one of six Kano categories according to Kano evaluation table as shown in Table 3, based on answers to both functional and dysfunctional questions. For example, if most of the respondents felt ‘I like it that way’ and ‘I dislike it that way’ when the function is present and absent, respectively, the function is classified into one-dimensional requirement.

Among six requirements, must-be and one-dimensional requirements are essential to prevent customer dissatisfaction, while attractive and indifferent requirements do not affect customer dissatisfaction even if they are absent. Therefore, in this paper, functions classified into must-be and one-dimensional requirements are considered to have high score in user module, while functions in attractive and indifferent requirement categories have low score. Functions in these four requirement types are

further examined in the technology module. On the other hand, reversal and questionable requirement are not recommended to be included in the service. Therefore, functions classified into reversal and questionable requirements are dropped before evaluation in the technology module.

Table 3 Kano evaluation table

(Tan and Pawitra, 2001; Baki et al., 2008)

		Response to dysfunctional question				
		1. Like	2. Must be	3.Neutral	4. Live with	5.Dislike
Response to functional question	1. Like	Q	A	A	A	O
	2. Must be	R	I	I	I	M
	3. Neutral	R	I	I	I	M
	4. Live with	R	I	I	I	M
	5. Dislike	O	R	R	R	Q

3.2.3 Derivation of technology score

1) Derivation of mobile service criteria

In the first step of technology-centered module, the components for evaluating service functions in mobile perspective are defined. For defining these components, research papers in the area of mobile service design, mobile service quality, mobile commerce, online commerce, internet technology were reviewed. Most of the components were derived from the

area of mobile service quality and mobile commerce. Then, they were classified into three dimensions. As a result, Table 4 explains 23 mobile components. Evaluation criteria in the third column describe how the functions are evaluated according to the component criteria.

Table 4 Mobile service criteria

	No.	Mobile components	Evaluation criteria	Reference
Equipm-ent	1	Display screen size	Is the function affected by display resolution and smaller screen size?	Anckar and D'Incau, 2002
	2	Display color	Is the function affected by display color?	Anckar and D'Incau, 2002
	3	Telephony usage	Does the function use telephony of mobile device?	Callahan, 2008
	4	Internet connection	Does the function require internet connection?	Khansa et al., 2012
	5	Cellular network based location system	Does the function use cellular network based location system?	Mcginity, 1999; Narayanan, 2001
	6	Gravity/Acceleration sensor	Does the function use gravity/acceleration sensor?	Callahan, 2008
	7	Bluetooth	Does the function use bluetooth?	Tarasewich, 2002
	8	GPS	Does the function use GPS?	Tarasewich, 2002
	9	Camera	Does the function use camera of mobile device?	Khansa et al., 2012
Design	10	Instant reminders	Does the function use push system?	May, 2001; Peters, 2002
	11	Navigation	Is the function affected by navigation within the	Tarasewich, 2002

			service?	
	12	Font	Is the function affected by font?	Tarasewich, 2002
	13	Music/sound	Does the function use music or alart sound?	Kalakota and Robinson, 2001; Tarasewich, 2002
	14	Image	Does the function provide images?	Kalakota and Robinson, 2001
	15	Video	Does the function provide videos?	Kalakota and Robinson, 2001
	16	Content simplicity	Does the function require simplicity of its content?	Anckar and D'Incau, 2002
Context	17	User data usage	Does the function access and use user's data?	Ropers, 2001
	18	Customization	Does the function use customized information?	Durlacher, 2001
	19	Any time/Real time access	Does the function use any time/real time access?	Durlacher, 2001; Perry et al., 2001
	20	Location	Is the function affected by usage in specific location?	Perry et al., 2001; Kar et al., 2006
	21	Service content	Is the function affected by the content of the service?	Tarasewich, 2002; Lu et al., 2009
	22	Purpose	Is the function affected by user's purpose of use?	Kalakota and Robinson, 2001
	23	Identification system	Does the function use identification system?	Muller-Versee, 2000; Carlsson and Walden, 2002

2) Construction of online-mobile relationship matrix

In the next step, the online-mobile relationship matrix is implemented. The matrix is derived from two dimensions of online service functions and mobile quality components, and illustrated in Table 5.

Table 5 Online-mobile relationship matrix

	Function 1	Function 2	Function 3	…	Function n
Component 1	m_{11}	m_{12}	m_{13}	…	m_{1n}
Component 2	m_{21}				
Component 3	m_{31}				
…	…			…	
Component 23	$m_{23\ 1}$				m_{23n}
Total sum	ts_1	ts_2	ts_3		ts_n
Synergy	s_1	s_2	s_3	…	s_n
Constraint	c_1	c_2	c_3	…	c_n

m_{ij}: most frequent relevance score of *j*th function to *i*th component

ts_j: total summation of m_{ij}

s_j: total summation of synergic values in m_{ij}

c_j: total summation of constrainable values in m_{ij}

After composing basic structure of the matrix, experts in mobile service area evaluate the effect of mobile quality criteria to the functions from user module. The functions are evaluated according to the evaluation criteria as described in Table 4 and the resulting relevance score is measured as very

synergic, synergic, not relevant, constrainable, and very constrainable with score of +2, +1, 0, -1, and – 2 respectively. The plus and minus sign represent the synergic and constrainable effect of the mobile component when the function is implemented in mobile environment. Finally, most frequent values among experts are used as representative relevance score in the online-mobile relationship matrix. Those values are represented as m_{ij} in Table 5. The matrix form enables intuitive finding of new opportunities and constraints in the mobile environment.

In the bottom of the matrix, total summation values of m_{ij} are calculated as ts_j. The value of ts_j shows the aggregated effect of mobile environment to the function. For example, if ts_j is higher than zero, the function j is considered to have bigger synergies than constraints. However, in this paper, only the functions with higher value of ts_j than average are considered to have high score in technology module. Respectively, functions with lower value of ts_j than average have low score in this framework. This is because it is a selection process among existing service functions, not among new function alternatives. The purpose of the matrix is to choose functions with more synergies in mobile than others functions in the service, not to choose all the functions with possibilities of delivering benefit.

However, it is also important to classify functions with low tsj values in detail, because there can be both cases of high synergies, high constraints and low synergies, low constraints. If the function is worthwhile to be included in mobile service because of its high synergies, there can be possibilities of implementation without considering constrainable criteria. Therefore, total summation values of synergies and constraints among m_{ij} are measured respectively, as s_j and c_j. Functions are again classified with

combination of high and low values of s_j and c_j.

3.2.4 Derivation of strategic information for implementation

1) Selection of functions to be converted

The functions from online service can be classified into four categories with the scores from user and technology modules, as illustrated in Table 6.

Table 6 Determination on whether to convert

User	Tech.	Description	Conversion
High	High	• Being expected from the users • Having various ways to be implemented	Convert
High	Low	• Being strongly required from the users	Convert
Low	High	• Delivering new opportunities	Convert
Low	Low	• Not wanted from the users • Having little synergic effect	Not convert

The first category has both high scores than average in user and technology module. The functions in this category must be implemented because they are not only expected to give satisfaction to the users, but also are expected to have various ways to be implemented in mobile environment.

The second category has low score in user module, but high score in technology module. Service functions in this category are not expected from

the users, but there might be new ways of delivering them to the users in mobile environment. These functions may create new opportunity in mobile service and affect user satisfaction.

The third category has both low values in user and technology module. This category includes functions that are not expected from the users. Moreover, those functions are not supposed to bring significant synergic effect with mobile criteria. Therefore, they are basically not suggested to be included in the mobile service.

The last category has high score in user module, but low score in technology module. The functions classified into this category do not have big synergic effect in the mobile environment. However, they should be implemented because they are strongly required from the users. The developers should try to overcome the constraints to include them in the mobile service.

As a result, the functions in the third category are dropped out before constructing synergy-constraint map. They are regarded as unnecessary functions in the mobile environment.

2) Construction of synergy-constraint map

In this step, the synergy-constraint map is constructed with the functions decided to be converted. The map is derived from two dimensions of synergy and constraint, and functions are mapped with normalized values of sj and cj. The functions are classified into four types on the synergy-constraint map as illustrated in Figure 4.

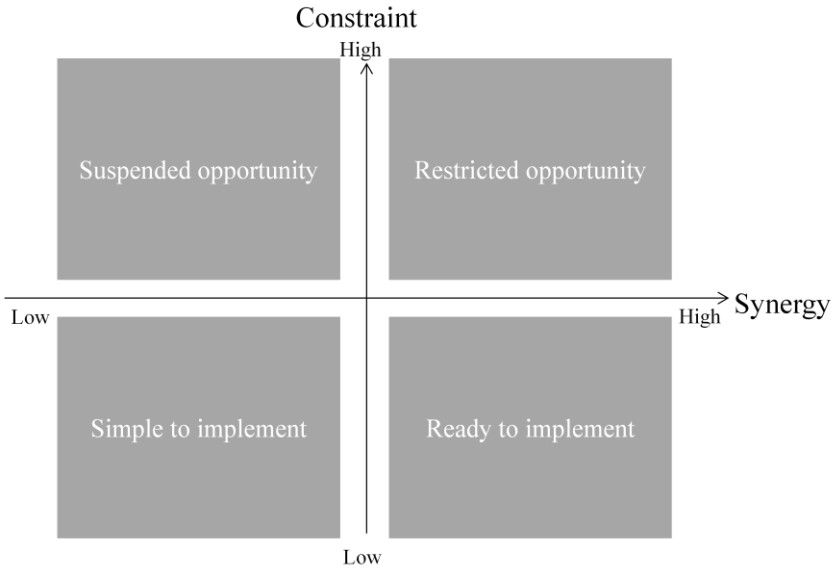

Figure 4 Synergy-constraint map

Table 7 Classification of functions on the synergy-constraint map

Name	Synergy	Constraint	Strategic implication
Ready to implement	High	Low	Supposed to bring large synergic effects in mobile environment, and have little constraints, making it relatively easy to implement →Should be implemented right immediately and included in the early version of the mobile service
Simple to implement	Low	Low	Not supposed to bring big synergies, but easy to implement → Should be implemented in the early version, and keep monitored for finding new synergies

Restricted opportunity	High	High	Expected to have big synergic effect in mobile environment, but restricted by many constraints → Should be implemented focusing on synergic components but the constraints should be overcome by degrees for bigger opportunity
Suspended opportunity	Low	High	Not supposed to bring big synergies, and difficult to implement → Should be implemented in the most simple way, and be improved with both overcoming constraints and finding new opportunities

As shown in Table 7, different strategies should be pursued for different types of functions in the implementation process. First of all, the functions classified into 'ready to implement' are supposed to bring large synergic effects in mobile environment. Moreover, they have few constraints, which make the implementation relatively easy. They should be implemented right immediately, considering the ways to maximize synergies.

The functions classified into 'simple to implement' are even easier to implement. They also have few constraints, and they do not have synergic effects to consider compared to 'ready to implement' functions. It is recommended to include them in the first version of mobile service, and keep monitoring for finding new synergies.

On the contrary, the functions classified into 'restricted opportunity'

have both high scores in synergies and constraints. They are expected to bring synergic effect in mobile environment, but restricted by many constraints. Therefore, the developers should focus on the synergies and implement them first. Then, by degrees, the developers should resolve the constraints to create more opportunities.

Lastly, the functions included in ‘suspended opportunity’ do not bring synergic effects in the mobile environment. Rather, they have many constraints to be implemented in mobile. Because they require big efforts for constraint-free realization, they should be developed in the simplest way. Then, they should be improved by overcoming constraints by degrees, and by finding new opportunities.

3) Deriving relevant mobile component

The online-mobile relationship matrix introduced in the technology module can work as a reference for the implementation process. If a function is decided to be included in the mobile service, the developer may check which are the most relevant and synergic mobile criteria in the matrix. For example, the function ‘finding the nearest exit in the highway’ is assumed to be included in the mobile service and it has high relevance with the criteria ‘GPS’, ‘internet connection’ and ‘location’. One way of implementing the function is providing the map information through internet connection, and checking current location using GPS system in the mobile device. Also, because this function is considered to be highly impacted by the location of the user, the developer may include enabling process of the function, making

it work only when the user is in the highway.

Chapter 4. Case study

4.1 Service decomposition

1) Target service selection

As a relatively new phenomenon first introduced by ‘Yahoo!’ in 2005, social commerce has been rapidly growing. Social commerce makes it possible for the consumers to share information, experiences and opinions about what, where and from whom to buy (Jascanu et al., 2007; Curty and Zhang, 2011). Social commerce services, such as Groupon, even more developed with emergence of social networking services such as Facebook and Myspace.

In South korea, social commerce companies such as Ticket monster, Coupang, WeMakePrice were established in 2010 and have grown rapidly, surpassing the revenues of existing online commerce companies. Furthermore, after releasing their mobile applications in 2011, combined with explosive increase of smartphone users (Joo and Sang, 2011), social commerce companies got even more flourishing. Among them, Coupang is selected as target service in this paper for its impact in South korean online commerce market. Because Coupang succeeded to make more than half of its revenue from mobile platform in 2012, it could be referred for further benchmarking after the research. The screenshots of online and mobile Coupang are shown in Figure 5.

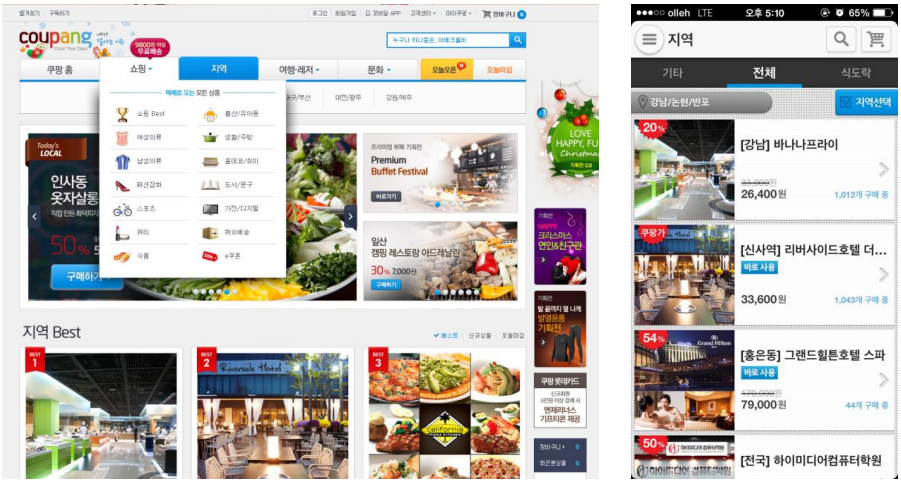

Figure 5 Screenshot of Coupang online and mobile

2) Decomposition of target service

In this case study, the functions were firstly derived from the sitemap, and then further extracted from the website of Coupang online. For convenience of the survey process, the number of functions was reduced by experts. The final 26 functions selected as data of the research are listed with explanation in Table 8.

Table 8 Selected functions of Coupang case

No.	Function	Description
Function 1	Today's hot	Showing the deals selected for today by Coupang
Function 2	Best deals	Showing the best-selling deals in 1 hour for every categories

Function 3	Deal finder	Search for deals that the user want to find
Function 4	Opened today	Showing deals opened from today
Function 5	Closed today	Showing deals scheduled to close today
Function 6	Right available	Showing marks for the deals that the user can immediately use from local category
Function 7	Subscribe	Subscribing to deal information for the selected category
Function 8	Registration	Enabling singing up in the mobile so that the users can register for a new ID
Function 9	Coupang announcement	Showing the notice of Coupang service
Function 10	Ask questions	Asking questions about canceling the purchase, exchanging, returning, billing, coupons and delivery related, product related, system related, and customer related inquiries
Function 11	Notify ‘Ask questions’	Notifying to the user via e-mail, SMS or status bar when the answer is registered for ‘Ask questions’
Function 12	Find ID/PW	Finding information about the account – ID/Password search

Function 13	Purchase history / Track your order	Searching for the history of deals purchased and used / Tracking delivery queries for the products from shopping category
Function 14	My information	Checking and correcting the user's information such as address, contacts, history and shopping interest
Function 15	Show number of purchase	Showing the number of purchased deals
Function 16:	Show remaining time	Showing the remaining time of the deal
Function 17	Image description	Using product image for a detailed description
Function 18	Video description	Using video for a detailed description
Function 19	Share via twitter/mail/facebook	Notifying that this deal is currently in progress through twitter/email/facebook
Function 20	Show homepage information	Showing deal related website
Function 21	Show phone number information	Showing deal related phone number
Function 22	Map guide	Displaying the location of the store on the map

Function 23	Find the fastest route	Connecting to Naver Maps and finding the fastest way to the store from current location
Function 24	Product review	Leaving or reading a review about the deal
Function 25	Coupang exhibition	Showing collection of deals with certain theme; such as clothes exhibition, 'Tropical night break' exhibition
Function 26	Terms and polices	Seeing the terms of service and polices

4.2 Derivation of user score

4.2.1 Design of Kano questionnaire

The first step is designing the Kano questionnaire for the survey. The original functional-dysfunctional formed questions for 24 functions were utilized. The survey was distributed both in offline and online through email and social networking services. The respondents were constrained to the people who have familiarity with mobile environment, use minimum of 10 mobile applications, and have experience in Coupang service.

4.2.2 Kano analysis

After the survey, data from 106 respondents between age of 20 and 27 were collected. Among 106 responses, 8 of them were considered as unusable responses and eliminated. The functions were classified using total 98 responses based on Kano evaluation table, and the result is depicted in Table 9.

Table 9 Result of Kano analysis on Coupang case

No.	Function	Type	No.	Function	Type
1	Today's hot	A	14	My information	I
2	Best deals	M	15	Show number of purchase	A
3	Deal finder	O	16	Show remaining time	I
4	Opened today	M	17	Image description	O
5	Closed today	I	18	Video description	A
6	Right available	A	19	Share via twitter/mail/facebook	I
7	Subscribe	I	20	Show homepage information	A
8	Registration	I	21	Show phone number information	A
9	Coupang announcement	I	22	Map guide	O
10	Ask questions	O	23	Find the fastest route	A

11	Notify ‘Ask questions’	O	24	Product review	O
12	Find ID/PW	A	25	Coupang exhibition	Q
13	Purchase history / Track your order	M	26	Terms and polices	R

Among 26 functions, function 25 and function 26 are revealed as questionable and reversal requirements. Therefore, these functions are dropped before next process.

4.3 Derivation of technology score

4.3.1 Construction of online-mobile relationship matrix

In the next step, the online mobile relationship matrix was constructed with 24 functions from user module. The relevant scores of each function to the mobile criteria were measured from 10 experts from mobile service area, and the most frequent values were recorded in the matrix. The resulting online-mobile relationship matrix for total 24 functions is in Table 10. The total score, synergy score and constraint score for each function is calculated and recorded below the matrix, and values above average are marked in each row.

Table 10 Online-mobile relationship matrix of Coupang case

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23	F24
C1	-2	-2	0	1	1	-1	0	0	-2	0	0	0	-1	0	0	0	-2	-1	0	0	0	-2	-1	-2
C2	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0
C3	0	0	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0	0	2	0	2	0	0	0
C4	-2	-2	-2	-2	-2	-2	-1	-1	-1	-2	-2	-2	-2	-2	2	2	-2	-2	-1	0	0	0	-2	-2
C5	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	0
C6	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	-2	0
C7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0
C8	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
C9	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
C10	2	-2	0	1	1	2	2	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0
C11	2	1	1	0	0	2	0	0	0	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0
C12	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

C13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1
C14	2	0	-1	0	0	1	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	2	0	2
C15	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
C16	2	2	-2	0	0	1	0	0	-2	-2	0	0	-2	0	2	2	0	0	2	0	0	0	0	0
C17	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
C18	0	0	0	0	0	0	0	1	0	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0
C19	-1	2	2	1	1	2	0	0	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0
C20	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
C21	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0
C22	2	2	2	1	1	1	2	2	0	2	1	2	2	2	0	0	0	0	2	0	0	1	2	0
C23	0	0	0	0	0	0	0	2	0	2	2	2	2	2	0	0	0	0	0	0	0	0	0	1
ts_j	7	7	5	3	3	14	3	4	-6	4	7	5	1	4	6	8	-2	5	9	0	2	2	-1	6
s_j	14	13	10	5	5	17	4	5	0	10	11	7	6	6	6	8	4	10	11	0	2	4	6	10
c_j	-7	-6	-5	-2	-2	-3	-1	-1	-6	-6	-4	-2	-5	-2	0	0	-6	-5	-2	0	0	-2	-7	-4

4.4 Derivation of strategic information for implementation

4.4.1 Classification of service functions

In the next step, the functions were classified with their scores from user and technology module. Among 24 functions from the user module, function 4, 5, 7, 9, 14, 20 and 21 had low scores both in the user and technology module as shown in Table 11. These seven functions are eliminated and not included in the mobile service.

Table 11 Determination of whether to convert Coupang functions

User	Tech.	Function	Convert
High	High	F3, F6, F11, F12, F16, F24	Convert
High	Low	F8, F10, F13, F17, F22, F23	Convert
Low	High	F1, F2, F15, F18, F19	Convert
Low	Low	F4, F5, F7, F9, F14, F20, F21	Not convert

4.4.2 Construction of synergy-constraint map

After selecting functions to be converted, the synergy-constraint map was constructed. The synergy scores and constraint scores were normalized, and then used to mark each function on the map. The resulting map is indicated in Figure 6, and the functions classified into four types after

mapping are shown in Table 12.

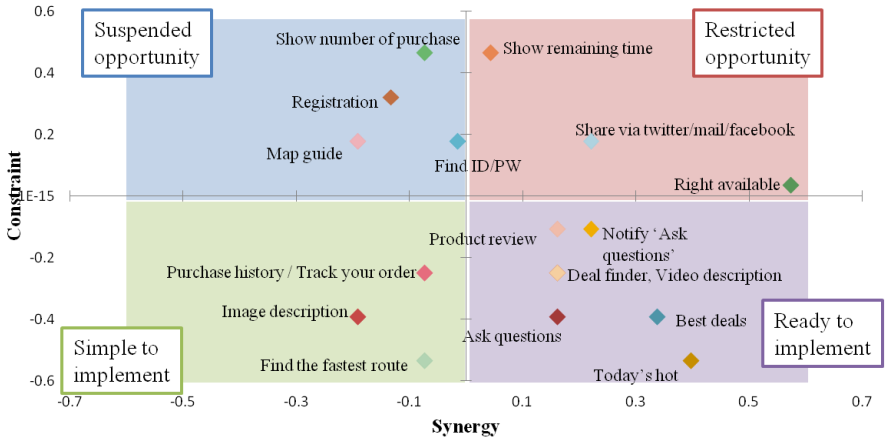

Figure 6 Synergy-constraint map of Coupang case

Table 12 Function classification of Coupang case on the synergy-constraint map

Name	Functions
Restricted opportunity	F6 (right available), F16 (show remaining time), F19 (share via twitter/mail/facebook)
Suspended opportunity	F8 (registration), F12 (find ID/password), F15 (show number of purchase), F22 (map guide)
Simple to implement	F13 (purchase history/track your order), F17 (image description), F23 (find the fastest route)
Ready to implement	F1 (today' hot), F2 (best deals), F3 (deal finder), F10 (ask questions), F11 (notify 'ask questions'), F18 (video description), F24 (product review)

As presented in Table 12, F1 (today' hot), F2 (best deals), F3 (deal

finder), F10 (ask questions), F11 (notify ‘ask questions’), F18 (video description), F24 (product review) are classified into ‘ready to implement’ functions. Therefore, they should be implemented considering synergies and included in the early version of the mobile service. The other functions in different categories should be implemented with corresponding strategies.

4.4.3 Derivation of relevant mobile component

Among the functions, F24 (product review) is looked in more detail for deriving technical information for realization. The synergies and constraints relevant to this function are derived from the online-mobile relationship matrix in Table 10. The function is considered to make synergies with mobile criteria C9 (camera), C13 (music/sound), C14 (image), C15 (video), C17 (user data usage) and C23 (identification system), and to be constrained by mobile criteria C1 (display screen size) and C4 (telephony usage). Because this function is classified as ‘ready to implement’, the developers should concentrate on delivering synergies immediately. For example, the function may utilize mobile device’s camera to instantly take a photo or video of the product for review. Besides, it could use pre-taken photo or video in the device to write reviews. The function may utilize text-to-speech for reading or listening to the reviews, and it may display the reviews that the current user had written after logging in.

Chapter 5. Conclusion

In this paper, the framework for converting online service to mobile service is suggested. Firstly, the target online service is decomposed into functions, and these functions are measured in terms of user and then technology. For the user perspective, Kano analysis is conducted to classify the functions according to the users' satisfaction level depending on the presence of each function. The functions classified into must-be and one-dimensional requirements get high score, and those classified into attractive and indifferent requirements get low score. The functions turned out to be questionable and reversal requirements are reduced before further analysis. In the technology perspective, the online-mobile relationship matrix is composed after deriving mobile criteria from literature. The matrix is constructed from two dimensions of online service functions and mobile quality criteria. The most frequent values from the evaluators are recorded in the matrix and the scores of total summation, synergies and constraints are measured respectively. The functions with low scores both in user and technology perspectives are decided not to be included in the mobile service. After choosing functions to be converted, the synergy-constraint map is constructed to get strategic information for the implementation process. Lastly, technical information for implementing each function is derived from relevant criteria in online-mobile relationship.

This framework suggested in this paper has contribution in two aspects. First of all, the framework both considers user and technology aspect. Previous research only focused on technical aspect for the conversion, but the framework suggested in this paper takes the user into account with Kano

analysis. This delivers higher user satisfaction in mobile service and reduces extra cost for implementing unnecessary functions. Second of all, the mobile quality criteria were utilized to enable service providers to consider changing environment from online to mobile. This helps service providers to decide on which way to implement the function, reflecting synergies and constraints.

Despite the contributions, however, there are a few limitations that could be addressed in future research. Firstly, the mobile criteria derived from literature review may not be enough. It is suggested to compare the result of case study with actual mobile application of Coupang, and to refine current mobile criteria. Secondly, the framework suggested in this paper only covers the online services which are expanding their business to mobile market. After verifying suggested framework with cases of various online services, new framework for the conversion of entire business platform may be further investigated.

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초 록

최근 온라인 서비스의 모바일 시장으로의 진출이 확대되면서 모바일 서비스로의 전환이 서비스 혁신의 중요한 주제로 대두되고 있다. 이러한 추세에 따라, 모바일 서비스로의 전환에 관련된 연구도 활발히 진행되고 있다. 그러나 지금까지의 연구는 모바일 상거래의 인터페이스 설계, 모바일 환경에서의 가치 창출을 위한 비즈니스 모델 선정, 그리고 모바일 서비스의 구조 설계와 같이 대부분 사용자 관점보다는 기술적 관점에서의 시스템 구현에 초점이 맞추어져 왔다. 이러한 연구들은 모바일 환경으로의 전환에 따르는 기술적 제약을 해결하는 데는 많은 성과를 거두었지만 사용자의 관점을 고려하지 않음으로써 사용자가 실질적으로 원하는 기능이 채택되지 않는 문제점을 낳고 있다. 이에 따라, 본 연구는 온라인 서비스의 모바일로의 전환에 사용자 관점과 기술적 관점을 동시에 고려하는 프레임워크를 제안한다. 제안된 프레임워크는 크게 두 개의 모듈로 구성되어 있다. 첫째, 사용자 관점의 모듈에서는 온라인 서비스의 각 기능이 모바일에서 적용되었을 때의 사용자 만족도를 KANO 모형을 이용해 파악한다. 둘째, 기술 관점의 모듈에서는 서비스 기능과 모바일 서비스의 기술 환경 요소를 두 축으로 하여 온라인-모바일 관계 매트릭스를 구성한다. 이후 사용자 관점의 모듈과 기술 관점의 모듈에서 나온 점수들을 기준으로 모바일 서비스에 포함시킬 기능들을 결정한 뒤,

온라인-모바일 관계 매트릭스에서 도출된 시너지와 제약 점수를 이용하여 시너지-제약 지도를 작성한다. 이를 통해 기능을 구현하기 위한 전략적 정보를 도출할 수 있고, 모바일 환경에서의 기능 구현의 기술적 제약조건과 새로운 기술 환경에 따른 기회를 함께 탐색할 수 있다.

주요어: 서비스 혁신, 모바일 서비스, 온라인 서비스, 카노(Kano) 분석, 온라인-모바일 매트릭스, 시너지-제약 지도

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