설득적 시스템 사용 동기에 대한 연구 : 상호작용적 거울 시스템 중심으로

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Motivational Factors for Persuasive System Adoption : Interactive Mirror System Case

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Abstract

Despite the growing enthusiasm for the persuasive system like an interactive mirror system little is known about what motivates the customers to try the system and makes customers return repeatedly to the system. The key to understanding persuasive system adoption is the identification of the preconditions needed for the system adoption. Using grounded theory building methodology, we identified the preconditions needed for the system adoption. First, past research regarding users' motivational factors to use the persuasive system is reviewed. Then, research methodology and data analysis are presented. Finally, the study findings and conclusions are presented.

Keywords : Pervasive System, Motivation, Interactive Mirror System, Precondition, System Adoption

1. Introduction

Information systems have influenced people's attitudes and behaviors in one way or another [Oinas-Kukkonen and Harjumaa, 2008]. Recently, more and more retailers equip their off-line stores with information systems for the persuasive purpose to change users' attitudes or behavior toward their products. An example is an interactive mirror system installed in retail shops (see ⟨Figure 1⟩). Using the user's psychological cognition with a visual reflection of one's image on the mirror as a persuasion strategy on user's behavioral change, the interactive mirror systems attempts interactions and persuasive communication with customers the same way as human shop masters interact and communicate with customers to change customer's behavior towards the products.

While retailers in the past relied on a shop master's comments to persuade consumers to make a purchasing decision, interactive mirror systems are a self-initiative interactive system that minimizes the whole process of the shop master's verbal guidance. Users of the interactive mirror systems are considered to obtain a positive experience. The system is considered to be more influential to customers than the shop masters.

⟨Figure 1⟩ Interactive Mirror Systems with Celebrity Athlete's Image to Persuade Customers

Persuasion is defined as an attempt to change behaviors, attitudes or both without using coercion or deception [Fogg, 2003]. The persuasive system is an interactive information system designed to influence, motivate and persuade people to change their behavior and attitudes [Fogg, 2003; Torning et al., 2009]. Recently, organizations create innovative persuasive systems targeting user's heuristic experience and hoping to influence user's behavior change [Fogg, 2009]. Persuasive systems are used in many areas such as personal healthcare, welfare, commerce, education, safety, environmental preservation, occupational effectiveness, among other fields [Oinas-Kukkonen and Harjumaa, 2008]. For example, persuasive systems in healthcare motivate people toward healthy behavior, and prevent medical problems [Kraft et al., 2009]. Persuasive systems are delivered in various ways such as web-based applications, portable hand-held devices, stand-alone devices, robots, or computerized toys [Oinas-Kukkonen and Harjumaa, 2008]. Furthermore, to increase persuasion impact, the persuasive system increasingly utilizes interactive media such as graphic, virtual reality, and augmented reality. With these persuasive media employed by the system provide the simulated environment, which offers experiences to the users. The user's experience in the simulated environment can influence behaviors and attitudes of the users [Zulkifli et al., 2013].

Despite growing enthusiasm for the persuasive system, little has been done to investigate what (1) compels the customers to try and run through the system and (2) makes customers return repeatedly to the system. A key to our understanding on persuasive system adoption is the identification of preconditions necessary for the adoption of the system.

Originally created to prescribe persuasive software requirements and designs, the Persuasive Systems Design (PSD) Model provides conceptualization of technology-mediated persuasion [Fogg, 2003; Torning et al., 2009]. The framework widely provides a useful means for understanding persuasive technology.

Based on Fogg's persuasive system design model [Fogg, 2009], Dahl and Moreau's research on motivational factors for creative tasks [Dahl and Moreau, 2007], this research derives users' motivation factors to use and run through the interactive mirror system. This research is important not only because understanding motivation factors helps to increase persuasive technology adoptions and makes the technology valuable, but also because the results of this study provides researchers with insight to further develop the persuasive technology adoption model and test the model empirically.

2. Persuasive System

The persuasive system is divided into three categories : interpersonal persuasion, computer-mediated persuasion and human-computer persuasion [Kraft et al., 2009; Oinas-Kukkonen and Harjumaa, 2009]. Interpersonal persuasion occurs when two or more people interact with each other, involving, for example, verbal and non-verbal behavior, feedback, and coherence of behavior. In this case, a person has a potential ability to persuade over person to person relationship by encountered a situation. He or she has persuasive communication skills to persuading another user without interacting with the system. Computer-mediated persuasion means people persuading others through computer-mediated communication. The research on computer-mediated persuasion investigates

how technology such as e-mails, instant messages, or blogs affects our modes of communications, what happens when a message travels via computers between humans, and how the technology impacts the communication [Torning et al., 2009]. Human-computer persuasion is the study of how people are persuaded interacting with computer technology [Fogg, 2003]. Since humans are persuaded when interacting with technology, the type of system is called human-computer persuasive system.

The focus of this study is human-computer persuasion. The aim of persuasive system is changing user's behavior through an interactive use of system or device. The technology provides the user with an environment where the user gets involved with the technology and controls the system. The user acts as a facilitator for running the system. The technology makes the user generate action or change the user's state as the reaction to the information generated by the technology. Thus, persuasive systems are inherently transformative [Torning et al., 2009].

The focus of the persuasive system must be a technology-mediated transformation of either attitudes or behaviors, including a transformation by bolstering or reinforcing existing attitudes or behaviors [Oinas-Kukkonen and Harjumaa, 2009]. Persuasive systems deliberately attempt to infuse a cognitive and/or an emotional change in the mental state of a user to transform the user's current cognitive state into another planned state [Torning et al., 2009].

The persuasive system promotes a self-directed and active learning process [Zulkifli et al., 2013]. Computers do not have intentions of their own. Those who create, distribute, or adopt the technology are the ones who have the intention to affect one's attitudes or

behavior [Fogg, 1998]. Through human-computer interactions, people are motivated and persuaded.

3. Interactive Mirror System

In the persuasive system, the form of persuading can be many forms : an alarm, a text message, an announcement or a growling stomach [Fogg, 2009]. The persuasion triggers user's behavior and boost either user's motivation or ability or both [Fogg, 2009].

The mirror's reflection characteristic and technology combined is an interactive mirror system. Interactivity is defined as the extent to which users can participate in changing the state and content of a mediated environment in real time [Steuer, 1993]. The mirror is a reflective surface [Coleman, 2013]. We stand in front of a mirror because mirror is transferring a live image through the reflection (see ⟨Figure 2⟩).

⟨Figure 2⟩ User Stands in Front of the Interactive Mirror and Makes a Hand Gesture to Proceed to the Next Stage

When the user looks at the self-reflected image on the mirror to identify the image, the hidden functionality of the system detects the user's body or face image to operate the system (see ⟨Figure 2⟩). That is, the mirror recognizes the attributes of the user's

image as a signal to the system to trigger a new state or event targeting user's attitude or behavioral change. As the new state or event occurs, the user reacts to the state or event either by continuing or discontinuing the subsequent steps (see ⟨Figure 3⟩). In this way, users are persuaded as the pre-designed system induces.

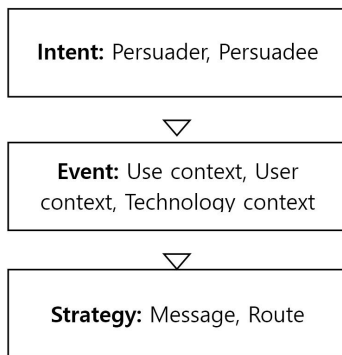⟨Figure 3⟩ If the User Wants to Continue, She Can Select Celebrity Athlete's Image

The content of virtual images is purposely designed to change user's behavior and persuade the user. The mode of virtual images shown on the mirror is to persuade the user. From the virtual aspect of a human-computer technology, the user can get a new experience, and obtain self-created information.

The user can manipulate the virtual images on to their self-reflected image on the mirror screen. The user can create and view the self-created information through the interactive communication. This participatory method of an interactive system encourages the user to get involved into the interactive reaction of the virtual image processing.

4. Persuasive System Design Model

Persuasive System Design model(PSD model) provides a framework to analyze persua-

sion context that includes 1) intent, 2) event and 3) strategy (see ⟨Figure 4⟩).

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┌─────────────────────────────────┐
│  Intent: Persuader, Persuadee   │
└─────────────────────────────────┘
                ▽
┌─────────────────────────────────┐
│     Event: Use context, User    │
│  context, Technology context    │
└─────────────────────────────────┘
                ▽
┌─────────────────────────────────┐
│   Strategy: Message, Route      │
└─────────────────────────────────┘
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⟨Figure 4⟩ Core Components of the PSD Model

Intent. Analyzing intent involves analyzing the intent of persuader and the intent of persuadee. While the persuader is the system, the persuadee is the system's user. Main feature of analyzing intent is to find out whether the persuasion targets attitude and/or behavior change. Attitude is based on emotions, beliefs or past experiences [Petty and Cacioppo, 1986]. Persuasion is defined as "human communication designed to influence others by modifying their beliefs, value, or attitudes" [Simons et al., 2001]. Therefore, persuasive communication process consists of complicated psychological events in person's mind [Oinas-Kukkonen and Harjumaa, 2009]. This means that persuasion may be considered as a process rather than as a single act [Oinas-Kukkonen and Harjumaa, 2009].

Persuasion Event. Analyzing persuasion events of the system involves analyzing use context, user context and technology context. Analyzing the use context involves understanding the characteristics of problem domain in which the persuasive system is used. As a result of use context analysis, it is determined what information is relevant for a user in a given problem domain.

Analyzing user context relates to analyzing the user's individual differences and characteristics such as age and gender. These individual differences affect the user's information processing. For the user context analysis, the following individual characteristics can be considered : "user's interests, needs, goals, motivations, abilities, pre-existing attitudes, commitment, consistency, compromises, life styles, persistence of change, cultural factors, deep-seated attitudes, social anchors, and perhaps even the whole personality" (p. 490 of [Oinas-Kukkonen and Harjumaa, 2009]). Despite the fact that persuading the user is a multi-phased and complex task, understanding the user's characteristics may help change user's attitudes or behavior successfully [Oinas-Kukkonen and Harjumaa, 2009].

Analyzing technology context is associated with identifying features, strengths, weaknesses, opportunities and risks of the technology being used. A persuasion event can be triggered by a finger touch or a motion, depending upon the technology being used.

Strategy. Persuasion relies primarily on symbolic strategies which trigger emotions. However, some researchers argue that convincing the persuadee is a part of persuasion. Rooted in logical proof, the conviction strategy appeals to the persuadee's reason and intelligence [Miller, 2002].

5. Persuasive System Design Model Applied to an Interactive Mirror System
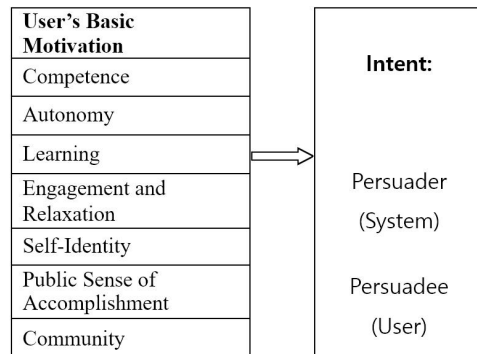
5.1 The Intent

In order to use an interactive mirror, the user needs to recognize the technology tool

first. When the user recognizes the interactive mirror, the user may see it as a mirror object. Meanwhile, once the system recognizes the user, the system changes the mode of an interactive system and the system will be initiated. Then, the user automatically understands that the mirror's recognition of the user triggers this change. Now, the interactive mirror is ready to communicate with user and provides a set of services.

To use the interactive mirror system, the user (persuadee) needs specific conditions which might encourage them to change their behavior or attitudes towards a set of services. Fogg's Factors in the Behavior Model (FBM) asserts that for a target behavior to happen, a person must have a) sufficient motivation, b) sufficient ability, and c) an effective trigger [Fogg, 2009].

5.1.1 User's Motivations to Use The System

The persuasive system, in reality, gives the user unexpected experiences (i.e. dynamic events) while using the system. Since the interactive mirror system is designed to provide creative experiences to users, the user normally gets novel tasks while they run the system. To run through the whole process of an interactive persuasive system,

User's Basic Motivation	Intent:
Competence	
Autonomy	
Learning	
Engagement and Relaxation	Persuader (System)
Self-Identity	
Public Sense of Accomplishment	Persuadee (User)
Community	

〈Figure 5〉 Motivations to Use the System

the user should have motivation to get involved with the entire process by using the system. The 〈Figure 5〉 shows the user's basic motivations to perform a creative task. These seven motivations emerged from the previous study on customers participating in creative activities [Dahl and Moreau, 2007] and summarized in 〈Table 1〉.

Competence enables users to recognize the persuasive system in the physical space where the system resides. The user with competence could automatically understand the system configuration set for the target users. Thus, the user could understand the messages from the interface and generate appropriate actions to use the system. The user with competence might be an easy adopter of the system.

〈Table 1〉 User's Basic Motivations During Creative Tasks(adapted from [Dahl and Moreau, 2007])

Basic Motivation	Definition
Competence	Anticipated satisfaction derived from completing a creative project successfully [Dahl and Moreau, 2007].
Autonomy	Enjoyment derived from the freedom to choose the process and/or design of the creative task [Dahl and Moreau, 2007].
Learning	Desire to attain or improve the skills necessary for completing creative projects [Dahl and Moreau, 2007].
Engagement and Relaxation	Anticipated satisfaction derived from immersion in the creative process itself [Dahl and Moreau, 2007].
Self-Identity	Desire to reinforce or enhance self-perceptions of creativity [Dahl and Moreau, 2007].
Public Sense of Accomplishment	Anticipated satisfaction derived from others' recognition of one's own creative accomplishments [Dahl and Moreau, 2007].
Community	Desire to share creative experiences with others who are similarly motivated [Dahl and Moreau, 2007].

Autonomy allows users to feel free to communicate within an interactive system. The persuasive system provides an open format of user modalities which user can select and control each event. Therefore, the user with autonomy could generate his or her own specific information from the underlying system. From this, he or she could feel free to use the technology. Moreover, the user could easily adopt the operating functions of their own style. The user could organize the whole process and manipulate the provided information on the mirror wall. This direct interactive response mode makes user feel as they are experiencing real human communication.

Learning allows user to stay with the interactive mirror and interact with the system. The user who likes learning to complete the creative tasks, might enjoy experiencing a new skill during the interaction with the persuasive system.

Engagement and Relaxation allow the user to enjoy the persuasive system. The user with engagement and relaxation might enjoy go through the whole process of the persuasive system by taking the generated message and events. The user with engagement and relaxation interacts with the system smoothly by responding to the system's messages and events.

Self-identity. The user with self-identity is the one who can recognize his or her creativity. The user with high self-identity makes it easy to adopt the interactive mirror system. Interactive mirror system generates novel tasks while the user runs through the system. The user with self-identity might be confident to perform the novel tasks and enjoy having the novel experiences.

Public Sense of Accomplishment motivates the user to adopt the persuasive system. By showing that they use novel systems like interactive mirror successfully, the user might obtain a sense of accomplishment. That is, by demonstrating that the user likes to try novel tasks of the interactive mirror and complete the tasks successfully, the user might get the sense of accomplishment.

Community. By sharing novel experiences of using the interactive mirror with others, the users might get a sense of community. At the end of sessions, the interactive mirror offers users with Quick Response Code to share with others via social networking services. If the user likes to share his or her experience with others, the user's desire of being connected with the community could motivate the users to use the interactive mirror.

Since the differences in users' characteristics and cognitive style underlie the users' motivation, the consumer's response to stimuli and persuasive interaction might differ [Alhammad and Gulliver, 2013; Kaplan and Saccuzzo, 2009]. That is, users' individual differences in the above motivational factors influence their information processing and affect the successful adoption and use of the persuasive system [Oinas-Kukkonen and Harjumaa, 2009].

5.2 Persuasion Event

An event is defined as an action or occurrence recognized by the system [Oinas-Kukkonen and Harjumaa, 2009]. The event can be generated or triggered by the system, by the user or in other ways. Normally, the events are handled with the flow of the software program. 〈Figure 6〉 shows the persuasion events which occurred during the use of the interactive mirror system.

Step 1 : the user puts on the Radio Frequency Identification attached clothing.
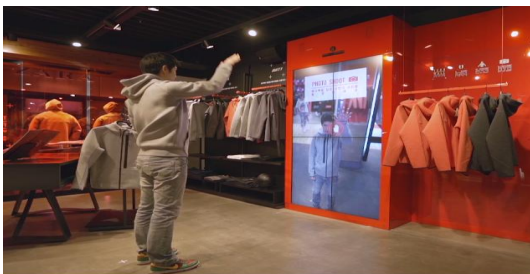

Step 2 : User stands in front of the interactive mirror.

Step 3 : User moves his body until the mirror reaches 100 percent.

Step 4 : User makes a hand gesture to move on to the next stage.

Step 5 : User selects a celebrity athlete's image

Step 6 : Once a celebrity image is selected, a waiting message appears for 2 seconds.

Step 7: A message appears while the photo is printing

Step 8 : User finds the picture with a Quick Response Code

〈Figure 6〉 Persuasion Events in Nike's Interactive Mirror

5.3 Persuasion Strategy

The persuasion strategy of Nike interactive mirror is having users to gain novel experiences with the interactive system. With the system, the user can create photographic content with his or her image with a celebrity athlete's image. The user can share this special experience and photo via social networking services using the Quick Response Code (see ⟨Figure 7⟩). If the user finds this to be useful, the user could have a positive experience. In turn, this might make the user engage with the purchase.
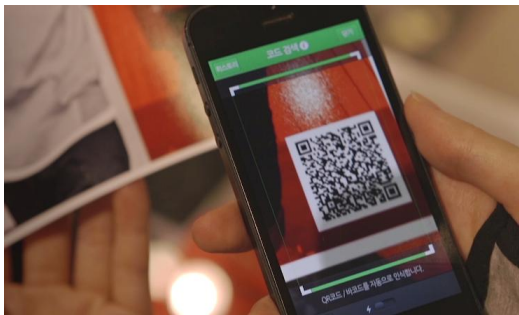
⟨Figure 7⟩ Persuasion Strategy : User Uploads the Picture on Social Networking Sites Using the Quick Response Code

6. Research Methodology

Grounded theory building methodology is used to build theory grounded in the data inductively [Glaser and Strauss, 1999]. To find which user's motivation factor may influence a change in their behavior and complete the offering system, the interviews are conducted in an off-line store where an interactive mirror system is installed. Among the individual users who spend enough time to complete the system, random samples are selected for one-on-one interviews. Each interview was held separately in a private place.

The interview participants include three males and two females (see ⟨Table 2⟩). Interview questions focus on which motivational factors tend to cause a response to the persuasive technology and performing to the unexpected system. On average, each interview took around an hour. The shortest interview took about 30 minutes.

⟨Table 2⟩ Interview Participants

	Gender	Age	Education Level	Previous Experience Using an Interactive Mirror
User 1	Male	20~30	Bachelor	None
User 2	Male	20~30	Bachelor	None
User 3	Male	20~30	Master	None
User 4	Female	20~30	Bachelor	None
User 5	Female	20~30	Bachelor	None

7. Data Analysis and Interview Findings

Each participant's interview proceeded through data analysis. The first step was to transcribe the user's interviews and read them several times, then extract the sources of the text (words, phrases, or sentence) on the transcripts, and categorize them into seven motivation codes. The user's seven motivations were adopted from review of the literature (see ⟨Table 2⟩).

7.1 Competence

The following is the selected excerpts from interview data.

I felt these systems would be good to reducing fitting time. (User 2)

The users easily realized the aim of the interactive mirror system ; and were competent that the system would be useful, valuable, or fun when they complete the system successfully.

When the system starts, the user's body image is reflected on the mirror panel. This makes the users have an instinctive belief that the system is related to their reflected body image. After the system generates options for the user to choose from, the user has a belief that the system is providing a virtual clothing fitting over the reflected body image. And, they identify their early stage belief in the purpose of the system while they carry out the interactive process. Therefore, users can build competence in the system, which helps them complete the system.

The machine to put things on to my body virtually was good. It helped me to reduce time changing clothes. (User 1)

When I tried the system, I was able to realize that the system is about virtual clothing contents and it reflected my whole body on the mirror panel. This type of program gave me the total look of the clothes on my actual body. For me it was like a 'styling' pregame converted into a virtual system. This system was useful. I could get inspired by the virtual fitting program. The virtual clothes fit my reflected body well on the mirror panel. (User 3)

The machine recognized my body and the interaction with the machine was successful and the virtual image was close to the reality. I did not try on actual clothes and change clothes. Through the system I could get the same experience. The idea was good to try on the machine so I tried the system. The idea of trying clothes on the machine was a fun and fresh experience. (User 4)

The total experience of the system was

that I had never used it before. And I had a good experience today. I tried several clothes on the machine, and some I would like to try on for real. The whole experience was good. I wanted to try some clothes as a real experience but through the system, I tried clothes via virtual images. This was good experience. (User 5)

Proposition 1 : User's competence (anticipated satisfaction) that the system would be useful, valuable, or fun leads the user to adopt the system.

7.2 Autonomy

The autonomy motivation makes users access to the system according to their own style. In the interview, this motivation shows an increase in the user's own motivation to use the system and feel free to select any icons, and enhances the user's behavior to move their body freely in front of the system.

This motivation pulls out the user's independent mind, therefore the user figures out how to use the system. By at the end of the process, they know how to control the system. This is because the persuasive system offers no instructions for system usage. Therefore, users determine their own way of using the system through the system. Moreover, individual users can get different impressions of using the system.

When I first used the system I chose female from the gender selection, so I was embarrassed, but I easily found the "Home" icon at the top of the interface. And I eventually understood that the system loaded by my hand gesture. This

easy understanding of the system design made continue using the system. (User 1)

The "stand here" line in front of the interactive mirror made me want to try to use it. The stand line on the floor makes something curious. It made me want to use it as a self-service system use as I could use this machine without another person's help or guidance. (User 2)

When I entered the shop and saw this machine for the first time, I could perceive the machine as an "Event" to promote special things for a particular brand. Also, I used the machine because I wanted to get to know what kind of 'special event' program would be offered by the machine. (User 3)

Even the shop masters did not tell me what I should do or give me advice about how to operate the system. This allowed me to use the machine freely. If this interactive machine was displayed in a fitting room then I could use it for a long time. (User 4)

Proposition 2 : User's autonomy within the system (to select and control event) leads the user to adopt the system.

7.3 Learning

The users were found to have no previous experience with an interactive mirror. They all had curiosity about the interactive mirror and were attracted by the new appearance of the system. Learning the system while they were using it allowed users to complete the system to the end and to have a positive experience with the unexpected system. Also,

the simple, user-friendly system allowed users to easily gain the necessary skills to operate the system. This easy learning system made users stay with the system.

Learning experience or how to use this system was OK.
The operating rules of the system were very simple. The system worked by "Go" and "Back" and I could see all the applied clothes on the mirror screen, and If I want to wear other clothes, then put my hand on the right side. This interactive mirror system was not hard to control. I used simple motions. (User 1)

The operating system design was easy to follow so I could understand each step, but if the system's operation was more complicated, I would not complete each process and would find it hard to follow. (User 2)

Each option was in a large font and the offering words from the system were short and simple, so it was easy to catch on to how to operate the system.
I had to make a right motion and move-ment and the system loaded to the next step so that I could follow the correct process. (User 3)

The whole system was easy to under-stand. (User 4)

The control options were easy to under-stand as was operating the system.
The whole system was quick to experience so I could get to the end of the system easily. This was good to get something I have completed successfully. And, the method of controlling the system was easy to follow. (User 5)

Proposition 3 : The learning during the system use gives users a sense of achievement; allows them to have a fun experience; and enables the user to adopt (complete) the system.

7.4 Engagement and Relaxation

The users were especially engaged with the virtual fitting on their reflected body on the mirror panel. The virtual images with clothes made the users excited; and this made them engage with the system. This real-feeling of the system without the need for trying on real clothes was exiting. The high quality (e.g. colors, figure) of the detailed information provided users with high involvement and attention to the system.

It felt like real clothes that I was wearing for real.
The virtual image on the mirror screen was moving as I moved my body.
The colors of virtual clothes were vivid and felt like real clothes that I was wearing for real. Also, the virtual mage on the mirror screen was moving as I moved my body side to side. It seemed that I was wearing real cloth that the mirror screen showed in front of me. (User 1)

The system also provided detailed information about where the items were displayed. (User 2)

I'd rather concentrated on the hand motion. I had to make a right gesture where the system guided me to match the point with the system. (User 3)

The machine recognized my body, and the interaction with the machine was successful and virtual image was close to reality. (User 4)

I have tried few virtual applications on my mobile phone. This was the first time that I tried a larger version of the virtual experience. The experience was totally different than those I tried on the smaller screen of my mobile phone. This system was showing the whole body look. (User 5)

Proposition 4 : Engagement and relaxation motivation stimulate the user's emotional response to the system. If this response is positive, the user can accept new information easily through the unexpected system.

7.5 Self-Identity

Self-identity makes a user to try the system. The user who likes to try new experiences finds positive associations by using the unexpected system. Also, they can find the value of the system through their own experience of trying the new system.

I used the machine to have a new experience, for my own new activity. (User 3)

Overall, I liked trying things on the system rather than trying clothes on physically. If the contents provided more effects, it would be more fun to experience the system. For example, if the system provided accessories, such as shoes and hats, then the system could provide an entire perfect outfit for users. (User 2)

The virtual experience was new to me but I'm not sure that trying on real clothes and the virtual fitting will give me the same value. If I try the real clothes on my body and if I get the same feelings as I did from the virtual experience then I would think that my virtual experience was valuable. Because of the novelty of the machine, I might use it several times. (User 4)

When I first saw the interactive machine, I did not realize it was a machine with a system embedded in it. I was curious about the system, so I tried it. Using the system gave me the motivation to pick the real clothes that I had tried on with the virtual system. (User 5)

The system made my body fit to the virtual clothing images, thus it felt very fun. So I wanted to try other clothes in front of the interactive mirror. (User 1)

Proposition 5 : User's self-identity poten-
tially helps the user to ac-
cess to the offering system.
And this motivation supports
user to complete the whole
system.

7.6 Public Sense of Accomplishment

A public sense of accomplishment did not motivate users to use the system. The followings include the selected excerpts from interview data.

The machine looked fun and it looked novel to me. And once it I tried the machine, it was faster than I would be at actually changing real garments. It

helped me to reduce time. I am a lazy person who doesn't like to spend a lot of time changing clothes, and the machine put things on my body virtually. This was good.
The open environment was quite strange but I could concentrate on the system. On the mirror screen, my whole body was reflected and virtual clothing images well overlapped my reflected image on the screen, so I could feel as if I put real clothes on. This real feeling made me move on to the next stage of the system. (User 1)

Other people did not fully try this machine, but their small amount of trying experience influenced me to use this interactive mirror. (User 2)

This virtual experience in the open environment and off-line shop was OK. I did not get the feeling of other people watching me while I was in front of the mirror using the system. (User 3)
Using this interactive system and machine was free and nobody was concerned about my actions.
I might use this machine several times. I recognized the machine because there were a lot of people surrounding it. (User 4)

"It was OK. But I did not like that other people could watch my images on the panel. If I came here with my boyfriend, I could enjoy the system more. It would be more fun to enjoy with more than one person trying it."
"I did not like so much of an open environment because other people could watch what I chose on the system and they

could watch my motions as well. Also, they could see my reflected body and overlapping virtual images on the big mirror panel because of the open environment." (User 5)

7.7 Community

Most users liked to upload the contents that they created using interactive mirror via SNS. The users took their own pictures and uploaded them using SNS services, shared the information in verbally with others, and/or the uploaded their special experience via QR code from the system.

If the user is sensitive about sharing personal contents via the Internet, they were negative about uploading and did not want their face on SNS. But, if the system offers extra rewards (e.g. a 10% off coupon), then even the reluctant user was willing to upload her personal contents without showing her face.

I might upload on SNS to share my new information with friends. (User 1)

I would like to do it. I will upload today's experience on my SNS services. I will upload my photo that I took from this system and share the moment with my friends. I would like to tell them about my experience today. (User 2)

I might upload today's experience for my daily communication on SNS service. It's like 'I did this for today's activity.' I don't upload pictures every day but if I see something amazing or try a new activity, I upload picture to my SNS services as a special memory. And I like to share the moments with my friends. (User 3)

I could upload today's experience on SNS because the experience I had was creative. I usually upload unusual things and share with my friends on SNS."
I like to let my friends know about new information. (User 4)

I don't usually upload my face picture to SNS services. But if there is an 'event' service, for example, if I upload the picture of my experience using an interactive machine experience on SNS services and I could get a little gift, then I could upload a picture of the back view of me using the system. (User 5)

Proposition 6 : The user's community motivation can generate new information through the user's real experience with the system.

Different user perspectives can make positive or negative community motivation through the interactive system experience. Therefore, the system offers fulfilling rewards to increase the user's community motivation.

8. Conclusion

This research found the research model and propositions that would help both academics and practitioners to understand users' motivation factors for using the interactive mirror system. Competence, autonomy, learning, engagement & relaxation, self-identity, and community have influence regarding use of an interactive mirror system. Persuasive systems such as interactive mirror system is increasingly installed in commercial setting as a marketing tool. Persuasive systems are especially designed to attract users to participate in the system. The attractive per-

suasive systems increase positive user experience, facilitate information provision, and provide meaningful benefits to the individual users. Understanding individual-level user acceptance to these systems is important for organization to benefit from such systems. That is, the success of these types of systems is important for firms to gain benefits from their investments.

Persuasive systems are used by users mainly on a self-service basis. The user interaction and experience with the technology have been found to be an integral part of improving user satisfaction [Meuter et al., 2000]. In this regard, the design of user-oriented persuasive systems should aim to increase user's experience; and is based on the understanding the purpose of the use of the system by the users. Thus, understanding consumer motivation for using the system is central to the concept of designing and delivering effective Persuasive systems [Schaeffler, 2012]. More pervasive systems influence users more to pay attention to the system and to change behavior without force. The contribution of this research is to investigate what makes users to decide to use and finish the system until the end of the system. This helps the task of the system design which can be potentially leads to the targeted advantage of users and organization. Is based on this understanding.

9. Limitations and Future Research

The findings cannot be generalized because this study is based on five cases and one type of system. Thus, future study is suggested to conduct more interviews, perhaps with users of persuasive systems of other domains. Nonetheless, the findings still provide some fairly significant insight in the exploratory type of research.

In the future, the six propositions derived from this research could be further developed and tested to identify the relationship between user's motivations and use of the interactive mirror system. We believe that the user's experience with the interactive persuasive system is closely related with the user's motivation, cognitive process, and emotional appeal that a system can give to the user [Zulkifli et al., 2013]. To develop a robust research model, further literature review could be done on : (1) user-centered system design principle based on user's motivation, cognitive effect of the use, and emotional experience, (2) persuasive system design principle from the user's journey perspective, and (3) features of the persuasive system or interactivity technology that can lead to the users engagement without employee's help.

References

[1] Ahuvia, A., "Beyond the extended self : Loved objects and consumer's identity narratives", *Journal of Consumer Research*, Vol. 32, No. 1, 2005, pp. 171-184.

[2] Alhammad, M. and Gulliver, R., "Context Relevant Persuasive Interaction and Design : Consideration of Human Factors Influencing B2C Persuasive Interaction", *Information Technology Interfaces*, 2013, pp. 24-27.

[3] Barry, T. and Howard, D., "A review and critique of the hierarchy of effects in advertising", *International Journal of Advertising*, Vol. 9, 1990, pp. 121-135.

[4] Boontaring, W., Quirchmay, G. Chutimasakul, W., and Papasratorn, B., "An Evaluation Model for Analyzing Persuasive Systems in Mobile Healthcare", *IEEE*, 2014.

[5] Coleman, R., "Sociology and the virtual :

interactive mirrors, representational thinking and intensive power", *The Sociological Review*, Vol. 61, 2013, pp. 1-20.

[6] Dahl, W. and Moreau, C., "Thinking Inside the Box : Why Consumers Enjoy Constrained Creative Experiences", *American Marketing Association, Journal of Marketing Research*, Vol. XLIV, 2007, pp. 357-369.

[7] Fishbein, M. and Ajzen, I., "Belief, Attitude, Intention, and Behavior", *Reading : Addison-Wesley Publishing Company, Inc.*, 1975.

[8] Fogg, B. and Nass, C., "Silicon Sycophants : the effects of computers that flatter", *International Journal of Human Computer Studies*, Vol. 46, No. 5, 1997, pp. 551-561.

[9] Fogg, B. J., "A Behavior Model for Persuasive Design", *Persuasive '09*, Claremont, California, USA : ACM, 2009.

[10] Fogg, B. J., "Persuasive Computers : perspectives and research directions", *in Proceedings of the SIGCHI conference in Human factors in computing systems : ACM Press/Addison-Wesley Publishing Co*, Los Angeles, California, 1998, pp. 225-232.

[11] Fogg, B. J., "Persuasive Technology : Using Computers to Change What we Think and Do", *San Francisco : Morgan Kaufmann Publishers*, 2003.

[12] Fogg, B., Cuellar, G., and Danielson, D., "Motivating, influencing, and persuading users", *The Humans-Computer Interaction Handbook*, 2007, pp. 358-370.

[13] Gharibi, S., Danesh, Y., and Shahrodi, K., "Explain the effectiveness of advertising using the AIDA Model", *Institute of Interdisciplinary Business Research*, 2012.

[14] Glaser, B. and Strauss, A., "The Disco-very of Grounded Theory : Strategies for Qualitative Research", *New Brunswick, N.J, Aldine Transaction,* 1999.

[15] Harjumaa, M. and Muuraiskangas, S., "Building Persuasiveness into Information Systems", *The Electronic Journal Information Systems Evaluation*, Vol. 17, Issue 1, 2014, pp. 23-35.

[16] Harjumaa, M. and Oinas-Kukkonen, H., "An Analysis of the Persuasiveness of Smoking Cessation Web Sites", *in Proceeding of the Second International Symposium on Medical Information and Communication Technology, Oulu : CWC, University of Oulu*, electronic publication, 2007.

[17] Harjumaa, M. and Oinas-Kukkonen, H., "Persuasion Theories and IT Design", *In : Lecture Notes in Computer Science 4744*, Persuasive, Berlin Heidelberg, 2007, pp. 311-314.

[18] Kaplan, R. M. and Saccuzzo, D. P., "Psychological Testing : Principles", *Applications and Issues*, Cengage Learning, 2009.

[19] Kraft, P., Drozd, F., and Olsen, E., "Digital Therapy : Addressing Willpower as Part of the Cognitive Affective Processing System in the Service of Habit Change", *Communications of the Association for Information Systems*, 2009.

[20] McGuire, W. J., Persuasion in G. A. Miller, "Communication, Language, and Meaning Psychological Perspectives", *New York : Basic Books*, 1973, pp. 242-255.

[21] Meuter, M. L., Ostrom, A. L., Roundtree, R. I., and Bitner, M. J., "Self-Service technologies : Understanding customer satisfaction with technology-based service encounter", *Journal of Marketing*, Vol. 64, 2000, pp. 50-64.

[22] Miller, G. R., "On being persuaded : Some basic distinctions", *in The Persuasion Handbook : Developments in Theory and*

Practice, Dillard, J. and Pfau, M. Eds, Sage Publications, Thousand Oaks, 2002.

[23] Oinas-Kukkonen, H. and Harjumaa, M., "A systematic Framework for Designing and Evaluating Persuasive Systems", *International Conference on Persuasive Technology*, 2003, pp. 164-176.

[24] Oinas-Kukkonen, H. and Harjumaa, M., "Persuasive Systems Design : Key Issues, Process Model, and System Features", *Communications of the Association for information Systems*, 2009.

[25] Oinas-Kukkonen, H. and Harjumaa, M., "Towards Deeper Understanding of Persuasion in Software and Information Systems", *in Proceedings of the first international conference on Advances in Human-Computer Interaction* (ACHI 2008), Sainte Luce, Martinique, 2008.

[26] Oinas-Kukkonen, H., "Behavior Change Support Systems : A Research Model and Agenda", *International Conference on Persuasive Technology*, 2010, pp. 4-14.

[27] Pandey, A., Manivannan, A., Nov O., Satterthwaite, M., and Bertini, E., "The Persuasive Power of Data Visualization", *IEEE*, Vol. 20, Issue 12, 2014, pp. 2211-2220.

[28] Petty, R. and Cacioppo, J., "Communication and persuasion : Central and peripheral routes to attitude change", New York : Springer, 1986.

[29] Schaeffler, J., "Digital signage : Software, networks, advertising, and displays : a primer for understanding the business", *Burlington*, MA : CRC Press, 2012.

[30] Schmidt, A., "Implicit human computer interaction through context", *Personal and Ubiquitous Computing*, Vol. 4, Issue 2-3, 2000, pp. 191-199.

[31] Simons, H., Morreale, J., and Gronbeck, B., "Persuasion in Society", Sage Publications, Inc., Thousand Oaks, 2001.

[32] Steuer, J., "Defining virtual reality : Dimensions determining telepresence", *Journal of Communication*, Vol. 42, No. 4, 1993, pp. 73-93.

[33] Swan, J., Bowers, M., and Richardson, L., "Customer trust in the salesperson : an integrative review and meta-analysis of the empirical literature", *Journal of Business Research*, Vol. 44, Issue 2, 1999, pp. 93-107.

[34] Torning, K. and Oinas-Kukkonen, H., "Persuasive System Design : State of the Art and Future Directions", *Persuasive '09*, Claremont, California, USA : ACM, 2009, pp. 26-29.

[35] Zulkifli, N., Noor, M., Bakar, A., and Mat, C., and Ahmad, M., "A Conceptual Model of Interactive Persuasive Learning System for Elderly to Encourage Computer-Based Learning Process", *in Proceeding of International Conference on Information and Creative Multimedia*, 2013.

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