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The Impact of Mobile Technology Paradox Perception and Personal Risk-Taking Behaviors on Mobile Technology Adoption*

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ABSTRACT

People acknowledge that mobile technology has improved their lives in terms of convenience, flexibility, connectedness, and new freedom of choice. However, as people increase usage of technology, they may become frustrated, challenged, annoyed, and irritated with it. This is the main characteristic of mobile technology paradoxes. Once technology gets into people's daily life, which it already has, people will look for a way to minimize the dependency on the technology, as well as finding a way to use the technology to improve the quality of their life. The focus of this study is to understand the mobile technology paradoxes and to develop coping strategies. As mobile technology is already a part of people's daily life, it is inevitable that people need to utilize technology as part of their lifestyles. This study developed a research model regarding the relationship between mobile technology perception and choice of coping strategies, including personal risk propensity as a mediating factor. Discussion on the importance of the technology paradoxes for developing mobile solution and services from the customers' perspectives followed after hypotheses testing.

Keywords: Mobile Technology, Technology Paradoxes, Risk Propensity, Technology Acceptance

1. Introduction

Mobile technology is changing rapidly, driven by strong consumer demand. These

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days, the typical life time of a mobile phone in Korea is about 6 months and the average Koreans change their mobile phones approximately every 18 months. Due to this trend, mobile device developers make tremendous efforts to meet the ever-changing consumer demand.

Through the introduction of new features and services for mobile devices, the industry is moving towards creating greater value to consumers, instead of merely providing basic telecommunication services. Newer mobile phones have high-resolution digital cameras, business card scanners, voice recognition, TV/Video, built-in flash memory card interface, navigation, etc. However, all these new features, which the mobile phone manufacturers though users would like to have and were claimed to be 'world's best' and 'first of its kind,' may not be as well adopted by the market as expected.

Some researchers started to discuss the conflict between consumers' expectations and the real performance of new technology, using the term "technology paradoxes" [30]. For example, TV attracts people to a certain place, but at the same time it also isolates each of them by making them focus on the TV program and not engage each other in conversation [31]. Few studies extended the concept of the technology paradoxes to mobile technology [2, 23]. Compared to personal computers with less flexibility of mobility, mobile devices have become more of a necessity or even a personalized accessory. It represents the personal identity of an individual user [26, 27, 35]. As mobile technology becomes more familiar in our daily lives, consumers will start to realize the conflict between their initial expectations of the service and what they actually observe. For example, mobile technology allows people to be reachable at anytime, but at the same time they also lose freedom when mobile technology is attached to them.

Like many other technologies, the sustainable acceptance of the mobile device is becoming a more important element, succeeding in the market than accepting a new technology. As telecommunication technology rapidly develops, users have a wide spectrum of mobile devices and services that they can choose to effectively support their work. Therefore, in the process of using a certain telecommunication service, if the users are satisfied with it, they will likely continue to use it, otherwise, the users will stop using it and switch to new ones [34]. With the introduction of mobile Internet service, a survey showed that about 70% of the users would not use the mobile Internet service after they experience unsatisfactory results [37]. From this perspec-

tive, the concept of mobile technology paradoxes presents the foundation of further development of the theory on sustainable mobile technology usage, which is required in this industry.

However, as most of the present studies on technology paradoxes depend on qualitative method, they lack objective measuring tools and discussion on this issue was not done systematically. In order to demonstrate the paradox awareness of such mobile device users, it is necessary to develop objective measurement. Consequently, the purposes of this study are (1) to define and verify the concept of the mobile technology paradoxes, (2) to identify mobile technology paradox types, (3) to suggest a research model on user recognition of the mobile technology paradoxes and coping strategies including mediating factor, risk propensity, which was not included in current literature on this topic, (4) to empirically verify the model, and (5) to discuss the implication of the study results for mobile device design considerations for practitioner and researchers in this area.

2. Theoretical Background

2.1 Definition and Types of Mobile Technology Paradoxes

In the field of formal logic, "paradox," is a self referential statement in two parts. Each of which is unremarkable when taken separately, but irreconcilable in combination [39]. As technology is designed and created for certain purposes and for certain work to be done, it is judged that the result opposite to the purpose will not appear. However at times, many technologies could create an opposite result or situation while carrying out their own functions. For example, the purpose of an antibiotic or germicide is to kill bacteria and reduce disease. But the more we use it, the more resistive and stronger the bacteria gets, resulting in illness [2].

Existing literature on technology has covered a wide variety of viewpoints. One of them focuses on positive aspects of technology, such as increased freedom and ability due to technical development. Another party emphasizes the negative aspects, such as environmental destruction and subjection to a machine [30]. Meanwhile, some researchers have stated that technology has both bright side and dark side simultaneously, so technology itself contains conflicts. For instance, people frequently

complain that electronic products that were purchased to save time end up wasting time instead [12].

The mobile technology paradoxes extends the characteristics of technology paradoxes to mobile technology. As mobile technology integrates various functions/technologies in a single device, it is highly expected that users experience the paradoxes.

Most studies on the paradoxes focus on the categorization of the paradoxes. The studies on this topic are based on Mick and Fournier's [30] research, which suggested 8 technology paradox types from consumer products, targeting ordinary technology-based products which are not limited to a special field. Methodologically the studies adopted the qualitative one, dependent on the observation and interview.

Jarvenpaa and Lang [23] conducted a study on cellular phone users. They grouped them into 33 focus group sessions, and asked them to share their experiences of benefits and conflicts in using cellular phones. Other than the eight paradoxes Mick and Fournier [30] suggested, they added two more paradoxes. Juntumaa and Tuunnainen [25] researched the benefits and obstacles of using the PIM (Personal Information Management) service in existing mobile technology from the viewpoint of consumers and service providers. Through the interviews with PIM users, they deduced the benefit and obstacle aspects. The benefits consumers felt were ability to plan, communication, flexibility of time and space, productivity, enjoyment, and ease of use, while some of the obstacles included difficulty of usage, technology limitation, and breach of security. On the basis of the current literature, this study identified the types of mobile technology paradoxes into 7 as in Table 1.

Researchers who identified the types of technology paradoxes used similar terms interchangeably for the same (or similar) type. So this study tried to choose the best fitting terms. For example, empowerment/enslavement (Jarvenpaa and Lang's term) was more comprehensible than freedom/enslavement (Mick and Fournier's term). For the same reason, we chose engage/disengage (Jarvenpaa and Lang's term) instead of assimilation/isolation (Mick and Fournier's term). Another consideration was that Mick and Fournier's classification of technology paradox types was not limited to mobile technology. So the classification in this study is closer to Jarvenpaa and Lang's work, which is narrowed down to the issue to mobile technology. Thus private/public, and planning/improvisation, which are unique to mobile technology, were added.

In addition, some terms were quite vague and similar with others. For example, Control/Chaos and Competence/Incompetence are similar to Efficiency/Inefficiency

thus this study integrated the former ones with the latter one.

Table 1.Summary of types of Mobile Technology Paradoxes

Paradox Type	Definition	References
Efficiency/ Inefficiency	"Efficiency" means to reduce the required effort or time with technology and "inefficiency" means that use of technology requires more effort and time. People might pay a high price to get mobile technology with the expectation that it would help them to do something they want, but sometimes it might be less useful than expected, or people have to spend more time on it. For example, in order to ensure mobility of a mobile device, some have to keep battery chargers in every place such as home, a company or in a car.	[23], [30]
Fulfill /Create needs	"Fulfill needs" means to accomplish what a user wants with the mobile device and to "create needs" means to generate new desire, which was unknown until the mobile technology was used. One purchases a mobile device to increase the merits such as mobility, but it is expected such mobile device must have features which could not be imagined in the past. For example some mobile services require special middleware, software, and some extra devices.	[6], [9], [14], [16]
Empowerment/ Enslavement	"Empowerment" means to reinforce the power of users with the use of a mobile device and "enslavement" means that users are subordinate to the mobile device. Mobile technology gives users freedom from the restraint of time and place, thus they work anytime and anywhere. However, at the same time they also experience that they are bound by the technology. Thus, even when they are at home or at vacation, they are still connected to their bosses.	[30]
Private/ Public	A mobile device is usually purchased for private use. Having their own mobile device, users can use private communication space regardless of where they are. Sometimes, they can make their own virtual private space even in a public place such as an airport or train. However, it can not remove a physical space that actually exists. For example, when they make or receive a mobile phone call in a public place, other people can hear the conversation without intention to be distracted by the ticking sound of pressing key buttons.	[23], [25], [36]

Planning/ Improvisation	Mobile device is a useful apparatus in planning to engage or cooperate with people and other social activities. However, the impromptu nature of a mobile device sometimes encourages people to improvise rather than plan in advance. For example, people become less sensitive to not being on time as long as they let the other party know that they will be late because they can easily get in touch with the other party by using mobile phone.	[1], [2], [23], [42]
New/ Obsolete	"New" means allowing people to obtain the benefit of the latest technology and "obsolete" means that soon after a product is placed on the market, it falls behind the times. When a new product is launched, it may attract people's attention with better function, improved design, and lower price. However, the moment people buy a new product, it becomes an old product. This situation can be worse when various technologies were integrated into a mobile phone.	[2], [16], [17], [23], [36]
engage/ disengage	Mobile technology enables users to choose when to engage and disengage in a discourse. Unfortunately, most people find it difficult to engage in parallel activities, to engage in something new without disengaging from something else. For example, when calls interrupt a conversation, the caller will typically abruptly disengage from the current conversation and engage in a new one, often leaving others stranded.	[2], [24], [30]

2.2 A strategy of Accepting Technology Paradoxes by Technology Users

The reason why technology paradoxes are critical in understanding user behaviors is that when users perceive the paradoxes, they also simultaneously make a strategy to cope with the paradoxes. The framework proposed by Mick and Fournier [30], a representative research in this field, suggests that when users encounter the paradoxes after using a mobile device, they inevitably face a certain degree of anxiety. Hence, they choose a strategy to cope with the paradoxes, either to avoid or confront them(See Figure1). Jarvenpaa and Lang [23] embodied situational elements, which includes technical environment, individual environment, organizational environment, and cultural background.

Coping strategies could be either avoidant or confrontative [19]. Avoidance is to minimize the usage of technology, which includes ignoring the information on the usefulness of the product, refusing to own the item and delaying the purchase. The

user may temporarily show no interest in that product, reduce usage, or even not to use the product and leave it as it is when it is out of order. On the other hand, a confrontation is when a user makes effort to learn and use the features or services of the technology, and revises his expectation value as he understands the potential technology and restraints [23]. He might attempt to confront the limitations of the product by accommodating, changing their expectations, and accepting what the product can or cannot do by accumulating necessary information, and searching for detailed information on the product and brand. He might choose to understand the operating principles, merits and demerits of the owned product, and master the use of it.

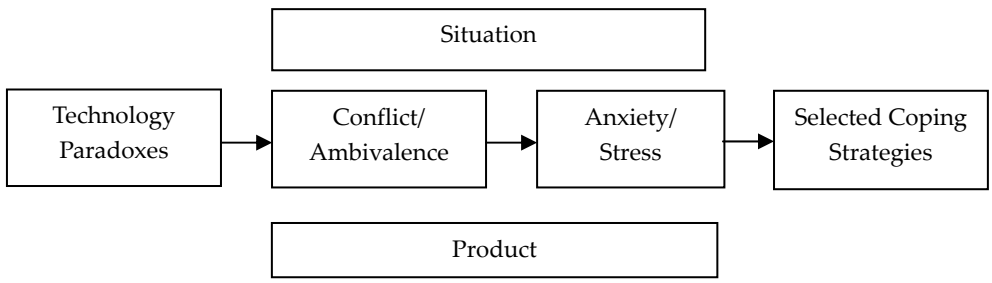

Figure 1. The Framework of Technology Paradoxes and Coping Strategies [30]

2.3 Risk Taking Behaviors and Mobile Technology Adoption

The potential problem of theories regarding technology paradoxes is that they set up mediating factors with only situational factors and does not include any individual factors. Even if users use the same version of mobile device they perceive the paradoxes differently and choose different coping strategy. Thus, individual factors should be set up as ones influencing the extent of their stress level caused by the perception of paradoxes.

Theories dealing with acceptance of new technology are closely related to theories of risk-taking behaviors in an individual perspective. Thus, this study sets up risk propensity as an individual factor that would influence on the stress level. Risk propensity is defined as the motivation to take the risk of a given decision problem (e.g. coping mobile technology paradoxes). It was argued that an individual has an inherent tendency toward risk-taking in a specific domain and it is not easily changed [28, 38]. Such a tendency is not exceptional in the IT domain and should be discussed in examining user behaviors with mobile technology adoption.

According to Weill and Ross [43]'s study, under the IT monarchy governance structure IT decision-makers' risk propensity would be greatly influenced by their intrinsic risk preference in this domain. Risk preference means the decision-maker's intrinsic tendencies in a given domain.

The other individual factor that would have an influence on risk propensity could be self-efficacy on digital technology. Self-efficacy on digital technology refers to an individual's perception regarding his/her ability to use digital technology [10]. Bandura [3, 4] suggested self-efficacy theory, which states that in the absence of system experience, the confidence in one's computer related abilities and knowledge can be expected to serve as a basis for an individual's judgment on how easy or difficult a new system will be to use. Self-efficacy has been empirically proven as a factor that would make differences on individual adopting information technology or systems [20]. Research findings from previous studies suggest a positive relationship between computer self-efficacy and user beliefs in information systems. Some studies also found that self-efficacy had a significant influence on perceptions about the ease of use of a new technology/system, which is the key to the acceptance of new technology [21, 41].

3. Research Design and Method

3.1 Research Model and Hypotheses

The first purpose of this study was to develop a measurement that will quantativley evaluate the users' perception of mobile technology paradoxes. Most of the research on technology paradoxes that has been published so far depended on qualitative methods such as interview and observation. Thus this study developed measurement based on the previous literature, then tested reliability and validity (measurement model testing). The next purpose of this study was to empirically test the relationship between user perception of mobile technology paradoxes and coping strategies with the measurement.

To achieve the purposes we developed a research model like Figure 2. The model is based on Mick and Fournier's [30] framework. However, the framework did not include individual factors. This study suggested research propensity, risk preference,

and self efficacy on digital technology as individual factors, which were suggested in the previous research related to individual adaptation of new technology.

In this study, users' perception of mobile technology paradoxes and risk propensity are independent variables and choice of coping strategy is the dependent variable. Stress level from mobile technology is a mediating factor. Thus users' perception of mobile technology paradoxes would influence on their stress level. The risk propensity also influences users' stress level from mobile technology. Then the stress level influences on their choice of coping strategy. The antecedents of risk propensity are risk preference and self efficacy of digital technology. Therefore, the study suggests the following 5 hypotheses.

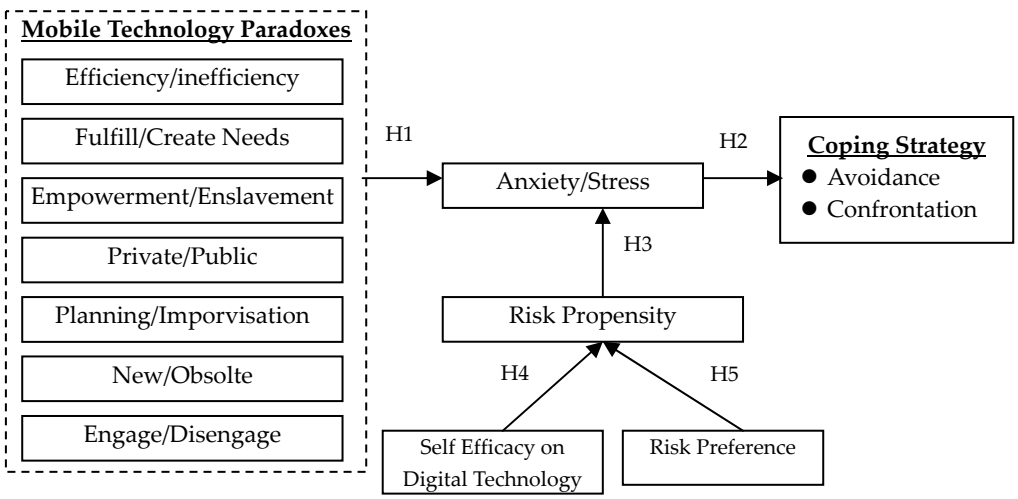

Figure 2. Conceptual Research Model

H1: The higher perception of mobile technology paradoxes will increase users' stress/anxiety about mobile technology.

H1-1: The perception of efficiency/inefficiency paradox will increase users' stress/anxiety about mobile technology.

H1-2: The perception of fulfill/create need paradox will increase users' stress/anxiety on mobile technology.

H1-3: The perception of empowerment/enslavement paradox will increase users' stress/anxiety about mobile technology.

H1-4: The perception of private/pubic paradox will increase users' stress/anxiety about

mobile technology.

H1-5: The perception of planning/improvisation paradox will increase users' stress/anxiety about mobile technology.

H1-6: The perception of new/obsolete paradox will increase users' stress/anxiety about mobile technology.

H1-7: The perception of engage/disengage paradox will increase users' stress/anxiety about mobile technology.

H2: Users who are more anxious about mobile technology will choose avoidance rather than confrontation for their paradoxes coping strategy.

H3: Users with higher risk propensity will have less stress about mobile technology.

H4: Users' self efficacy on digital technology will positively affect their risk propensity.

H5: Users' risk preference will positively affect their risk propensity.

3.2 Sample and procedure

The study conducted a survey to collect data from the May to June, in 2008. We randomly selected 300 mobile device users from the list provided by Korean Telecommunication Company. Of the 300 surveys mailed, 172 were completed and returned and 18 were returned as undeliverable. As Table 2 shows, more female respondents (55.2%) answered. Most respondents' ages were in the 30~49 range and more than 50% of them were employees.

Table2 Sample Charateristics

Gender	Female	95 (55.2%)	Job	Student	37 (21.5%)
	Male	64 (37.2%)		Engineer	4 (2.3%)
	Missing	(7.6%)		Professional	4 (2.3)
	Teen	29 (16.9%)		Employee	110 (64.0%)
Age	20~29	25 (14.5%)		Public Service	1 (0.6%)
	30~39	54 (31.4%)		Others	7 (4.6)
	40~49	40 (23.3%)		Missing	8 (4.7%)
	Over 50	14 (8.1%)			
	Missing	10 (5.8%)			

3.2 Measurement

The initial set of items used to measure mobile technology paradoxes, risk propensity, risk preference, and self-efficacy of digital technology was generated based on reviews of previous relevant literature and field surveys. First, we indentified mobile technology paradox types based on the previous research. Among paradox types the suggested previous research were almost identical, thus this study could identify 7 paradoxes in Table1. The survey items were based on the examples contained in the previous research. As most studies used qualitative research methods, they had abundant examples of each paradox. 7 Likert scale was used for each item.

Strategic behaviors for coping with mobile technology paradoxes were classified as either avoidance or confrontation, and further subcategorized similar to Table 3 according to Holahan and Moos [19] and Mick and Forunier [30]'s frameworks. Based on their logic, each of the subcategory has degree within its own category. For example, abandonment is the most avoidant behavior and the distancing is the least avoidant behavior. In confrontation category, accommodation is the least confrontative behavior and mastering is the most confrontative behavior. The behaviors suggested in Table 3 scaled from the least avoidant behavior (distancing) to the most confrontative behavior (mastering) with the value of 1 to 6.

Table 3. Types of Strategic Behaviors for Coping with Mobile Technology Paradoxes

Variables	Operational definition	Source
Avoidance	• Distancing: Developing restrictive rules for when or how a technological possession will or will not be used • Neglect: Loss of interest in mobile device/service • Abandonment: Exchange of mobile device/ Cancellation of mobile service contract	[19], [23], [30]
Confrontative	• Accommodation: Identifies the advantages and disadvantages of the mobile device • Partnering: Personalize the mobile device and service to meet personal requirement • Mastering: Dominating a technological possession by thoroughly learning its operations, strengths, and weaknesses.	[9], [16], [19], [30]

Once the item pool was created, content validity was conducted. A group of MIS, sociology faculties, and graduate students were solicited to further demonstrate con-

tent validity and clarify the wording for each item. Items that consistently did not match the corresponding construct or shown to be ambiguous were deleted from the items. Based on the responses received from the pilot study, the questionnaire was revised.

4. Data Analysis

4.1 Analysis Method

A multivariate normality test was conducted using AMOS 5 [13]. The result showed that the data used were multivariate non-normal ($t = 24.55$, $P < 0.001$). Therefore, covariance-based SEM (Structural Equation Modeling) techniques such as AMOS and LISREL were not appropriate. Partial Least Square (PLS) was used to test the research model since it does not require the data to exhibit multivariate normal distribution [8, 11]. PLS is a component-based technique which simultaneously tests the properties of the scales used to measure the constructs (measurement model) and examine the strength of the relations between the constructs (structural model). The bootstrap re-sampling method (500 samples) in PLS was used to estimate the *t*-value which determines the significance of the path coefficients.

The analysis involves two stages: (1) assessment of the measurement model, which includes the reliability and validity of the measures, and (2) estimation of parameters in the structural model, which deals with the relationships among latent variables (or constructs). The standard errors were estimated using bootstrapping with 1000 re-sampling. The analyses were conducted using PLS-Graph Version 3.00 for the study.

4.2 Measurement Model Assessment

The quality of measurement model was evaluated by assessing several types of psychometric properties such as reliability and convergent validity under a PLS factor analysis framework. Item loadings were used to assess the significance of the item to the factor. A measurement model with eleven factors was constructed where the eleven factors consisted of five constructs (mobile technology paradox, stress level, coping strategy, risk propensity, self-efficacy, and risk preference).

Reliability relates to the internal consistency and accuracy of the measurement items; that is, the extent to which the measurement items used are consistent in what they intend to measure [22, 40, 44]. For a scale to possess a good reliability, composite reliability and average variance extracted (AVE) should be 0.70 and 0.50 respectively [13]. All eleven subscales demonstrated good reliability as shown in Table 4. The observed composite reliabilities are between 0.994 and 0.772, and the observed AVEs are between 0.512 and 0.752.

Table 4. Composite reliability and AVE of Constructs

Constructs	Composite Reliability	AVE
Fulfill/Create	0.809	0.588
Efficiency/Inefficiency	0.796	0.513
New/Old	0.813	0.523
Planning/Improvising	0.887	0.567
Public/Private	0.880	0.650
Empowerment/Enslavement	0.869	0.527
Engaging/Disengaging	0.772	0.531
Stress Level	0.901	0.752
Self Efficacy on Digital Technology	0.994	0.736
Risk Preference	0.845	0.646
Risk Propensity	0.899	0.690

Convergent validity examines whether measures which should be related are related [13]. The convergent validity was assessed by checking whether item loadings on their specified factors are higher than 0.60 [7]. As Appendix 1 shows the measurement has 12 items that shows low loadings below 0.60: Q1-4, Q2-1, Q3-5, Q3-6, Q5-4, Q5-5, Q6-2, Q6-6, Q6-7, Q7-1, Q7-2, Q7-3. The items were deleted for the further analysis such as structural model Assessment.

Discriminant Validity examines the relationship between measures of similar and different constructs to provide more evidence that the scales used are measuring distinct constructs. There are two methods that PLS confirm discriminant validity. First, the deviation of each constructor should be greater than correlation with other constructs. Table 5 shows the values of the square root of the AVE (on the diagonal in bold) were all greater than the inter-construct correlations (off the diagonal). An addi-

tional test of discriminant validity was checking loading and cross-loading. All measurement items were assessed to ensure that each measurement item had a higher loading on its assigned factor than on the other factors [7, 11]. The results are presented in Appendix 1. Except for 12 items deleted after convergent validity test (in bold), no cross-loadings were observed to be higher than item loadings. This demonstrates that the measures exhibit satisfactory discriminant validity.

Table 5. Inter–Construct Correlations and Square Root of Average Variance Extracted Statistics

	Fulfill	Planning	Efficien	New	Public	Empow	Engagin	Stress	prope	Efficac	Prefer	Str
Fulfill	**0.766**											
Planning	0.288	**0.753**										
Efficiency	0.568	0.213	**0.704**									
New	0.368	0.432	0.426	**0.704**								
Public	0.109	0.278	0.311	0.314	**0.806**							
Empower	0.387	0.416	0.418	0.395	0.43	**0.726**						
Engaging	0.186	0.483	0.211	0.343	0.433	0.454	**0.726**					
Stress	0.425	0.246	0.418	0.485	0.209	0.453	0.395	**0.867**				
Propensity	0.009	0.129	-0.04	0.078	0.036	0.127	0.176	0.024	**0.831**			
Efficacy	0.072	0.036	-0.099	0.117	0.07	0.047	0.011	-0.037	0.278	**0.858**		
Preference	0.073	0.042	-0.099	0.083	-0.052	0.117	0.039	0.035	0.557	0.566	**0.804**	
Strategy	-0.111	-0.068	-0.204	-0.065	-0.052	-0.118	-0.022	-0.28	0.073	0.192	0.132	1

4.3 Structural Model Assessment

4.3.1Goodness of the Model

PLS does not generate a single measure of goodness of fit. However, R^2, factor loadings, path coefficients, and the number of iterations required to converge on a solution are jointly used to provide indications regarding the goodness of the tested model [7, 29]. The test of the structural model involves estimating two components: (1) the path coefficients that link between the latent variables under investigation, and (2) R^2 which represents the amount of the variation in the R^2 values of the structural model. Figure 3 shows that the coefficients for more than half of paths having significant value at 0.1. The results also indicate that 38% of the variance in stress/anxiety, 31.2% of the variance in risk propensity, and 7% of the variance in coping strategy was explained by the model. Overall, the result suggests the model has acceptatble predictability.

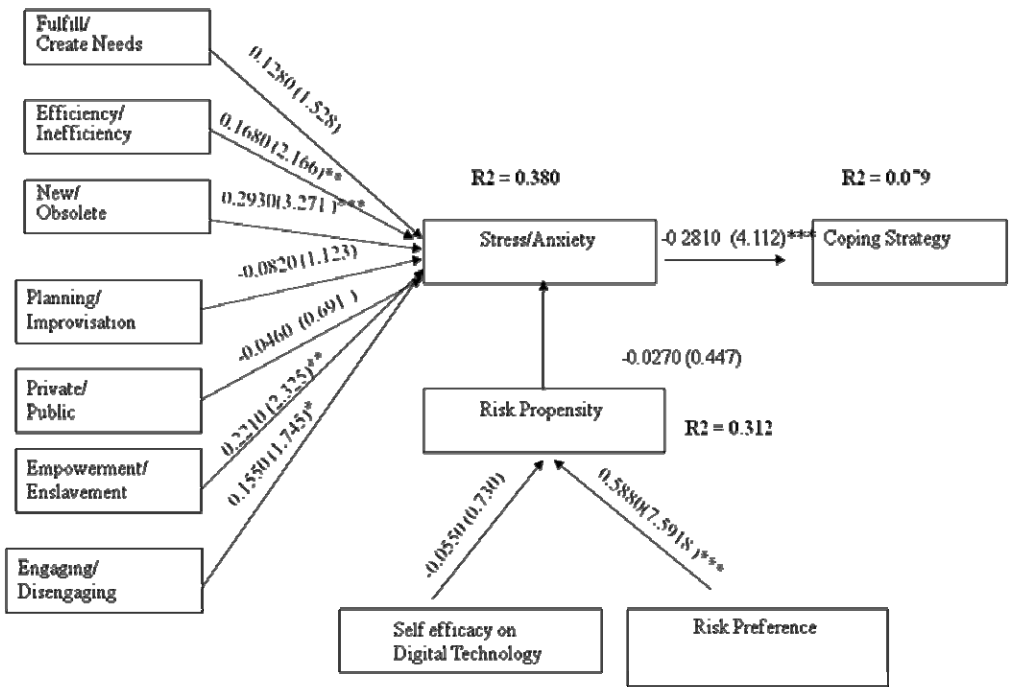

Figure 3. Path Coefficients and R^2 Values of the Structural Model

4.3.2 Hypotheses Testing

Hypotheses were tested within the structural equation model shown in Figure 3. Hypotheses which posit direct relations between constructs were tested based on the magnitude and significance of path coefficients estimated using PLS. Figure 3 and Table 6 provide the magnitude and significance of inter-construct relationships.

The analysis showed that three paradoxes (efficiency/inefficiency, new/obsolete, empowerment/enslavement) had a significant positive influence on the stress/anxiety ($\beta = 0.1680$, $t = 2.166$, $p < .005$, $\beta = 0.2930$, $t = 3.271$, $p < .001$, $\beta = 0.2210$, $t = 2.325$, $p < .005$) at 0.05 significance level. These results supported hypotheses H1-2, H1-3 and H1-6. The path between engaging/disengaging and stress/anxiety (H1-7: structural rink = 0.1150, t = 1.745) was positive and significant at 0.1 significance level. The path between stress/anxiety and choice of coping strategy (β = -0.2810, t = 4.112, $p < .001$) was negative significant at 0.01. This supported the H2. The path between risk propensity and stress/anxiety (β = -0.0270, t = 0.447) was negative and not significant. Thus, H3 was rejected. The path between self efficacy on digital technology and risk propensity (β = 0.0550, t = 0.730) was negative and not significant. Thus, H4 was rejected. The

path between risk preference and risk propensity (β = 0.5880, t = 7.5918) was positive and significant. Thus, H5 was supported.

Table 6. Summary of Hypotheses Testing

	From	To	Direction*	Test Results
H1-1	Fulfill/Create Needs	Stress/ Anxiety	+	Reject
H1-2	Efficiency/Inefficiency		+	Do not reject
H1-3	New/Obsolete		+	Do not reject
H1-4	Planning/Improvisation		-	Reject
H1-5	Private/Public		-	Reject
H1-6	Empowerment/Enslavement		+	Do not reject
H1-7	Engaging/Disengaging		+	Reject
H2	Stress/Anxiety	Coping strategy	-	Do not reject
H3	Risk Propensity	Stress/Anxiety	-	Reject
H4	Self Efficacy on Digital Tech	Risk Propensity	-	Reject
H5	Risk Preference	Risk Propensity	+	Do not reject

5. Discussion, Conclusion and Implications

The purpose of this study was to develop a measurement to quantitatively test the relationship between paradox perception and strategic behaviors for coping with mobile technology paradoxes. This study reviewed literature related technology paradoxes and new technology acceptance behaviors. Based on the previous studies, we developed a measurement for mobile technology paradoxes and then empirically tested it. The empirical data provided a substantial support for the hypotheses suggested in the research model. The results of the hypothesis testing are discussed below.

First, the relationship between mobile technology paradoxes and stress/anxiety on mobile technology showed more various aspects than current literature suggests. Efficiency/Inefficiency, New/Obsolete, and Empowerment/ Enslavement paradoxes showed significant positive relationships with stress about mobile technology. These paradoxes are ones that users more frequently experienced, and the results are consistent with the current research results. However, even though it was not significant, the relationships between planning/improvisation, private/public paradoxes and

stress about mobile technology were negative. This could imply that users consider the paradoxes as benefit rather than conflict. The mobile technology's capability for users to improvise may help users do their work efficiently. On the other hand, using mobile phone in public places was one of the conflicts publicly discussed about at an early phase of mobile phone's history. However, as time passes, society has developed social norms regarding mobile phone usage in public places. Thus the conflict has been considerably decreased. The results suggest that as people get used to mobile technology the paradoxes could be changed. The paradoxes suggested by studies so far seem to have two attributes: Technology and management. In other words, the paradox could be classified as either technical attribute-oriented or managerial attribute-oriented. For example, public/private paradox is more managerial attribute related rather than technological one. On the other hand, in the case of efficiency/inefficiency, the paradoxical situation happens when unexpected technical components were required to achieve users' desire. From this point of view, if a paradox is based on managerial attribute, then it could be changed from a conflict to a benefit as users' experience with mobile device becomes mature.

Second, the study found a significant negative relationship between stress/anxiety and coping strategy choice. This is due to the measurement scale being designed to go from the most avoidant behavior to the most confrontative one. This means higher the stress due to mobile technology paradoxes the more avoidant users become. They tend not to use the function anymore or less interested in using the device. Integrating with the results of H1 testing, when users perceive efficiency/inefficiency, new/obsolete, and empowerment/enslavement paradoxes they are likely to choose more avoidant strategies.

Finally, the antecedents of risk propensity, self efficacy, and risk preference showed mixed results in the tesing of relationship with risk propensity. The result shows that risk propensity does not have significant impact on a user's stress level related to mobile technology. This result required the correction of the research model. Thus we droppped the risk propensity and related variables (preference and self efficacy) then, conducted some statistical processes to test mediation effect of the mediating variable (stress/anxiety). When we tested the model without mediating factor, the coefficients of independent variables and R^2 of dependent varaible were lower than the the other one which include the mediating factor. (See Figure 5 and Figure 6). Thus the final model keeps the orginal one, but it excludes the risk propen-

sity and realted factors like Figure 6.

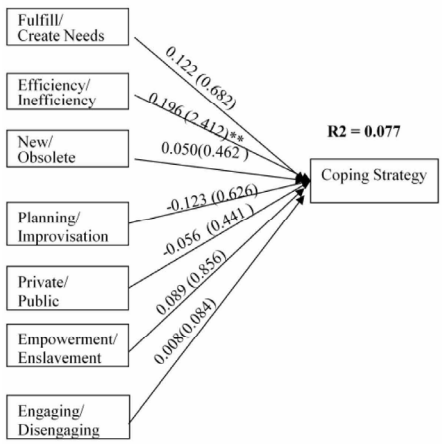

Figure 5. A Corrected Research Model Without Mediating Factor

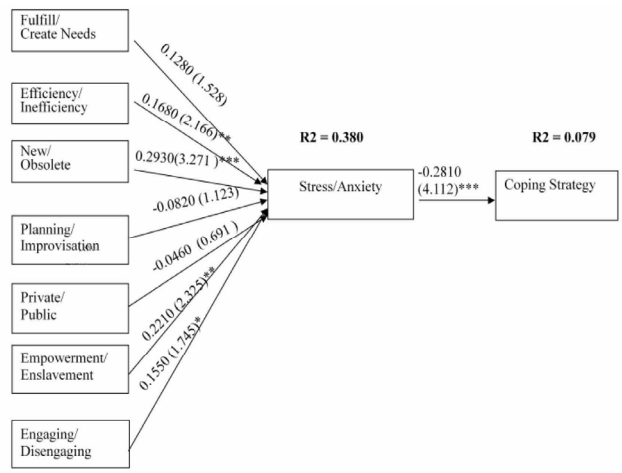

Figure 6. A Corrected Research Model With Mediating Factor (Final Research Model)

These findings have several implications for research and practice. First, the study represents an important attempt to open the black box of users' perception on mobile technology paradox and their technology adoption behaviors. A large number of studies have suggested ideas regading user behavoirs with technology paradox related issues. However, these studies rarely tried to objectively measure the users' perception, bahaviors, and their relationship. They depended on episodes and examples to explain technology parapdoxes and strategic behaviors for coping technology paradoxes. This study developed a measurment and confirmed its relaibility and validity. Thus it opend an efficient way for researcher to examine users' behavors related mobile techology.

Second, mobile technology paradoxes could be a crucial issue for practitioners in the mobile industry because users' frequent experience of the paradoxes could grow into an emotional issue. The findings of this study also showed that the perception on the paradoxes could be changed as users' experiences with mobile technology becoming mature. Thus, practitioners need to consider ways to reduce efficiency/inefficiency, new/obsolete, and empowerment/enslavement paradoxes, which users perceive most. To reduce paradoxes it is required to increase use of ease and compatibility between devices.

Third, the study results also showed that planning/improvisation and private/public paradoxes had negative relationships with stress/anxiety. The results imply that users enjoy the paradoxes. The results let us think about the impact of culture in mobile usage. Harris *et al.* [15] mentioned that collective cultural group preferred synchronous communication than individualistic cultural group. Korean culture has strong collectivism based on the Hofstede's [18] cultural dimension model. The mobile technology could be an effective tool to strengthen the Korean's preference of synchronous communication. The result suggests that culture should be considered in discussion on technology paradoxes.

Finally, the study provides some insights on continued usage of IT theory. There is a consensus that continued use is a source of profit in technology related business rather than new purchase. Theory of continued usage of IT, Expectation-Conformation Model of IS Continuance (ECM-IS), has been dynamically discussed. The theory is based on Expectation-Conformation Model (ECM) in marketing area. Basically, customers purchase a product with a certain expectation. If the expectation is confirmed after use they will repurchase [32, 33]. Bhattacherjee [5] applied ECM to IT/IS usage but he emphasized that the expectation is an expectation after usage because people update their expectations while they are trying technology. Users' perceiving the mobile technology paradoxes correspond to disconfirmation in ECM and it is supposed to be excluded from the repurchase/reuse cycle of the model. However, taking a confrontative attitude means that they adopt the technology even when they have disconfirmation. The process of adoption coping strategy against paradoxes corresponds to the process of updating the expectation on the technology after using in ECM-IS. Thus, theories related to mobile technology paradoxes suggests clues for the process of updating expectation on technology from pre-adoption to post-adoption, which was not actively studied yet in this area.

6. Limitations

The findings of this study should be considered in the light of its inherent limitations. First, the findings are based on self-reported data, which may be subject to common method variance or potential respondent self-selection bias. However, the

multiple tests (reliability, validity) conducted and the good psychometrics properties reported in the study support the validity of the results reported in this study. Moreover, capturing data from multiple respondents may be viewed as offsetting the respondents' bias

Second, the model suggests causal relations and multistage using cross sectional data which only allows testing the association between the variables of the research model. As the study attempts to understand a complex phenomenon in a natural setting and generalize the findings, the survey method may not be the best option either. Future research should consider using longitudinal data.

Third, users' reaction on each paradox could be different. Mick and Fournier [30] found that people showed confrontative attitude to control/chaos paradox but avoidant one to other paradoxes. Thus, future research should consider developing a measurement that could measure users' coping strategy on each paradox perception.

Finally, the study did not control cultural factors. Perception of mobile technology paradoxes could be different based on the user's culture. For example, the result of this study suggested planning/imporvisation paradox was not a conflict for Korean respondents anymore. Perception of time would be different along certain cultural regesions. For example, some coutries such as U.S. the reservataion system is strongly set up compared to Korea. A cross-cultural study comparing users' perception of the paradox would be an interesting extension.

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Appendix 1. Loading and Cross-Loading

	Fulfill	Planning	Efficien	New	Public	Empower	Engaging	Stress	Propens	Efficac	Prefere	CopingS
Q1_1	0.782	0.173	0.345	0.289	0.024	0.215	0.104	0.340	-0.073	0.117	0.024	-0.043
Q1_2	0.644	0.214	0.270	0.263	-0.038	0.179	0.081	0.180	0.012	0.171	0.098	-0.034
Q1_3	0.649	0.272	0.337	0.231	0.041	0.227	0.127	0.258	0.092	0.101	0.120	0.084
Q1_4	**0.201**	0.744	0.162	0.259	0.202	0.299	0.344	0.170	0.017	0.029	-0.034	-0.092
Q2_1	0.478	0.139	**0.587**	0.235	0.260	0.268	0.113	0.160	-0.049	0.079	-0.013	-0.048
Q2_2	0.247	0.080	0.630	0.160	0.300	0.149	0.113	0.235	-0.052	-0.289	-0.284	-0.197
Q2_3	0.399	0.090	0.615	0.203	0.018	0.201	0.080	0.188	-0.017	-0.063	-0.056	-0.144
Q2_4	0.482	0.169	0.722	0.359	0.115	0.417	0.109	0.377	0.054	0.083	0.117	-0.151
Q2_5	0.361	0.205	0.801	0.398	0.355	0.307	0.262	0.349	-0.097	-0.154	-0.156	-0.135
Q3_1	0.262	0.313	0.280	0.746	0.279	0.324	0.281	0.356	0.008	0.130	0.040	-0.046
Q3_2	0.279	0.360	0.336	0.823	0.266	0.273	0.273	0.434	0.015	0.033	0.009	-0.092
Q3_3	0.109	0.253	0.268	0.668	0.126	0.176	0.231	0.314	0.058	0.022	-0.017	0.002
Q3_4	0.469	0.310	0.358	0.612	0.115	0.372	0.130	0.327	0.084	0.097	0.164	-0.086
Q3_5	0.082	0.205	0.232	**0.505**	0.344	0.215	0.322	0.154	0.163	0.162	0.143	0.048
Q3_6	-0.006	0.135	-0.050	**0.318**	0.163	0.023	0.066	0.049	0.164	0.145	0.114	0.065
Q4_1	0.201	0.744	0.162	0.259	0.202	0.299	0.344	0.170	0.017	0.029	-0.034	-0.092
Q4_2	0.206	0.715	0.155	0.297	0.177	0.212	0.317	0.062	0.059	0.116	0.038	0.079
Q4_3	0.240	0.826	0.174	0.289	0.174	0.373	0.383	0.222	0.139	-0.037	0.026	-0.091
Q4_4	0.242	0.767	0.118	0.324	0.241	0.282	0.372	0.248	0.058	0.038	0.007	-0.085
Q4_5	0.181	0.786	0.121	0.324	0.183	0.306	0.395	0.134	0.173	0.055	0.096	-0.003
Q4_6	0.208	0.670	0.250	0.481	0.267	0.359	0.361	0.158	0.142	0.041	0.094	0.008
Q5_1	0.053	0.093	0.244	0.221	0.776	0.302	0.272	0.128	-0.063	0.042	-0.033	0.030
Q5_2	0.119	0.253	0.297	0.258	0.819	0.340	0.299	0.220	0.043	0.105	-0.060	-0.055
Q5_3	0.051	0.182	0.246	0.225	0.823	0.372	0.264	0.131	-0.100	0.040	-0.039	-0.084
Q5_4	0.005	0.132	0.099	0.106	**0.491**	0.140	0.371	0.095	0.043	-0.035	-0.035	0.005
Q5_5	0.147	0.241	0.113	0.293	**0.580**	0.346	0.375	0.136	0.085	0.053	-0.058	0.041
Q5_6	0.035	0.237	0.255	0.179	0.667	0.273	0.296	0.118	0.145	0.031	0.026	-0.148
Q6_1	0.255	0.337	0.294	0.435	0.377	0.610	0.316	0.284	0.183	0.138	0.205	-0.060
Q6_2	0.009	0.120	0.110	0.050	0.092	**0.201**	-0.032	0.104	-0.060	0.097	0.028	0.070
Q6_3	0.273	0.366	0.247	0.295	0.289	0.735	0.343	0.278	0.078	0.050	0.149	-0.121
Q6_4	0.391	0.293	0.379	0.295	0.328	0.768	0.315	0.343	0.126	0.003	0.051	-0.181
Q6_5	0.322	0.280	0.272	0.291	0.279	0.703	0.307	0.306	0.170	0.144	0.214	-0.103
Q6_6	0.052	0.123	0.197	-0.042	0.203	**0.305**	0.218	0.139	-0.091	-0.328	-0.272	-0.192
Q6_7	0.160	0.354	0.244	0.259	0.251	**0.599**	0.397	0.255	-0.019	-0.029	-0.057	-0.008
Q6_8	0.210	0.172	0.228	0.207	0.164	0.642	0.246	0.329	0.084	-0.003	0.030	0.072
Q6_9	0.297	0.262	0.318	0.255	0.368	0.790	0.322	0.382	0.075	0.055	0.113	-0.117
Q7_1	0.030	0.197	0.056	0.220	0.284	0.163	**0.573**	0.248	0.154	0.002	-0.011	-0.044
Q7_2	0.164	0.364	0.185	0.201	0.216	0.456	**0.497**	0.171	0.122	-0.093	0.011	-0.035
Q7_3	0.223	0.277	0.117	0.088	0.086	0.197	**0.516**	0.271	0.104	-0.032	-0.007	0.113
Q7_4	0.035	0.238	0.097	0.179	0.373	0.252	0.612	0.235	-0.033	-0.056	-0.029	-0.089
Q7_5	0.091	0.257	0.167	0.245	0.361	0.388	0.679	0.203	0.201	0.103	0.047	-0.051
Q7_6	0.108	0.386	0.146	0.293	0.224	0.215	0.624	0.228	0.083	0.111	0.136	0.000
Q8	-0.111	-0.068	-0.204	-0.065	-0.052	-0.118	-0.022	-0.280	0.073	0.192	0.132	1.000
Q9_1	0.357	0.348	0.298	0.501	0.203	0.345	0.413	0.850	0.074	0.003	0.062	-0.226
Q9_2	0.390	0.236	0.419	0.429	0.164	0.394	0.313	0.929	-0.020	-0.027	0.024	-0.310
Q9_3	0.357	0.050	0.368	0.330	0.178	0.443	0.304	0.819	0.011	-0.073	0.003	-0.187
Q10_1	0.007	0.020	-0.101	0.108	0.077	0.017	0.057	-0.012	0.245	0.883	0.461	0.253
Q10_2	0.032	0.001	-0.124	0.105	0.065	0.055	0.018	0.020	0.230	0.907	0.472	0.192
Q10_3	0.074	-0.030	-0.094	0.088	0.109	0.017	-0.013	-0.059	0.278	0.856	0.407	0.151
Q10_4	0.139	0.057	0.023	0.103	0.062	0.103	-0.033	-0.020	0.216	0.822	0.503	0.107
Q10_5	0.050	0.065	-0.084	0.095	0.043	0.024	0.027	-0.081	0.237	0.877	0.498	0.073
Q10_6	0.076	0.089	-0.120	0.102	-0.012	0.038	0.001	-0.029	0.216	0.798	0.602	0.211
Q11_1	0.005	0.001	-0.016	0.043	-0.050	0.098	0.062	0.006	0.564	0.321	0.845	0.078
Q11_2	0.026	0.013	-0.219	-0.006	-0.084	0.027	-0.052	0.052	0.345	0.467	0.807	0.057
Q11_3	0.170	0.102	-0.048	0.170	0.008	0.153	0.063	0.039	0.378	0.654	0.757	0.195
Q12_1	-0.075	0.081	-0.062	0.032	0.033	0.067	0.085	0.075	0.796	0.196	0.409	-0.058
Q12_2	0.060	0.130	0.001	0.076	0.025	0.187	0.159	0.107	0.898	0.218	0.571	0.054
Q12_3	-0.010	0.154	-0.010	0.123	0.122	0.127	0.221	-0.035	0.839	0.283	0.432	0.068
Q12_4	0.037	0.056	-0.079	0.024	-0.063	0.007	0.116	-0.105	0.783	0.239	0.406	0.188