

Exploring the Factors of Decision Making by the Psychological Power of Smartphone

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스마트폰의 심리적 파워에 의한 의사결정 요인 탐색

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Abstract The purpose of this study was to explore factors that influence decision making for smartphone users. This study sets intimacy, personal connection, use & dependence, familiarity and expertise, efficacy and effectance, self-identity, and control as independent variables and sets decision making as dependent variables. In this study, 200 smartphone users were collected and analyzed through questionnaires, and Smartpls 3.0 was used to understand the impact between variables. Five of the six factors that affected smartphone users' psychological strength were analyzed to have affected their decision-making. In addition, we examined the relationship between psychological effects and use period as a control variable. The results of this study can be used as a basis for the consumer behavior of smartphone devices in the development of smartphone devices.

Key Words : The Fourth Industrial Revolution, smartphone, Psychological Power, Smartphone Psychological Ownership(SPO), Decision-Making

요약 본 연구의 목적은 스마트폰 사용자들의 의사결정에 영향을 미치는 요소들을 탐구하는 것이었다. 본 연구는 친밀감, 개인연결성, 사용 및 의존성, 친숙함 및 전문성, 효능 및 효과, 자아정체성, 제어 등을 독립 변수로 설정하고 의사 결정을 종속 변수로 설정한다. 본 연구에서는 스마트폰 사용자 200명을 설문지를 통해 수집·분석하였으며, 변수 간 영향을 파악하기 위해 Smartpls 3.0을 사용하였다. 스마트폰 사용자의 심리적 강도에 영향을 준 6가지 요인 중 5가지가 의사결정에 영향을 미친 것으로 분석됐다. 또한 조절변수로서의 사용 기간 등이 심리적 영향과의 관련성도 살펴보았다. 본 연구 분석 결과는 이전에 스마트폰의 심리적 영향에 대한 요인들에 연구가 미진한 가운데 스마트폰 기기의 발전 형태의 소비자 행동 기반이 될 수 있고, 향후 본 연구를 바탕으로 스마트폰 시스템 개발에 도움이 될 것으로 기대한다.

주제어 : 4차산업혁명, 스마트폰, 심리적인 힘, 스마트폰 심리소유권, 의사결정

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1. Introduction

As the age of the Fourth Industrial Revolution is approaching, machine learning and automation technologies such as artificial intelligence are increasingly affecting or even affecting the professional world of tourism[1]. In people's lives, smartphones can be seen as a necessity of life. Smartphone users always look at smartphones before going to bed and the morning[2]. The use of smartphones has made human life very convenient. users can access a diversity of resources via smartphone and can connect to a variety of tools, including data and people[3].

Human beings are placed in conflict at every moment of choice, and at the moment when they have to make decisions that require a high level of conscious judgment and determination in addition to simple and repetitive decisions. This behavior is represented by the overall decision-making process, which results in a process of human thinking in which decisions are made. Human beings eventually choose any strategy or action to solve the problem they face or to take advantage of a given opportunity. This is called decision making[4].

In this study, we discuss the psychological power of the user, and investigate the factors that affect the decision making of smartphone users when they have psychological power untreated in previous studies.

2. Literature review

2.1 Psychological power of the user

Power is the ability of an actor to influence the behavior and attitude of an individual or group[5]. It's the potential ability to force someone into action, to influence individuals, groups, and others in the system[6]. Many social

psychological studies have defined psychological power as essentially a fundamental influence in social relation[7,8]. Psychological power is the ability to control human cognitive resources and change their behavior[9]. They focused mainly on how psychological power influenced the formation and perception of the group around them, which is how much effort they make on the information given to them in a socially weak or powerful situation. This can be a very important factor[10].

In this study, it is noted that users who have such power will make a decision using smartphone, and what difference is there between power users and who has no power.

2.2 SPO(Smartphone Psychological Ownership)

People vary from about how much psychological ownership they have. They feel different satisfied with the smartphones they use, depends on how and for what object they use their phones. By owning a smartphone, people may invest in higher connectivity or smartphones, while others may not. These individual differences correspond to the SPO(Smartphone Psychological Ownership)[11]. For example, while a user occupies a park bench, he feels a sense of ownership of the bench. If someone comes and asks the user to move, he feels that the legitimate argument is violated as the person who first used the bench. Pierce et al (2003) recommend that a sense of ownership makes an important contribution to psychological purposes[12]. In other words, a smartphone meets psychological needs to achieve this purpose. Therefore, this study explores the psychological ownership of the claimed smartphone. (see Fig. 1). In other words, it is a research model that suggests arbitrary behavior, risk-taking, and moral tendency intervention model. These prior studies are somewhat complicated, and opinions based on experimental behavior of actual users are complex. We will change the part about

fraud, risk-taking, and moral inclination to decision making, and we will draw conclusions the adoption of hypothesis.

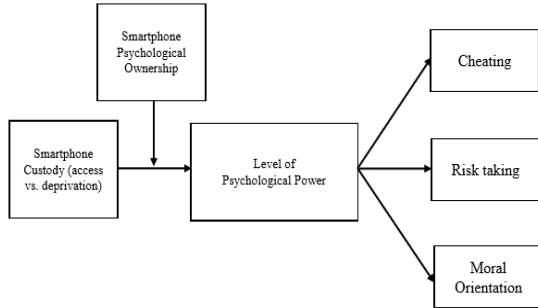


Fig. 1. The impact of the use of smartphones on psychological power (adjusted by the psychological ownership of smartphones) and the model of arbitrage, risk-taking, and moral inclination (Source: Egan, et al., 2016)

2.3 Psychological power and decision making

Human beings eventually choose any strategy or action to solve the problem they face or to take advantage of a given opportunity. This is called decision making[13].

Problem-solving ability is defined as an interaction of cognitive, mental, and performance processes to adapt to internal and external requirements[14]. Looking at previous studies on the continued use of information systems such as smartphones, Battacherjee and fremkumar (2004) verified the change in users' beliefs and attitudes during the pre-use and use phases of the device, and analyzed that satisfying users' expectations and satisfaction affected their continued use[15].

In addition, the smartphone access condition participants approached the smartphone in an experimental way how they differed from participants who were in a smartphone-starved state in order to predict that accessing the smartphone would increase psychological strength. Through experiments and surveys (Egan, et al., 2016), smartphone users defined through SPO as having an effect on their moral behavior(negative

behavior, risk reduction, etc.)[15].

This study refer to six factors related to the SPO users of smartphone users based on the psychological power of users This is to determine how this will affect decision making.

3. Research process and design

3.1 Research model

The purpose of this study is to establish the theoretical concept based on theoretical considerations and to clarify how the psychological power of the users connected with the smartphone affects decision making. Therefore, we try to find out the effect of smartphone access on decision making through SPO route based on previous studies. Independent variables are smartphone connections based on spo factor, and dependent variables are defined as decision making. In a previous study[16], a smartphone connection was studied experimentally and the relationship between this connection and SPO was derived as follows (Egan, et al., 2016 & Pierce, et al., 2003). Based on the questionnaire items based on the SPO theory, revealed the SPO factors through smartphone access using the top-down approach, And the contents are as follows (see Table 1).

Table 1. Post hoc analysis of themes emerging from the six-factor solution [5]

Factor	Item	Independent variable
1	My smartphone is a kind of "home-away-from-home".	Intimacy / Personal Connection
	My smartphone makes me feel connected to home wherever I am.	
	I feel that I've gotten to "know" my smartphone like one does a friend	
	My smartphone is an extension of myself.	
2	I always have my smartphone with me.	Use / Dependence
	I spend a lot of time using my smartphone.	
	I am very possessive of my smartphone. .	
	I would feel lost without my smartphone.	

3	I know how to use all of the features of my smartphone.	Familiarity / Expertise
	I am very familiar with my smartphone.	
	I have taken a lot of time to personalize my smartphone.	
4	My smartphone is extremely useful in helping me achieve my goals.	Efficacy / Effectance
	I am able to accomplish a lot more as a result of having my smartphone.	
	My smartphone makes me feel more capable.	
5	I have a lot of personal information stored on my smartphone.	Self-Identity
	My smartphone reflects my personality.	
6	Other people often use my smartphone. (reverse scored)	Control 제어
	I would be willing to let a friend borrow my smartphone for the day (reverse scored).	
	I am very possessive of my smartphone.	

Six factors that determine the impact of smartphone access on SPOs in previous studies (Egan, et al., 2016) are Intimacy / Personal Connection, Use / Dependence, Familiarity / Expertise, Efficacy / Effectiveness, and that it affects fraud, risk-taking, and moral inclination. Therefore, the research model to investigate the influence of decision making in comparison with this factor is as follows (see Fig. 2).

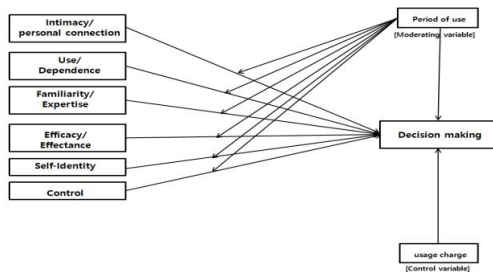


Fig. 2. Research model

3.2 Questionnaires and data collection

In contrast to the effects of SPOs on moral behavior through smartphone accesses proposed in previous studies (Egan, et al., 2016), this study defines what kind of choices the smartphone users will make in decision- I want to. Therefore,

this survey limited the respondents to the consumer group using a smartphone for research purposes and the conclusion is drawn by questioning 6 items of SPO to smartphone users.

A 5-point Likert scale (5 = very agreeable, 1 = not agree at all) was used for the measurement.

In this study, we conducted a survey on smartphone users. We collected surveys through smartphone users and completed the collection of 200 copies with the aim of collecting 200 copies. The survey was conducted from May 1, 2019 to May 10, 2019. A total of 194 collected surveys were used for actual statistical analysis.

The questionnaire analysis method is statistical processing of the collected data, and it is analyzed using Smart PLS 3.0 after the data coding process. It was used as a software to check external (validity and reliability) and internal models (ie hypothesis testing), and PLS-SEM was considered a suitable choice for this study.

This analysis verified reliability analysis, feasibility analysis, unstructured equation model analysis and research hypothesis. Through the analysis of the measurement model, it is confirmed that the internal reliability, the central validity, and the discrimination validity are satisfied, and the psychological power through the connection of the smartphone affects the decision of the user.

4. Analysis results

In the reliability test, the Cronbach's Alpha coefficient is calculated to be 0.6 or more, and in the case of the composite reliability (CR), it is significant when it exceeds 0.8. Validity verification is meaningful when the Average Variance Extracted (AVE) is greater than 0.5[17]. The following table 2 meets the criterion as a result.

Table 2. Construct Reliability and Validity

Var. name	Cronbach's AI	rho_A	Composite Reliability	AVE
intimacy/ personal connection	0.818	0.827	0.879	0.646
use/ dependence	0.788	0.799	0.864	0.617
familiarity/ expertise	0.757	0.772	0.858	0.668
efficacy/ effectance	0.816	0.821	0.891	0.731
self-identity	0.798	0.797	0.882	0.713
Control	0.60	0.790	0.816	0.694

In this study, the square root of AVE is larger than the correlation coefficient with other factors when analyzed to test the conceptual validity of the measurement tool. Therefore, this data is meaningful table 3.

Table 3. Discriminant validity

Control	0.83						
Decision making	-0.32	0.81					
Efficacy /Effectance	-0.19	0.60	0.85				
Familiarity/ Expertise	-0.29	0.38	0.52	0.81			
Intimacy/ Personal connection	-0.17	0.48	0.49	0.41	0.80		
Self-identity	-0.29	0.59	0.56	0.44	0.51	0.84	
Use/ Dependence	-0.26	0.55	0.52	0.58	0.53	0.64	0.78

* Values of the correlations between LV and square roots of the AVE values in the main diagonal

This study used demographic characteristics as control variables and moderating variables. Demographic characteristics were classified into sex, age, educational background, and duration of smartphone usage. The contents are shown in the following table 4.

Table 4. Demographic analysis

var	Division	Frequency	Ratio(%)
Period of use	not more than a year	11	5.7
	1 to 3 years	28	14.5
	3 to 5 years	27	14.0
	5 to 7 years	53	27.5
	7more than seven years	74	38.3
Gender	Male	103	53.4
	Female	90	46.6
Age	20~29 years old	145	75.1
	30~39 years old	18	9.3
	40~49 years old	10	5.2
	Over 50 years of age	20	10.4
Education	Middle school	1	5
	High school	39	20.2
	College school	107	55.4
	Graduation	34	17.6
	Above graduate school	12	6.2

The results of the analysis using PLS-SEM (Partial Least Squares-Structural Equation Modeling) are shown (see Fig. 3).

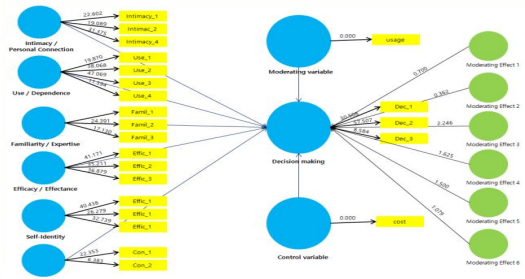


Fig. 3. Result of research model using PLS-SEM

The results of the hypothesis test show that 1 Intimacy/Personal, 2 Use/Dependence, 4 efficacy/effectiveness, 5 self-identity, and 6 control are statistically significant in terms of the impact on decision making, as shown in table 3. This result has a significant result in itself because it satisfies $t > 1.645$, $p < 0.10$ and hypotheses 1, 2, 4, 5, and 6 all meet the criteria and are consequently accepted. In addition, since hypothesis 6 control is a reverse score, factor 6 is reverse-coded to meet the criterion(see Table 5).

Table 5. Hypotheses analysis results (Dependent variable: decision making)

Hypo	Independent variable	Original sample	STDEV	T	P	Res
1	Intimacy/ Personal connection	0.129	0.126	1.789	0.074	Accept
2	Use/ Dependence	0.172	0.174	2.107	0.035	Accept
3	Familiarity/ Expertise	-0.092	0.089	1.353	0.176	Reject
4	Efficacy / Effectance	0.342	0.341	4.970	0.000	Accept
5	Self-identity	0.227	0.225	2.614	0.009	Accept
6	Control(reverse scored)	0.172	0.174	2.107	0.035	Accept

5. Conclusions

In this study, we analyzed smartphone users to investigate the factors affecting decision making of psychophysical power of smartphone untreated in previous studies. This analysis is based on the feature of smartphone users. The psychological power of smartphone users will have a strong influence on decision making in all areas based on the behavior of smartphone users, which will be meaningful research in tourism, brand purchase, and new product development.

In this study, we investigated how the psychological power of smartphone users affect users' decision making by using intimacy/personal connection, use/dependence, familiarity/expertise, efficacy, control, and decision making.

According to the analysis results, the following hypothesis was adopted.

First, intimacy/personal relationships are affecting decision making. The T value is 1.789 and the P value is 0.074 so all standard values are met ($t > 1.645$ and $p < 0.10$). Therefore, intimacy / personal connection means that users feel superior to smartphone users.

Second, use / dependence is affecting decision making. Since the T value is 2.107 and the P value is 0.035, it satisfies all of the standard values ($t > 1.645$ and $p < 0.10$). Therefore, use / dependence means that the user is using the

smartphone for a long time and that the dependency on the smartphone is high.

Third, Efficacy / Effectance influences decision making. Since the T value is 4.970 and the P value is 0.000, it satisfies all of the standard values ($t > 1.645$ and $P < 0.10$). This means the psychological power of affirmation that users are helped to achieve their goals through a smartphone, which affects decision making.

Fourth, self-identity is affecting decision making. Since the T value is 2.614 and the P value is 0.009, all standard values are met.

$T > 1.645$ and $P < 0.10$ Therefore, self-identity means that the user feels self-identity through the smartphone

Fifth, control influences decision making. Since the T value is 2.107 and the P value is 0.035, it satisfies all of the standard values $T > 1.645$ and $P < 0.10$. In addition, two of the questionnaire items on the actual control appeared as reverse scores. As a result of reverse coding, T and P values were 2.321 and 0.020, respectively.

As future work, Hypothesis 3 needs to further analyze the reasons why the familiarity/expertise is rejected, and it is necessary to further analyze the familiarity/expertise of smartphone users and items. However, as measured by the moderating variable effect (duration of smartphone usage), factor 3 familiarity/expertise was found to affect decision making with a t value of 2.246 p of 0.025, which is a significant variable. This means that users who have used the smartphone for a long period of time have a significant influence on smartphone decision making when they have the expertise and feel familiar with the smartphone.

That is when a user makes a decision making, the user does not like someone to control them. The focus of this study is the SPO defined in the previous study (Egan, et al., 2016). The psychological ownership felt by the smartphone users will be different for each person's tendency and values, and this psychological power will be divided into

a decision of many results. Therefore, future research plans that can lead to positive results of psychological power felt by individuals will be a very important task.

In this study, we analyzed the effect of SPO of smartphone users on decision making in comparison with the effect of smartphone access SPO defined by Egan, et al.(2016) on risk-taking, cheating, and moral orientation. The results of the experiments in the existing research are realistically low in the daily life of the smartphone users and the difficulty of the questionnaire is too high.

Therefore, in this study, the dependent variable was changed to decision making and the comparative analysis was carried out. In previous research Egan, et al(2016), both the connection and deprivation status of smartphone users were measured by an experimental method. but the number of users who are in the state of being deprived of smartphones for a long time is very rare, respectively. So, this study has a realistic reflection result itself when compared with the study of Egan, et al(2016)[17]. because it has always been for the subject who owns the smartphone at all times. Smartphones are already deeply embedded in life[18,19]. noted that while mobile devices, including smartphones, can not completely replace other screens, it should be noted that content consumption is increasing. Many such studies have already argued that most users in their daily lives want to be helped in making decisions for effective business processing and problem solving by using a device called a smartphone. I feel that the demand and necessity for ubiquitous devices and services that can be conveniently used should be developed.

In line with this ubiquitous era, new technologies considering individual tendency and psychological conditions should be continuously developed. Therefore, this study will be meaningful data for the development of detailed technology and customized service that grasps the psychology

of users in fields such as life, tourism, education, and management.

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