Factors affecting shadow work awareness in sharing mobility services: A mixed-methods approach

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··· Abstract ···

The sharing economy is a business model and way of life that lends or exchanges additional goods or knowledge through social networks for mutual benefit and appropriate benefits. However, the use of shared mobile services requires users to invest a lot of time and effort in the use process. This invisibly brings users "digital shadow work" that they do not need to themselves. In this study, the characteristics and influencing factors of digital shadow work in a sharing mobility service environment were studied using mixed-methods approach. Ultimately, it was confirmed that inconvenience, perceived control, and time loss risk had a positive effect on shadow work awareness. This will lead to the user's intention to convert or stop using the service. This study not only deepens the understanding of digital shadow work at the academic level, but also provides recommendations for service improvement for shared services companies at the practical level.

Key Words : Sharing Economy, Sharing Mobility Services, Digital Shadow Work, Shadow work Awareness, Perceived Risk

Ⅰ. Introduction

The sharing economy is a business model and lifestyle that obtains mutual benefits and appropriate profits by lending or exchanging extra goods or knowledge through social networks. This sharing has developed into two types: Customer to Customer (C2C), where individuals and individuals are shared, and Business to Consumer (B2C), where companies provide shared vehicles to users (Ahn et al., 2017). In B2C, there are cases where the transaction brokerage platform and the lender are the same. This is done in a way that a company with idle resources builds its own platform and transacts with users. As the sharing economy service emerges as a new economic paradigm, domestic movements to expand the sharing economy service to not only for-profit businesses but also to policies and

local businesses of the government and local governments are becoming active (Yoon et al., 2017). As interest in the sharing economy increases, mobility services that can be 'shared' have also increased, and the market for this is also growing.

Meanwhile, digital shadow work (DSW) has recently been attracting attention due to the development of digital technology (Lee, 2021). Park and Lee(2019) defined digital shadow work as 'the hidden effort that people who use digital technology should be willing to do' by finding literature related to shadow work and analyzing it using the grounded theory method. When using digital technology, digital shadow work can occur because most tasks such as system login and content search can only be performed through appropriate manipulation by the user (Park et al., 2020). In particular, in order to use the mobility services based on the sharing economy platform, users must complete all application downloads, membership registration and information registration, and a lot of digital shadow work is included in the process.

This research focuses on identifying factors that influence users' awareness of digital shadow work, and how awareness of digital shadow work will influence subsequent service usage attitudes. The purpose of this study is to broaden the understanding of digital shadow work by examining the emotional and psychological responses of users during their participation in digital shadow work in a shared mobile service environment.

Ⅱ. Literature Review

1. Sharing Mobility Service

Lawrence Lessig (2008) defined the sharing economy as an economic activity produced goods are borrowed and shared by several people. He mentioned that the sharing economy is an economic method that is based on cooperative consumption, where products that are produced once are shared and used by several people, and that it is an economic method that includes not only tangible resources but also intangible resources such as experience, knowledge, and time. Gansky (2010) also defines it as a future sharing economy business created by sharing personal goods

with others based on IT technology, a business model that makes money by allowing customers to use the products or services they need for a while and then recycling or receiving them back.

Shared mobility is the result of applying the concept of the sharing economy to mobility, which aims to reduce resource waste and increase resource utilization by sharing idle resources. Shared mobility is expanding its scope into various forms thanks to consumption behavior that places importance on efficiency and cost-effectiveness through the use of information and communication technologies (Park et al., 2022). The most representative shared car can not only meet the long-distance transportation demand of people without a car and provide convenience, but also avoid the risk of infection caused by using public transportation during the COVID-19 period.

In the sharing economy environment, electric power-based one-person mobility devices, represented by electric bicycles and electric kickboards that provide personal mobility services, have appeared and are being used in various forms. Such personal mobility collectively refers to electric-driven personal mobility means that can drive short and medium distances, and includes small electric vehicle Segways, electric bicycles, and electric motorcycles (Yu, 2020).

2. Digital Shadow Work

The term "shadow work" was first mentioned by Austrian philosopher and social critic Ivan Illich in 1980. Shadow work includes housework, shopping-related activities, homework, and commuting work that most women do at home and apartments (Illich, 1980).

In today's digital environment, it is necessary to revisit and understand the concept of shadow work. Shadow work was originally handled by companies or organizations using their own paid work and was undertaken by consumers or employees without pay. Therefore, from the standpoint of companies, it helps to improve production efficiency and reduce work costs (Lee, 2018). Shadow work accompanying services provided in a digital environment is called digital shadow work (Park and Ryoo, 2020; Park et al., 2020). In addition, considering that the digitalization of work is promoted along with the development of digital technology,

platform work has been described as four types, including shadow work, from the point of view of the network effect (Lee, 2019).

3. Perceived Risk Theory

The concept of Perceived risk was first proposed by Harvard scholar Raymond Bauer (1960) and extended from the field of psychology to the field of marketing. He believes that consumers have no way to make a correct judgment on the results of any shopping behavior, but in fact individual results may bring consumers a bad shopping experience and cause emotional unpleasantness (Bauer, 2001).

In 1972, Jacoby and Kaplan (1972) first conducted a systematic study on the dimension of perceived risk, and proposed five subdivisions that are widely recognized: financial risk, performance risk, physical risk, psychological risk and social risk. Based on the data of 148 students, an empirical analysis was carried out, and it was found that the above five dimensions could explain 61.5% of the overall perceived risk. After that, Stone et al. (1993) newly introduced the time dimension suggesting the six dimensions for the perceived risk: financial, performance, physical, psychological, social, and time loss. Also, the empirical analysis of the perceived risk construct showed that these 6 dimensions can explain up to 88.8% of the overall perceived risk (Stone and Grønhaug, 1993). These six dimensions have become the most commonly used basic frameworks in perceived risk theory research.

Ⅲ. Research Method

1. Qualitative Study

1) Interview procedure

As a qualitative survey, this study conducted two interviews regarding the use of shared mobility services. Recently, in Korea, various shared mobility services are rapidly developing and being used near university districts, so Chinese college students and graduate students who can easily access shared mobility services were selected for the interview.

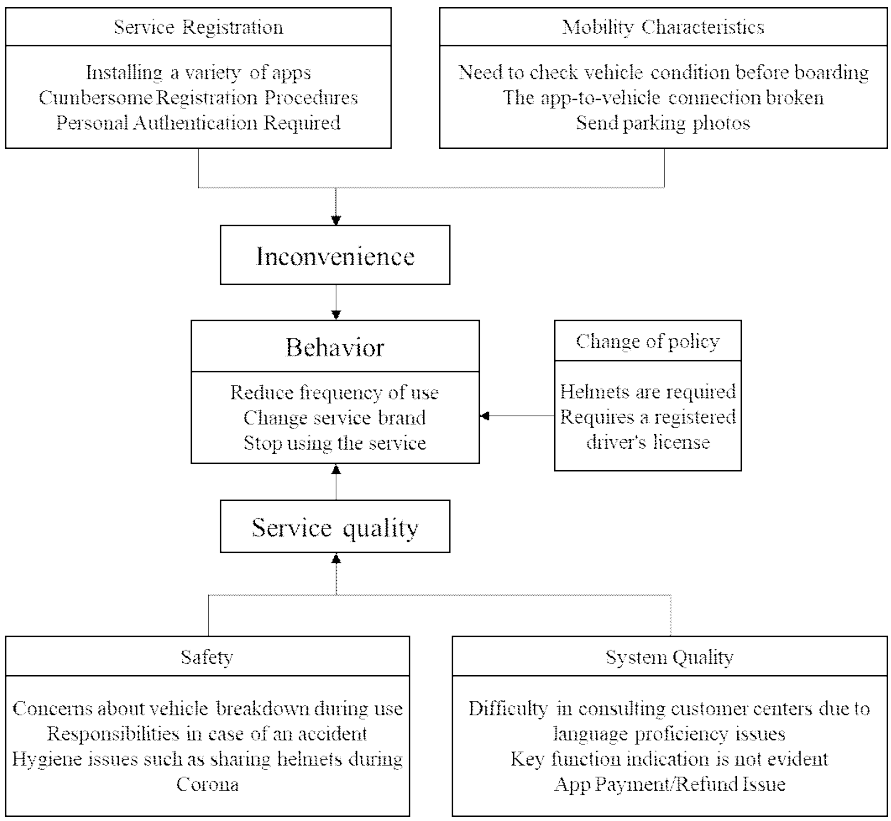
For data collection, a total of two interviews were conducted over a month from March 29, 2022 to April 28, 2022. Interview respondents were selected through the human network

around the researcher, and data were collected from the final six respondents. The first interview was conducted for those who have experience using shared mobility services regarding difficulties, their thoughts, and solutions that occur in the process of using the service. The second interview was conducted for those who have no experience in using the service, given that the negative impact of digital shadow work may hinder users' intention to use it.

Sampling continues when the focus becomes clearer and more theoretically saturated as the study progresses in detail, i.e. no new or meaningful data appears (Strauss and Corbin, 1990). Ultimately, in this study, it was determined that the interview results of six people reached theoretical saturation.

2) Findings

Based on the collected data, this study extracted the code related to the



<Figure 1> Code related to sharing personal mobility use

use of personal mobility as shown in Figure 1. The process of installing service software, personal authentication, and so on to join the service, as well as confirming the status of the vehicle, and the service using process such as the photo upload platform may make users feel inconvenient to use. Vehicle breakdowns, hygiene issues may cause users to worry about the safety of the use of the service. Moreover, the fluency and functionality of the service software system may also affect the user's evaluation of service quality. In addition to the inconvenience and service quality, changes to service-related policies can influence users' intentions to use the services.

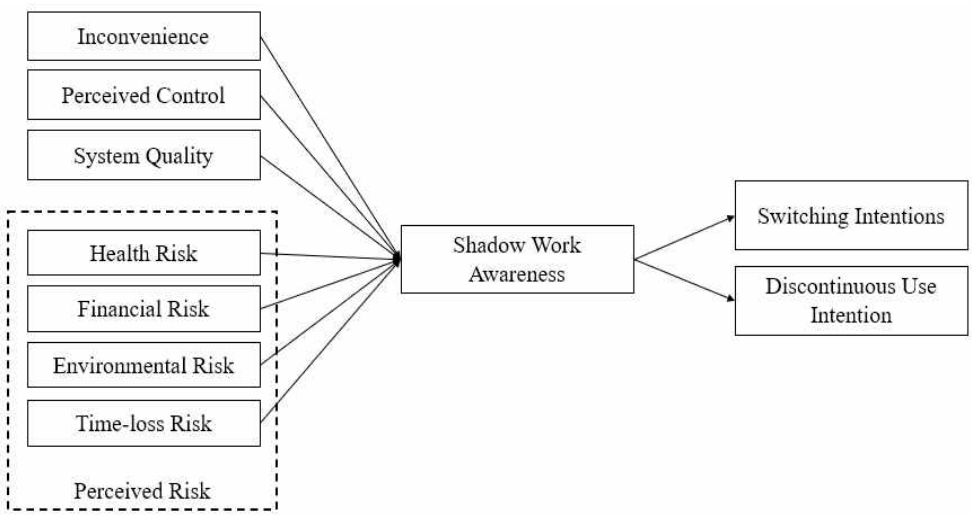
2. Quantitative study

1) Research model

We combined the codes derived from pilot study with perceived risk theory to arrive at our research model. Figure 2 depicts our research model. This model represents an attempt to identify the antecedents of shadow job awareness and the influencing relationships of subsequent behavioral intentions.

2) Hypotheses Development

Perceived control is referred to the extent that people believe the event or situation is under their control (Burger,



<Figure 2> Research model

1989). Providing car-sharing-related utility aspects (e.g., number of vehicles available, geographic coverage, ease of access to services) can help determine perceived control over behavior (Mattia et al., 2019). Mobility necessities (Haustein and Hunecke, 2007) have to be compatible with consumers' lifestyle and needs, but also consistent with the perceived barriers when relying on a certain transportation mode (Peters and Dutschke, 2014).

In the study of DeLone and McLean (1992), information system quality sub-components were classified into system quality, information quality, and service quality and analyzed. System quality means operational efficiency among the elements of information systems and has been generally regarded as a major success factor of information systems. This is an engineering-oriented performance and includes data realism, response time, conversion time, data accuracy, reliability, completeness, and system flexibility (Seo and Park, 2022). So we can hypothesize:

H1: Inconvenience has a positive effect on shadow work awareness.
H2: Perceptual control negatively affects shadow work awareness.
H3: System quality has a negative impact on shadow work awareness.

Combining several risks proposed in risk theory with the results of previous qualitative research, we decided to examine the effects of health risk, financial risk, environmental risk, and time loss risk on shadow work awareness. Among them, health risk refers to the risk that the use of the service will cause harm to one's own health and safety; financial risk refers to the risk of economic loss due to excessive use of services or additional costs; environmental risk refers to the user's perception of the service or vehicle environment level of concern; time-loss risk refers to the risk of wasting time due to service usage.

H4: Health risk has a positive effect on shadow work awareness.
H5: Financial risk has a positive effect on shadow work awareness.
H6: Environmental risk has a positive effect on shadow work awareness.
H7: Time-loss risk has a positive effect on shadow work awareness.

Shadow work appears in various ways in the digital service use

environment. Attitudes toward shadow work are usually negative, and representative examples include annoyance, hassle, irritation, and discomfort (Park et al., 2020). In addition, existing studies recognize that consumers have a lot of work to do for free in the online food shopping environment, they may give up the existing service and increase their intention to switch channels in other ways (Park and Kim, 2021).

The feeling of doing shadow work creates a potential threat to SSTs' value, leading to consumers' resistance to SSTs (Ryoo and Park, 2021). The study also proposes that shadow work can lead to user fatigue when using mobile shopping, which leads to the user's intention to stop using it. Previous studies have also suggested that mobile shoppers who are exhausted from using mobile shopping apps develop an intention to discontinue stressful behavior (Chen et al., 2019). So we can hypothesize:

H8: Shadow work awareness has a positive effect on switching intention.

H9: Shadow work awareness has a positive effect on discontinuous use intention.

3) Measurement

A survey instrument was designed to get information about research variables. All measures with multiple items used in this study were drawn from prior research with 7-point Likert scales (1=strongly disagree, 7=strongly agree). Table 1 shows the the measure items of all the constructs, and the related sources.

The four measurement items of inconvenience were adopted from Ji and Eun (2019). The four measurement items of perceived control were adopted from Zhang et al. (2019) and Choi (2013). The four measurement items of shadow work awareness were adopted from Ryoo and Park (2021). The four measurement items of system quality awareness were adopted from Seo and Park (2022). The three measurement items of switching intentions were adopted from Park (2022); Cho and Kang (2011). The three measurement items of discontinuous use intention were adopted from Kim (2021). The three measurement items of health risk, three measurement items of financial risk, three measurement items of environmental risk, three measurement items of time-loss risk, were adopted

from Hwang and Choe (2020).

4) Data Collection

We use an online survey method for data collection. Our unit of analysis is the commercial shared mobility service users in China. We developed our online survey via Sojump (www.sojump.com) which is a popular Chinese survey website. Then, we used the virtual snowball technique (Baltar and Brunet, 2012) to share and forward the survey links on WeChat, a dominant Chinese social networking service. Respondents were, at the beginning of questionnaire, first requested to record the brand name of commercial bike sharing service they use as well as the duration of use. After assessing the completed survey, we randomly provided 1-3 CNY reward to respondents. The period of data collection lasted about half a month (September 12 to September 25, 2022). We excluded 33 questionnaires that submitted uniform answers to all questions; therefore, 318 valid questionnaires were used for quantitative analysis.

In terms of gender and age of the respondents, 45.6 percent of the respondents were male, and respondents aged 18~30 accounted for the majority at 74.8% of the total. Regarding the education level, more than 99.4 percent of respondents were college or bachelor's degree or higher. In terms of occupation, 49.4% of the respondents were students and 30.5% were company employees. In terms of respondents' income, 41.8 percent of respondents' monthly income was less than 5,000 CNY (1 USD = approximately 7.13 CNY), and 39 percent of respondents' monthly income was between 5,001 and 10,000 CNY, suggesting that the general public was the main target user. The duration of use was in the order of less than one month (21.1%), 1~6 months (17%), 7~12 months (9.4%), and more than 12 months (52.5%).

[Table 1] Measurement Items for Constructs

Construct	Items	Source
Inconvenience	1. The procedure for using shared mobility services is very inconvenient.	Ji and Eun (2019)
	2. Shared mobility services (reservation, vehicle acquisition, vehicle return,	

	payment) are inconvenient.	
	3. New information and announcements of shared mobility services are not received in advance.	
	4. Problems arise due to the inconvenience of shared mobility services.	
Perceived Control	1. I am flexible when I use shared mobility services.	Zhang et al. (2019); Choi (2013)
	2. I can make many decisions on my own when I use shared mobility services.	
	3. I think I can safely control the use of shared mobility services.	
	4. I think there is an ability to prepare for security risks in shared mobility services.	
Shadow Work Awareness	1. I feel like the time and effort I put into shared mobility services seems to be in vain.	Ryoo and Park (2021)
	2. I feel like the shared mobility service is passing on to me what I don't have to do.	
	3. I feel that using shared mobility services seems pointless.	
	4. I feel that using shared mobility services is unnecessary for me.	
System Quality	1. Shared mobility services have the reliability to be trusted and used.	Seo and Park (2022)
	2. Shared mobility services are fast to process.	
	3. Shared mobility services are flexible depending on the situation.	
	4. Shared mobility services are always available when needed.	
Switching Intentions	1. I wouldn't recommend this shared mobility service to anyone else.	Park (2022); Cho and Kang (2011)
	2. I intend to switch to a shared mobility service of another brand.	
	3. I collect information to switch to shared mobility services from other brands.	
Discontinuous Use Intention	1. I want to stop using the shared mobility service.	Kim (2021)
	2. I don't want to use this ride-sharing service anymore.	
	3. I want to reduce the frequency of using shared mobility services if possible.	
Health Risk	1. I am worried that a traffic accident may occur while using the shared mobility service.	Hwang and Choe (2020)
	2. I'm afraid I'll get hurt using the shared mobility service.	
	3. I'm afraid I'll get hurt by a car failure.	
Financial Risk	1. I'm worried that using shared mobility services will be more expensive than I thought.	
	2. I am worried that I will have to pay additional costs if I use the shared mobility service.	
	3. I am worried that using shared mobility services will incur unexpected additional costs.	
Environmental Risk	1. I'm worried about the cleanliness of shared vehicles.	
	2. I'm worried about the environment conditions of shared vehicles.	
	3. I'm worried about the hygiene standards of shared vehicles.	
Time-loss Risk	1. I am worried that it will take too much time to plan the use of shared mobility services.	
	2. I am worried that it will take a long time to learn how to use shared mobility services.	
	3. I'm worried that using shared mobility services will be a waste of time.	

Ⅳ. Results

1. Measurement Analysis

We utilized the partial least squares structural equation model (PLS-SEM) method to conduct a confirmatory factor analysis (CFA) to assess the reliability and validity. Reliability assesses the consistency of results across items within a test. The most common methods used for testing the internal consistency are Cronbach's alpha and composite reliability (CR). Cronbach's alpha assesses the average inter-correlation among these items, while CR reflects the internal consistency of the indicators that measure a given factor (Fornell and Larcker, 1981). All values exceeding the recommended value of 0.70 suggest that the items have acceptable internal consistency. Validity refers to the degree to which an instrument measures what it was intended to measure, in which convergent and discriminant validity should be formally tested. The convergent validity is inferred when different items are used to measure the same construct, of which the scores are strongly correlated (Campbell and Fiske, 1959). Discriminant validity is demonstrated when measures of each construct converge on their respective true scores, which are unique from the scores of other constructs (Churchill, 1979). The results of reliability and convergent validity tests are shown in Table 2. The values of (CR) and Cronbach's α for all constructs were larger than 0.7, suggesting a highly acceptable scale reliability and internal consistency (Fornell and Larcker, 1981; Gefen et al., 2000). Regarding the convergent validity, in addition to the standardized factor loadings of indicators for all constructs being significantly greater than 0.7, values of CR that are higher than 0.7, and values of average variance extracted (AVE) for all constructs exceed the recommended minimum of 0.5, which indicates a satisfactory convergent validity (Fornell and Larcker, 1981; Gefen et al., 2000).

<Table 2> Results of Reliability and Convergent Validity Tests

Construct	Indicator	Standardized loading	Cronbach's α	CR	AVE

Inconvenience	Inc1	0.815	0.791	0.864	0.614
	Inc2	0.815			
	Inc3	0.725			
	Inc4	0.777			
Perceived Control	PC1	0.868	0.850	0.897	0.687
	PC2	0.839			
	PC3	0.879			
	PC4	0.720			
System Quality	SQ1	0.842	0.858	0.903	0.701
	SQ2	0.798			
	SQ3	0.897			
	SQ4	0.808			
Health Risk	HR1	0.946	0.926	0.953	0.871
	HR2	0.949			
	HR3	0.903			
Financial Risk	FR1	0.898	0.880	0.923	0.799
	FR2	0.885			
	FR3	0.898			
Environmental Risk	ER1	0.976	0.918	0.933	0.823
	ER2	0.829			
	ER3	0.911			
Time-loss Risk	TLR1	0.833	0.875	0.922	0.799
	TLR2	0.920			
	TLR3	0.925			
Shadow Work Awareness	SWA1	0.894	0.904	0.933	0.776
	SWA2	0.859			
	SWA3	0.887			
	SWA4	0.884			
Switching Intentions	SI1	0.869	0.780	0.870	0.691
	SI2	0.871			
	SI3	0.749			
Discontinuous Use Intention	DUI1	0.940	0.915	0.947	0.856
	DUI2	0.946			
	DUI3	0.888			

In order to examine the discriminant validity, according to Fornell and Larcker (1981), we compared the square root of AVE for each construct with the inter-construct correlation estimates regarding all pairs of constructs. Table 3 shows the construct correlation estimates and square roots of AVE (the diagonal elements in bold) for constructs. Each square root of AVE is larger than its corresponding row and column elements, indicating adequate discriminant validity.

<Table 3> Construct Correlations and Discriminant Validity

Construct	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
1. Inc	3.579	1.273	**0.784**									
2. PC	5.182	1.209	-0.245	**0.829**								
3. SQ	4.990	1.191	-0.272	0.659	**0.837**							
4. HR	4.525	1.531	0.282	-0.184	-0.174	**0.933**						
5. FR	4.505	1.505	0.352	-0.148	-0.183	0.518	**0.894**					
6. ER	5.078	1.433	0.216	0.015	-0.099	0.459	0.427	**0.907**				
7. TLR	4.038	1.493	0.428	-0.265	-0.287	0.467	0.499	0.323	**0.894**			
8. SWA	3.128	1.432	0.498	-0.326	-0.283	0.215	0.227	0.062	0.496	**0.881**		
9. SI	3.591	1.263	0.377	-0.136	-0.173	0.201	0.204	0.135	0.348	0.554	**0.831**	
10. DUI	3.043	1.484	0.433	-0.373	-0.321	0.255	0.238	0.084	0.45	0.734	0.617	**0.925**

Inc: Inconvenience, PC: Perceived Control, SQ: System Quality, HR: Health Risk, FR: Financial Risk, ER: Environmental Risk, TLR: Time-loss Risk, SWA: Shadow Work Awareness, SI: Switching Intentions, DUI: Discontinuous Use Intention
The **bold** numbers in the diagonal row are the square roots of the AVE.

Further, to check the potential multicollinearity, following Tabachnick and Fidell (1996), we assessed the variable inflation factor (VIF) values for antecedent variables. Results showed that VIF values that ranged from 1.470 to 4.481 did not exceed the threshold value of 10.0, indicating that multicollinearity is not a serious concern in this study.

2. Hypotheses Test Results

We utilized Smart PLS 3.0 to perform a path analysis to test the research hypotheses. Table 4 shows the hypotheses test results. Inconvenience was found to have a positive effect on shadow work awareness (β = 0.344, $p < 0.001$), supporting H1. Perceived control was found to have a negative effect on shadow work awareness (β = -0.146, $p < 0.05$), supporting H2. System quality was found to have no effect on shadow job awareness (β = -0.008, $p>0.05$), not supporting H3. Health risk was found to have no effect on shadow work awareness (β = -0.009, $p>0.05$), not supporting H4. Financial risk was found to have no effect on shadow job awareness (β = -0.054, $p>0.05$), not supporting H5. Environmental risk was found to have no effect on shadow job awareness (β = -0.103, $p>0.05$), not supporting H6. Time-loss risk was found to have a positive effect on shadow work

awareness (β = 0.373, p < 0.001), supporting H7. Shadow work awareness was found to have a positive effect on switching intentions (β = 0.554, p < 0.001), supporting H8. Shadow work awareness was found to have a positive effect on Discontinuous use intention (β = 0.734, p < 0.001), supporting H9.

<Table 4> Hypotheses Test Results

No.	Hypotheses	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	t Statistics (|O/STDEV|)	p Values
H1	Inconvenience -> Shadow Work Awareness	0.344	0.342	0.056	6.193	**0.000**
H2	Perceived Control -> Shadow Work Awareness	-0.146	-0.151	0.067	2.178	**0.030**
H3	System Quality -> Shadow Work Awareness	-0.008	-0.007	0.066	0.114	0.910
H4	Health Risk -> Shadow Work Awareness	-0.009	-0.009	0.060	0.159	0.874
H5	Financial Risk -> Shadow Work Awareness	-0.054	-0.051	0.062	0.864	0.388
H6	Environmental Risk -> Shadow Work Awareness	-0.103	-0.108	0.087	1.182	0.238
H7	Time-loss Risk -> Shadow Work Awareness	0.373	0.374	0.066	5.641	**0.000**
H8	Shadow Work Awareness -> Switching Intention	0.554	0.558	0.049	11.319	**0.000**
H9	Shadow Work Awareness -> Discontinuous Use Intention	0.734	0.737	0.032	23.108	**0.000**

Ⅴ. Conclusion

1. Discussion of Findings

This study adopts a mixed research approach to explore the characteristics of digital shadow work in a sharing economy environment and its impact on attitudes towards shared mobility services. Specifically, this study conducted interviews with a total of 6 students about the use of personal mobility services as a qualitative study, and collected and analyzed data. Based on the collected interview materials, we summarize several characteristics of shared mobility services (inconvenience, service quality, change of policy), and draw a framework model describing their relationship with related

behaviors.

In quantitative research, we combine the results summarized in qualitative research with the theory of perceived risk, draw a research model and verify it. We tested hypotheses about the effects of inconvenience, perceived control, and time-loss risk on shadow work awareness. These hypotheses are supported. That is to say, each link of the shared mobile service usage process should consider the convenience of service usage based on the user's perspective. This is because the difficulty of operation or encountering problems during the use of the service will increase the user's awareness of using the service as exercising digital shadow work. In addition, although various services based on digital technology will require users to do some things to varying degrees, it should be based on the user's greatest possible authority. Whether a user wants to switch brands or stop using the service depends in part on the degree of freedom the user has when using the service. Also, the process of using shared mobility services, including software and vehicles, should be improved as much as possible in a direction that is easy for people to learn and use. When a new user wants to use the shared mobile service, it needs to invest a certain amount of time and effort because he does not know the unfamiliar service usage method. This will strongly influence the value judgment of users on the service.

However, the hypothesis that the other three perceived risks (environmental risk, health risk, financial risk) have an impact on shadow job awareness does not hold. Consumers are less sensitive to these pervasive risks due to their greater experience using services similar to shared mobility (public transport: buses, taxis). And from the point of view that the use of the service meets the needs of the user, the functional value and entertainment value brought by the use of the service will make consumers love the service or brand, which may reduce the relationship between perceived risk and shadow work awareness. Finally, health risks, financial risks, and environmental risks may directly influence attitudes toward service use, rather than through shadow work awareness. Moreover, the hypothesis that system quality affects shadow work awareness is rejected because improving system

quality in shared mobility services can make shadow work that arises from service usage easier to perform, but does not reduce the amount of shadow work that users must perform, which may not affect their negative attitudes toward shadow work (shadow work awareness).

2. Limitations and Future Research Directions

This study has contributions from the academic aspects that contributed to the rich description of the digital shadow work phenomenon (Wiesche et al., 2017) and the densification of concepts (Trope, 2004), but the following research limitations exist. First, in qualitative study, only Chinese people were studied, the number of subjects is small, so there is a limit to generalization according to the characteristics of the subjects. In the future, it is necessary to refine the research findings by additionally selecting interviewees including various age and gender of various nationalities. In addition, this study selected and discussed sharing mobility in sharing services as a topic. In the future, it is necessary to conduct in-depth research on digital shadow work that exists in other types of services other than sharing mobility services.

Second, this study did not provide a comprehensive approach to different contexts in various situations for this concept. For example, this study conducted interviews with a focus on B2C, but there is a diversity of digital shadow work such as B2B or corporate situations and contexts. Therefore, research efforts are required for a comprehensive understanding in various contexts and situations other than shared services in the future.

Finally, in addition to the limitations of interviews, this study did not strictly conduct a large and sufficient basic survey, literature review, and case analysis necessary for the development of indicators of digital shadow work. In order to develop indicators or measurement tools of digital shadow work, it is necessary to be familiar with the process for this and to apply a very sophisticated and strict method. This is because the development of the concept, definition, and measurement method of digital shadow work will be a very influential issue in this field in the future. Despite these limitations mentioned above, this study could be an important cornerstone for accelerating

the pace of digital shadow work-related research in the future.

In addition, as a future research direction that can be suggested, the stimulus-organism-response theory, cognitive theory, social exchange theory, technology acceptance model, coupling and mentality, which have been frequently cited in the field of management informatics It is necessary to establish and verify a valid research model that can identify the shadow work phenomenon by examining accounting theories from various angles. In addition, it is necessary to review which existing theories are most suitable for understanding the shadow work phenomenon in each situation or context.

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