A STUDY ON THE EFFECT OF MARKETING USING VIRTUAL MIRROR TECHNOLOGY ON CUSTOMER SATISFACTION

By

JO, Junghee

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

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ABSTRACT

A Study on the Effect of Marketing Using Virtual Mirror Technology on Customer Satisfaction

This study is to research how high-tech technologies provided by customers in offline and online businesses affect customer behavior in the 4th industrial revolution environment. In the purpose of this study is to study how virtual mirror technology, which is a virtual reality technology, affects customers' expectation satisfaction and intention to use that rarely examined in previous studies. In this study, a research model was established based on sensory marketing theory. That is, based on the Stimulus, Organism, Response (S-O-R) model, the independent variable was set as the sensory stimulus of virtual reality technology and the emotional response according to the stimulus of the virtual reality technology, and the dependent variable was set as the behavioral response according to the sensory stimulus and emotional response. Specifically, the independent variables were the sensory stimulation and emotional response of virtual reality technology, and the user's pleasure, perceived product quality, remote reality, interaction, and immersion were set. As the dependent variable, the user's expected satisfaction and intention to use were set as behavioral responses. Based on this research model, a research hypothesis was established.

In order to verify the research hypothesis established based on the research model, empirical research analysis was conducted. The subjects of the study were random sampling, which is a non-probability sampling method, and the subjects were easily accessible by the researcher and those who had experience in shopping malls were selected. 117 questionnaire results were collected for those who experienced online and offline shopping malls. The

collected data were analyzed using IBM SPSS statistics 22.0. As an analysis technique, frequency analysis is performed to organize general characteristic samples, reliability analysis is performed to test the reliability of each variable, and factor analysis is performed to verify the construct validity of each variable, and regression analysis was performed to find out the influence between the variables using the representative values of each variable that secured reliability and validity. Through this, we analyzed how virtual reality technology affects customer behavior.

The analysis results of this study are as follows. First, as a result of analyzing the effect of sensory stimulation and emotional response of virtual reality technology on expected satisfaction, it was found that there was a positive influence in the order of i) immersion, ii) remote reality, and iii) sensory stimulation. Second, as a result of analyzing the effects of sensory stimulation and emotional response of virtual reality technology on intention to use, it was found that there was a positive influence in the order of i) pleasure, ii) immersion, and iii) product quality. Third, as a result of analyzing the effect of virtual reality technology's expected satisfaction on intention to use, it was found to have a (+) influence. Fourth, the independent variable that has a (+) effect on both the user's expectation satisfaction and intention to use is the user's emotional response variable, which is the degree of commitment. In other words, the degree of immersion affects the user's expected satisfaction and intention to use. Fifth, the independent variable that does not have a positive effect on both user's expectation satisfaction and intention to use is interaction as a user's emotional response variable. That is, interaction does not have a positive effect on expectation satisfaction and intention to use.

Considering the results of this analysis, the implications from a business management perspective are as follows. First, when using virtual reality technology, managers should continuously seek ways to increase customer satisfaction by stimulating the senses of buyers

and improving the sense of remote reality and immersion. Second, the CEO should devise a way to induce customers' interest, improve immersion through pleasure, and increase the intention to use the product by improving product quality. Third, empirical analysis showed that interaction did not affect expected satisfaction and intention to use. Virtual reality technology is used as a device to explain products in detail, and subscription inducement or mileage is used to improve access to shopping malls. It needs to be used side by side. The results of this study provides how to foster better relationship with customers by applying advanced technologies. In particular, adoption of technologies will help customers' decision making processes both via online and offline and enhance satisfaction and loyalty that are critical aspects for Customer Relationship Management (CRM).

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I. Introduction

Humanities have developed from the ancient times to modern society by inventing and creating new tools which many times aided in making our lives more convenient. We could name a few inventions that became a game changer to our society. From Tomas Jefferson's light bulb to Steve Job's Microsoft, new inventions made significant changes to our economical, cultural and social behaviors. We know the famous industrial revolutions that affected millions of death. First industrial revolution created the steam engine in 1700s. The second industrial revolution created electricity in 1800s. The third industrial revolution created computers in 1990s. An industrial revolution signifies a massive upheaval in technology and processes, which marks a newfound level of human productivity (Zoldan, 2021). Especially after the third revolution, the enormous potential brought in the development of a business, stimulated the appearance and promotion of new concepts, such as electronic business (e-business) and electronic commerce (e-commerce) and, over time, this has proved to be not only viable electronic alternatives, but also extremely profitable alternatives, of the traditional way of doing business or commerce (Apăvăloaie, 2014). When compared with previous industrial revolutions, the Fourth is evolving at an exponential rather than a linear pace: the possibilities of billions of people connected by mobile devices and possibilities multiplied by emerging technology breakthroughs in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing (Schwab, 2016). The technology evolution during industry 4.0 era is significantly impact on consumer behavior and Expectation (Ahmad, Masri, Chong, Fauzi, & Idris, 2020). In case of the United States, many of traditional brick-and-mortar businesses faced bankruptcy or face decline in their sales with the rise of click-and-mortar

businesses such as Amazon.com.

In fact, the future prospective of brick-and-mortar businesses is not promising as it is estimated that 100,000 brick-and-mortar businesses in the United States will shut by 2025 (Murphy, 2020). Brick-and-mortar (i.e., physical) businesses have adopted high-technology based services such as sensory marketing strategies in their businesses to enhance customers' satisfaction through experiences which also resulted in increase in sales. Furthermore, the rapid development of digital technology has led us to the 4.0 industrial revolution and the growth of Y generations (millennial generation) which caused changes in consumer behavior, especially in purchasing fashion products (Indah & Suryadinatha, 2019). In contrast to physical businesses, online businesses sell sensory products encountered limitation as customers cannot touch, smell, and taste products.

Based on the consideration above, this study investigates how customers experience high-technology offered in offline and online businesses in the environment of the 4th industrial revolution. As such, advanced technology is having a powerful impact on offline and online businesses. Therefore, this study aims to study how advanced technology provided by customers in offline and online business affects customer behavior in the environment of the 4th industrial revolution. Here, "high-tech" refers to the concept of virtual reality technology as follows. Mirror technology allows consumers to create a virtual model by uploading a digital image of themselves, offering them the opportunity to see how a product would look "on them" when they cannot physically test or see the product (Cho & Schwarz, 2012). The purpose of this study was to find the effect of virtual reality technology on customer behavior for customers using online and offline clothing stores to promote better customer relationship management through customers, to reduce the set of choices and considerations through sensory product experience. This study is characteristic in that there is little comparison of the

effects of sensory technology on customer satisfaction, intention to use, and behavior in previous studies. This study suggests the following research questions. i) How does the customer experience (using virtual reality technology) affect the customer's expected satisfaction and intention to use it?; ii) How does the strong mental stimulation (mental imagery) of virtual reality technology affect the customer's expectation satisfaction and willingness to use it?; iii) How does the telepresence of virtual reality technology affect the customer's expected satisfaction and intention to use it?; iv) How does the enjoyment of virtual reality technology affect the customer's expectation satisfaction and willingness to use it?; v) How does the interaction of virtual reality technology affect the customer's expectation satisfaction and willingness to use it?; and vi) How does an online (offline) experience of virtual reality technology affect on the customer's expected satisfaction and willingness to use in an offline (online) environment?

II. Literature Review

2.1. Experiential Marketing

2.1.1. Definition of Experimental Marketing

Experience is a concept that is unavoidable in contemporary marketing strategies to the point that almost all products and services are now sold as “experience.” (Batat, 2019). Schultz (2009) defines experimental marketing as a live event marketing experience where consumers have the opportunity to interact with a product or brand face to face. As a marketer, you provide stimuli that result in customer experiences: you select the “experience providers” (Schmitt, 1999). Modern economies have evolved from the delivery of commodities to the delivery of goods, from goods to services, and are in the process of evolving to the delivery of experiences; and the delivery of experiential market offerings involves engaging customers in a memorable

way (Petkus, 2004).

Experiential marketing is the process of identifying and satisfying customer needs and aspirations, profitably, engaging them through two-way communications that bring brand personalities to life and add value to the target audience (Smilansky, 2009). Experiential Marketing is the process of engaging customers with in-depth experiences of the product or a brand (Adeosun & Ganiyu, 2012). Experiential marketing is a strategy that uses the past experience of consumers, history records, experiences, and other ways to conduct product marketing strategies, such as blog marketing, social marketing, story marketing, database marketing, public-praise marketing, and so on (Wang, Wang, Chang, Yan, & Lin, 2014). Experiential marketing is about finding insights about people's passions and the connections which are created – naturally and uniquely – between them and the equity in the brands (Srivastava, 2008). Experiential Marketing focuses on customer experiences that evoke the senses (sight, smell, sound, touch & taste), heart and the mind (Shukla, 2007). The experiential approach seeks to identify behaviors (or attitudes or value sets) held in common across an audience whose demographic characteristics – the traditional basis of segmentation – might be quite diverse (Gautier, 2003).

Consumers feel engaged as a product/service for a sensory experience because their senses are effective in achieving their emotions (Pereira, Coelho, & Bairrada, 2016). Sensory marketing is beneficial for building brand value, including ensuring loyalty of standing customers as well as gaining new ones, building a successful brand and positive perception of the brand and product by users (Nadanyiova, Kliestikova, & Kolencik, 2018). It is increasingly geared towards providing pleasure and surprise to customers. The placement (color, secondary, graphic, placement, design, etc.) effect provided by the website triggers customer reactions and plays an important role in shaping customer attitudes (Kang, 2013).

2.1.2. Development of Experiential Marketing

Customer behavior evolved from rational choice to focus on irrational buying needs (Becker, 1976; Ariely, 2008). Howard and Sheth (1969) addressed that the buyer develops sufficient decision mediators to choose a brand which seems to have the best potential for satisfying motives for subsequent purchases, therefore, the probability of his buying that brand again is likewise increased. Conventional research, however, has neglected an important portion of the consumption experience (Holbrook & Hirschman, 1982). Traditional marketing is not psychologically based theory about customers and how they view and react to products and competition (Schmitt, 1999). The direction the revision might take is to replace the global rationality of economic man with a kind of rational behavior that is compatible with the access to information and the computational capacities that are actually possessed by organisms, including man, in the kinds of environments in which such organisms exist (Simon, 1995). The shift into today's experience economy – where experiences have become the predominant economic offering, the primary source of job creation and economic growth – comes with a number of implications that companies should keep in mind as they make the shift from commodity trading, manufacturing and service providing (or innovate wholly new businesses birthed in experiences) (Pine & Gilmore, 2013). Over the past twenty-five years, an alternative, information-processing approach to the study of consumer choice (e.g., Bettman, 1979) has argued that rational choice theory is incomplete and/or flawed as an approach for understanding bow consumers actually make decisions (Bettman, Luce, & Payne, 1998).

In today's tune-out culture, where the interruptive marketing strategies of yesterday have been rendered almost useless by consumers who can now tune you out, brands need more than a catchy jingle, an amusing TV spot, or a big budget to be noticed (Smith & Hanover, 2016). To provide personalized experiences, companies must create opportunities for customers to

experiment with and then decide the level of involvement they want in creating a given experience with a company (Prahalad & Ramaswamy, 2000). In addition, Yuan and Wu (2008) supports that experiential marketing induces customer satisfaction through experiential value. In the service sector, we can consider successful firms such as Starbucks, who have elevated the consumption of a routine commodity, coffee, to a memorable experience (Williams, 2006). Schmitt recommends to take five steps of customer experience management (CEM): i) analyzing the Experiential World of the Customer; ii) building the Experiential Platform; iii) designing the Brand Experience; iv) structuring the Customer Interface; and v) engaging in Continuous Innovation (Schmitt, CEM, 2003, p. 25).

This paper intend to apply the strategic experience module of Schmitt (1999).

Table 1. Application of Strategic Experience Modules (SEMs) (Schmitt, 1999)

Division	Contents
Sense	The SENSE module – or SENSE marketing – appeals to the senses with the objective of creating sensory experiences, through sight, sound, touch, taste and smell (Schmitt, 1999).
Feel	FEEL marketing appeals to customers' inner feelings and emotions, with the objective of creating affective experiences that range from mildly positive moods linked to a brand (e.g., for a non-involving, nondurable grocery brand or service or industrial product) to strong emotions of joy and pride (e.g., for a consumer durable, technology, or social marketing campaign) (Schmitt, 1999).
Think	THINK marketing appeals to the intellect with the objective of creating cognitive, problem-solving experiences that engage customers creatively (Schmitt, 1999).
Act	Act marketing enriches customers' lives by targeting their physical experiences, showing them alternative ways of doing things (e.g., in business-to-business and industrial markets), alternative lifestyles and interactions (Schmitt, 1999).
Relate	Relate marketing contains aspects of sense, feel, think and act marketing. However, relate marketing expands beyond the individual's personal, private feelings, thus relating the individual to something outside his/her private state (Schmitt, 1999).

2.2. Sensory Marketing

2.2.1. Definition of Sensory Marketing

According to Hultén, Broweus and Dijk (2009), sensory marketing is defined as an individual's perception of goods or services or other elements in a service process as an image that challenges the human mind and senses. Sensory marketing can be defined as 'marketing

that engages the consumers' senses and affects their perception, judgment and behavior (Krishna, Cian, & Sokolova, 2016). According to Krishna (2012), sensory marketing is marketing that engages the consumers' senses and affects their perception, judgment and behavior. As reported by (Hussain, 2019), sensory marketing is an innovative marketing strategy to stimulate a customer's relationship with a brand, which fosters an enduring emotional connection that optimizes brand loyalty. Explained by Simonson and Schmitt (1997), firm can use aesthetic output (total sensory experience- to see, hear, taste, smell, and feel) of its 'look and feel' strategically to create a variety of sensory experiences that will (1) ensure customer satisfaction and loyalty, (2) sustain lasting customer expressions about a brand's or organization's special personality and create irresistible appeal. Sensory marketing is based on a holistic approach towards the five senses and its aim is to provide customers with specific stimuli (Kuczamer-Kłopotowska, 2017). Sensory marketing is marketing through the five senses of taste, touch, sight, sound, and smell, which are the basis of forming perception and influencing consumer behavior (Lintelle, 2014). Retailers were among the first to use sensory marketing to influence consumer behavior – from providing background music in stores to diffusing a sensuous aroma – with the ultimate goal of enticing customers to stay in the store and shop longer, and buy more (Miller & Washington, 2012).

2.2.2. Development of Sensory Marketing

Figueiredo (2000) divides into four depending on the spectrum: commodity products, quasi-commodity products, "look-and-feel" goods and look-and-feel goods with variable quality. Figueiredo's (2000) "Dot-Com Retail Continuum" lists on one end of the spectrum the commodity products, for products where quality can easily be assessed, articulated, presented and perceived, on the other end, there are the "Look and Feel" goods with variable quality, for which the decisive element is the individual consumer's perception, not the product's

characteristics or the available information; In between the author also defines quasi-commodity and “Look and Feel” goods (Mityko, 2012). Ample evidence from behavioral studies and single-unit recordings in animals shows unambiguously that the brain is a multisensory processor in which inputs from different senses complement, modulate, and interact with each other (Thesen, Vibell, Calvert, & O’sterbauer, 2004). Moreover, recent progress in the field of human–computer interaction means that online environments will likely engage more of the senses and become more connected with offline environments in the coming years and this expansion will likely coincide with an increasing engagement with the consumer's more emotional senses, namely touch/haptics, and possibly even olfaction (Petit, Velasco, & Spence, 2018)

1) Visual factors (Sight)

Despite an average of six years of experience, bartenders were biased by the elongation of the glasses into which they poured (bartenders poured 20.5% more into short, wide glasses than tall, slender ones) (Wansink & Ittersum, 2005). Pharmaceutical companies usually distinguish their product by color and shape: i) Accudose tablets which treat thyroid conditions come shaped like a thyroid gland ii) On television ads, AstraZeneca promotes their leading anti-ulcer medication as the “purple pill.” (Lindstrøm, 2005).

2) Auditory factors (Hearing)

Sound has an immediate and, to a large extent, cognitively unmediated effect on recall and emotions, and activities such as listening to music, encourage the release of endorphins in the body, activating the very powerful pleasure centers of the brain (Gobe, 2001). More than 40 percent of consumers believe the cell phone sound-that is, the sound of its ring—is more important than the phone’s design (Lindstrøm, 2005). A sensorial sound strategy is used to

reinforce the identity and image of a brand, and sound, especially music, as sensory expressions, attach meaning to people and is a source of inspiration (Hultén, 2011).

3) Gustative factors (Taste)

16 percent of the Fortune 1000 brands could add taste to their brand platform, yet almost none have so much as given this a cursory glance (Lindstrøm, 2005). Taste of Colgate toothpaste is outstanding just like Bang and Olefson remote control machine, digital sound of Intel and white and red color of Coca-Cola (Maymand, Ahmadinejad, & Nezami, 2012). It is concluded that the formulated CSFs can help chefs in the development of new dishes and improvement of existing ones (Klosse, Riga, Cramwinckel, & Saris, 2004). Simply because a brand is strong, a Coca Cola drinker, for example, perceives it as different from other colas (Hultén, 2011).

4) Atmospheric factors (Smell)

More than 20 percent of consumers say that the smell of food is more important than the taste (Lindstrøm, 2005). Sense of smell is very close to our emotions and perfumes have great influence on our emotions, in fact smelling scent is sometimes accompanied with our emotional experiences and remember memorable images in mind of customer and create image of brand either for short term or long term (Maymand, Ahmadinejad, & Nezami, 2012). Holistic scheme of sensual universe. The sense of smell is related to pleasure and well-being and is closely connected to emotions and memories (Hultén, 2009).

5) Tactile factors (Touch)

Only a small 19 percent of consumers worldwide believe the look of an item of clothing is important than how it feels; Whereas a good half of them place the emphasis on feel rather

than appearance (Lindstrøm, 2005). Peck and Wiggins (2006) examined the process by which a touch element that provided positive sensory feedback influenced persuasion, and found that the persuasive effect occurred because of an affective or emotional response to the experience of touch. Glass Coca-Cola bottles are another brilliant example of appealing tactile senses through a curvaceous bottle that is pleasure to touch and hold (Gobe, 2001).

2.3. Neuro Marketing

2.3.1. Definitions of Neuro Marketing

Neuro marketing was preceded by both academic research and commercial attempts to employ neuroscience to provide answers to challenges in business practices, especially in advertising and marketing research (Ramsøy, 2019). Neuroscience helps to understand those hidden elements of the decision process (Singh, 2020). Neuromarketing can be used to decode these processes and convert advertising messages into a language that appeals to the different parts of the brain and motivates brand choices and other decisions (Zurawicki, 2011).

Neural responses of a small group of individuals predict the behavior of large-scale populations, and the finding suggests a novel way of connecting neural signals to population responses that has not been previously demonstrated and provides information that may be difficult (Falk, Berkman, & Lieberman, 2012). Shiv and Yoon (2012) submit that neuroscience can provide consumer researchers with a number of tangible benefits, and opportunities and guidelines to facilitate theoretical development and new empirical tests of standard theoretical claims. Neuromarketing has focused on this post-design application, in particular on measuring the effectiveness of advertising campaigns (Ariely & Berns, 2010). The essence of neuromarketing is the continued evolution of social cognitive neuroscience and its younger cousin, organizational cognitive neuroscience (Butler & Senior, 2007). Neuromarketing has

been described as ‘‘applying the methods of the neurology lab to the questions of the advertising world’’ (Thompson, 2003).

Recently, the International Journal of Psychophysiology called neuromarketing ‘‘the application of neuroscientific methods to analyze and understand human behavior in relation to markets and marketing exchanges’’ (Lee, Broderick, & Chamberlain, 2007). Neuromarketing and its precursor, neuroeconomics, use clinical information about brain functions and mechanisms to help explain what is happening inside of the “black box” so prevalent in many explanations of consumer behavior (Fugate, 2007). “Neuromarketing” loosely refers to the measurement of physiological and neural signals to gain insight into customers’ motivations, preferences, and decisions, which can help inform creative advertising, product development, pricing, and other marketing areas (Harrell, 2019).

2.3.2. Development of Neuromarketing

Having arrived at the view that the brain has a default mode of function through our analysis of activity decreases, Raichle and Snyder began to take seriously claims that there was likely much more to brain function than that revealed by experiments manipulating momentary demands of the environment (Raichle & Snyder, 2007). Neuromarketing can offer help on “what” particular messages engage the brain, but it’s less helpful on the “why.” (Jones, 2016).

1) Eye Tracking

The results from eye tracking combined with facial coding indicate the precise nature of gaze activity (where people look) and emotional response to a stimulus (how people feel about what they see) and, given adequate sample size, even to specific elements of the stimulus (Bove, 2008). EEG research proved that consumers were not influenced by the PL product price (Garczarek-Bąk, 2018). In another research conducted by Madlenak and Kianickova (2016), words represented triggers of subsequent actions, which the respondents carried out based on

the e-mail, but the message subjects listed the amount of discount did not capture a lot of attention. Color is the factor that influences customer behavior, but has found that current customers who are familiar with green products are concerned about the price (Mansor & Isa, 2018).

2) Gender

When watching the fixation cross of 1-minute, females produced in general considerably more delta and theta spectral power than males (highly statistically significant), and comparison of single scenes with respect to gender revealed clear differences when analyzing the spectral frequency content in all 17 brain locations (Dimpfel, 2015). However, the study conducted by Garczarek-Bak (2018) shows the eye-tracking study did not reveal differences between women's and men's esthetics sensitivity toward the presented PL products. Research conducted by Dunham (2012) shows that metallic labels outperform paper, especially among women.

3) Packaging

User packaging interaction (UPI) field has evolved with the aim to provide user-friendly packages, which support performing tasks such as, opening, handling, disposing, and checking-out (Mumani, 2018). Emotion of a product has influenced the user interaction and enhanced the value and quality (Alli, 2019). Neuromarketing brings in some heuristics on how to act for a better quality or for a better perceived quality, because most of the time the decision is taken before the service is delivered (Zielinski, 2016). Attractive packages induce specific cortical activity changes which are interestingly involved in areas related to visual attention and memory (group-level) as well as reward-related areas on single subject observation (Stoll, Baecke, & Kenning, 2008). Dunham (2012) examined shoppers' brainwave activity in real time

using two different label materials -- paper and metallic -- on three different popular canned products, and results showed metallic labels outperform paper, and pictures and branding information are particularly effective on metallic labels.

PepsiCo's Frito-Lay unit discovered that matte beige bags of potato chips picturing potatoes and other "healthy" ingredients in the snack don't trigger activity in the anterior cingulate cortex—an area of the brain associated with feelings of guilt—as much as shiny hags with pictures of chips (Burkitt, 2009). For Gerber baby products, a company used neuroscience in pre-design research to get a baseline assessment of the brand's existing packaging, and a company confirmed its strengths and limitations against the competition and identify opportunities for improvement (Young, 2011).

2.4. Adoption of technology for sensory marketing and measurement

2.4.1. Adoption of technology for sensory marketing

According to the Petit, Velasco and Spence (2018), a technology for sensory marketing can be categorized into two parts: common interfaces (mental imagery, sensory congruency, interactivity) and new sensory-enabling technologies (mental imagery, telepresence/ immersion, enjoyment, flow, interactivity, self-congruity, ownership, need for touch, curiosity).

1) Common Interfaces

Screen: Font, icon, picture, videos (color depth, size, position, dynamic) (Petit, Velasco, & Spence, 2018**).**

i) Mental Imagery

The Cian, Krishna and Elder (2014) propose that static visuals can evoke a perception of movement (i.e., dynamic imagery) and thereby affect consumer engagement and attitudes. In three studies conducted by Eelen, Dewitte and Warlop (2013) show that consumers' preference

of products that are easy to interact arises from the fit between product orientation and monitored situational constraints and highlight that motor fluency is a relevant cue for decision making when consumers assess how to interact with a product. In addition, a research conducted by Elder and Krishna (2012) demonstrates that visual product depictions within advertisements, such as the subtle manipulation of orienting a product toward a participant's dominant hand, facilitate mental simulation that evokes motor responses. Also, a new model proposed by Petit, Basso, Merunka, Spence, Cheok and Oullier (2016) facilitates this understanding observed consumer behavior and the success or failure of self-control in food intake and argues that bodily states and sensory information should be considered when modeling consumer behavior and developing health-related advocacy and communication campaigns.

ii) Sensory Congruency

The study conducted by Sunaga, Park and Spence (2016) examines how the lightness of packaging colors, and the location of products on a display shelf interact to affect consumers' purchase decision-making via perceived visual heaviness. In the study conducted by Velasco, Wan, Knoeferle, Zhou, Salgado-Montejo and Spence (2015), the study examined whether congruent (vs. incongruent) combinations of product packaging colors and flavor labels would facilitate visual search for products labeled with specific flavors. While it may be obvious that semantic knowledge concerning products, based on the packaging and/or design elements (e.g., typeface, logo, label, images), can guide the taste expectations that consumers generate in relation to a given product, here Velasco, Woods, Cheok and Spence (2016) demonstrate that there are also more fundamental correspondences that operate even with unfamiliar stimuli. Woods and Spence (2016) investigate whether pairs of colors (both associated with a particular

taste or taste word) would give rise to stronger associations relative to pairs of colors that were associated with different tastes. Spence and Deroy (2013) states the logic here being is that people also show robust associations between tastes (or taste words) and shapes.

iii) Interactivity

Song and Zinkhan (2008) identifies the determinants that enhance user perceptions of interactivity in a communication scenario in which consumers send instant messages to an e-store. In two studies conducted by Van Noort, Voorveld, and Van Reijmersdal (2012), the hypothesis was tested that a visitor's flow experience in a specific brand web site mediates the effects of interactivity on the number and type (web site vs. product related) of thoughts, on attitudes toward the brand and web site, and on several behavioral intentions.

2) New Sensory Technologies: 3D-interactive view, virtual try-ons, augmented reality (Petit, Velasco, & Spence, 2018).

i) Mental Imagery

Choi and Taylor (2014) examines the vividness of mental imagery as a mediator, and consumers' need for touch and product type as moderators of the effects and the vividness of mental imagery appears to directly influence attitudes and intentions by mediating the effects of 2D versus 3D. Empirical results of Huang and Liao (2017) revealed that three decorating psychological states (sense of body ownership, sense of ownership control, and self-explorative engagement) directly induced a multisensory flow experience.

ii) Telepresence/ Immersion

Employing the stimulus-organism-response (S-O-R) frame work made by Animesh, Pinsonneault, Yang and Oh (2011) investigate how technological (interactivity and sociability) and spatial (density and stability) environments in virtual worlds influence the participants'

virtual experiences (telepresence, social presence, and flow), and how experiences subsequently affect their response (intention to purchase virtual goods). Two experimental studies conducted by Klein (2003) evaluate the effect of two media characteristics - user control and media richness - on the creation of telepresence and assess the impact of telepresence on consumer beliefs about and attitudes toward the advertised product. The protocol analysis of Li, Daugherty and Biocca (2001) examines the content of virtual experience in e-commerce, as concurrently verbalized by a sample of 30 participants while interacting with four 3-D products. The research by Nah, Eschenbrenner and Dewester (2011) uses theories of flow, telepresence, positive emotions, and brand equity to examine the effect of using two-dimensional versus three-dimensional virtual world environments on telepresence, enjoyment, brand equity, and behavioral intention. Study conducted by Yim, Chu and Sauer (2017) evaluates the effectiveness of augmented reality (AR) as an e-commerce tool using two products — sunglasses and watches.

iii) Enjoyment

The proposed model of Kim and Forsythe (2008a) examined this dual role of sensory experience enablers in the online soft goods shopping process for three types of sensory enabling technologies that are widely applied in online retail sites. Kim and Forsythe (2008b) used focus group interviews and an online national survey to investigate online apparel shoppers' use of Virtual Try-on to reduce product risks and increase enjoyment in online shopping.

iv) Flow

Employing the stimulus-organism-response (S-O-R) frame work, Animesh, Pinsonneault, Yang and Oh (2011) investigate how technological (interactivity and sociability) and spatial

(density and stability) environments in virtual worlds influence the participants' virtual experiences (telepresence, social presence, and flow), and how experiences subsequently affect their response (intention to purchase virtual goods). Huang (2012) aims to examine the effects of interactive and social features on users' online experiences and their purchase intention of virtual goods from a social network site. Drawing on virtual liminoid theory, Huang and Liao (2017) aims to examine factors that induce a multisensory flow experience in an e-shopping context through the use of augmented-reality interactive technology (ARIT). Jiang and Benbasat (2004) discusses virtual control, a specific type of VPE implementation, and identifies its two dimensions: visual control and functional control, and visual control enables consumers to manipulate Web product images, to view products from various angles and distances. In a quantitative modeling framework, Novak, Hoffman and Yung (2000) develop a structural model based on previous conceptual model of flow that embodies the components of what makes for a compelling online experience.

v) Interactivity

The study conducted by Yim, Chu and Sauer (2017) revealed that immersion mediates the relationship between interactivity/vividness and two outcome variables — usefulness and enjoyment in the AR condition compared to the web condition where no significant paths between interactivity and immersion and between previous media experience and media novelty are found.

vi) Self Congruity

Merle, Senecal and St-Onge (2012) focuses on one form of IIT, the "virtual try-on" (VTO), and analyzes whether and, if so, how using a virtual 3D model to try on clothes influences cognitive, affective, conative responses to a retail web site, and underline the utmost

importance of model self-congruity and body esteem in increasing the impact of VTO on these responses.

vii) Ownership

The findings by Brengman, Willems and Kerrebroeck (2019) reveal that AR does indeed result in higher levels of perceived ownership, particularly in case of material products.

viii) Need for Touch

As the use of a touch screen device (i.e. smartphone vs. laptop) has previously been found to positively affect feelings of perceived ownership, the study by Brengman, Willems and Kerrebroeck (2019) examines whether the possibility to virtually manipulate a product on a mobile AR application would have an even stronger effect.

X) Curiosity

Beck and Crié (2018) aims to highlight the effects of an online VFR on consumer's exploratory behavior and intention to purchase, both online and offline contexts and results showed that the presence of such a tool significantly increases specific curiosity about the product, intention to patronize (online and offline) and intention to purchase (online and offline).

2.4.2. Sensory Measurement

1) Descriptive Analysis

All descriptive analysis methods involve the detection (discrimination) and the description of both the qualitative and quantitative sensory aspects of a product by trained panels of 5–100 judges (subjects) (Meilgaard, Carr, & Civille, 2015). Descriptive analysis methods aim to identify and quantify the sensory attributes of products, and this type of

assessment can be either absolute for a single product (e.g., quantitative descriptive analysis, flavor profile method) or relative to other products (e.g., flash profiling, napping) (Haase & Wiedmann, 2018).

2) Discrimination Testing

Sensory Discrimination Test: The decision rules that assessors use to formulate their responses in forced-choice or category-scaling tests differ from one test method to another (Meilgaard, Carr, & Civille, 2015). Discrimination testing focuses on differences between two or more products.

This type of comparison can be limited to overall perception (e.g., duo-trio test, "A"–"not A" test) or amplified to include specific sensory attributes (e.g., paired comparison test, ranking; Meilgaard, Carr, & Civille, 2006) (Haase & Wiedmann, 2018). Discrimination tests are suitable for distinguishing between confusable stimuli, but the problem is one of getting a judge who can discriminate between two stimuli to report (O'Mahony & Rousseau, 2003). However, rigorous discrimination testing to eliminate these nondiscriminators may unduly eliminate a large proportion of the respondent population (Moskowitz, Jacobs, & Firtle, 1980).

3) Hedonic Testing

Hedonic tests examine the acceptance of, or preference for, products as a whole (e.g., hedonic scale, paired comparison test) or concerning specific sensory attributes (e.g., just-about right scale; Meilgaard, Carr, & Civille, 2006) (Haase & Wiedmann, 2018). For measuring product liking and preference, the nine-point hedonic scale is probably the most useful sensory method (Stone & Sidel, 2004). The main characteristics of the hedonic scale are that each category is associated with a verbal descriptor from "dislike extremely" to "like extremely" and that the scale has a neutral category "neither like nor dislike" (Meullenet, 2004). A mean

liking score of 7 or higher on a nine-point scale is usually indicative of highly acceptable sensory quality; hence, a product achieving this score could be used confidently as a good illustration of 'target' quality (Everitt, 2009).

4) Sensory Perception Item Set (SPI)

The authors have the goal of addressing this deficiency and provide an initial approach to develop a holistic scale to capture sensory perception, which considers all five sensory dimensions (i.e., visual, acoustic, haptic, olfactory, and gustatory perception) in a consistent manner and not limited to a specific industry (Haase & Wiedmann, 2018).

2.5. Customer Relationship Management (CRM) and Application of Technology

2.5.1. CRM Concept and Features

1) Definition of CRM

Customer Relationship Management was often used as a marketing tool to promote its brand and sales (Rouse, 2020). The objective of CRM is to build customer loyalty by creating and maintaining a positive attitude toward the company (Magasi, 2016). CRM (Customer Relationship Management) refers to the integration of marketing and high-quality services through information technology with the aim of increasing the customers' satisfaction and loyalty to achieve the purpose of increasing business efficiency (Wang, 2008; Wang, Wang, Chang, Yan, & Lin, 2014). Customer relationship management is moving to be an integral part of the marketing management function (Aaltonen, 2004). Integration of the internet and database marketing enhances the effectiveness of customer relationship management practices, and customer information gathered through the internet can be used to improve customer relationship management through the strategies that derived from the integration of internet and database marketing to improve customer relationship management (O'Leary, Rao, & Perry,

2004).

Customer Relationship Management (CRM) is emerging as a new business strategy and has become a hot issue among scholars and marketing executives (Heinonen, 2014). CRM is defined as a strategic approach that combines people, organizational processes, and information technology (IT) to build and improve relationships with profitable customers and segments (Chen & Popovich, 2003). CRM unites the potential of relationship marketing strategies and IT to create profitable, long-term relationships with customers and other key stakeholders (Payne & Frow, 2005). Customer Relationship Management (CRM) is premised on the belief that developing a relationship with customers is the best way to get them to become loyal and that loyal customers are more profitable than non-loyal customers (Dowling, 2002). CRM is a management approach that enables organizations to identify, attract and increase retention of profitable customers by managing relationships with them (Hobby, 1999).

2) Features of CRM

Looking at customer culture by era, the post-1950s can be seen as a mass consumer society following on an early twentieth-century stage of mass consumption and mass production (Trentmann, 2011). Wahab and Ali (2010) provide an overview of relationship marketing (RM) and how it evolves to customer relationship management (CRM): “since 1980s, relationship marketing represents an emerging school of marketing thought, which offers an essential framework for understanding, explaining, and managing the relationships” (Khalili, 2005; MacMillan, Money, Money, & Downing, 2005; Rao & Perry, 2002).

CRM systems were also essential to support the move towards more customer-centric management strategies adopted at the start of the 1990s (Webber, 2013). The evolution from data dispersion through data organisation and data ownership toward data sharing is well in tune with the shift from viewing customers as passive to reconsidering them as active partners

(Prahalad & Ramaswamy, 2004a; Prahalad & Ramaswamy, 2004b). The reconfigured role of customer data, together with both public and private initiatives to give customers more access to their own data, have major implications for public policy as well and customer data sharing opened new business and service opportunities (Saarijärvi, Karjaluoto, & Kuusela, 2013).

As a result, customer management was centered on the IT technology team. The emergence of the Internet in the mid-1990s significantly changed the CRM market (Simmons, 2015). Digitalized CRM helped management track customers' interactions with the organization and allows the organization's employees to pull up all past information about the customers (Tinnsten, 2013). CRM strategy, which is a customer centric business strategy, fits best with customer intimacy value discipline because both CRM strategy and customer intimacy value discipline aim to develop long lasting profitable relationships with customers (Nasir, 2015). The resources expended and the opportunities to manage the customer and the channels will grow if information systems and the decision-support capabilities are driven by a multi-departmental or multi-business unit view, which means an enterprise approach to extracting and transforming information systems into a customer-centric info-structure (Swift, 2000).

Table 2. Changes in the Times of Customer Management (Yoon & Kim, 2006)

Division	Sale	Client Satisfaction	DB Marketing	Customer Relationship Management
Year	1970s	1980s	1990s	Late 1990s
Customer Perspective	Passive buyer	Optional buyer	Individualized/Diversified Buyers	Active buyer
Relationship with customers	One-sided supply to the entire market	Customer satisfaction measurement, one-way relationship	One-way relationship with grouped customers	Interactive communication with individual customers
Customer management	Focused on simple sales	Sales and sales-oriented	Focused on IT technology team	Enterprise management

Database marketing got started in the mid 1980s, and it was possible to store information about customers, and use the information to build lasting relationships with them (Hughes, 2021). A detailed look at the characteristics of CRM is as follows. First, measuring customer loyalty can accurately gauge the weaknesses in a company's value proposition and help to prescribe a cure; therefore, providing customers with ongoing value, catering to their individual needs, and making sure that customers get what they want when and where they want it is critical in today's super-fast, hyper-competitive market (Trepper, 2000). Second, CRM focuses on comprehensive and company-wide management innovation and seeks to realize long-term profits through management improvement (Song, 2002). Third, Kumar and Reinartz (2006) emphasizes the utilization of database marketing and developing communications strategies in order to build strong and profitable customer relationships. Fourth, CRM does not simply focus on marketing but is a management method that pursues balanced improvement in all areas necessary for customer relationship management (Choi & Yoo, 2001).

2.5.2. Introduction of e-commerce and e-CRM

1) The definition of e-commerce

E-commerce on the Internet is developing rapidly, primarily due to the phenomenal growth of WWW (Kini & Choobineh, 1998). The advent of the World Wide Web represents a turning point in electronic commerce, allowing organizations to achieve better economies of scale and scope (Holsapple & Singh, 2000). As a result, e-commerce has revolutionized business, changing the shape of competition with internet (The NET), the computer communication network creating an e-commerce market place for consumers and business (Gupta, 2014). The impact of Web 2.0 on e-commerce can be seen in both business outcomes and social interaction among consumers (Huang & Benyoucef, 2013). We have come across an adaption of the second meaning in the field of electronic commerce, and the vision of this

branch of computer science is to build and enable technologies allowing to perform maintenance, provide services, or advertise, sell and even distribute commercial products through global computer networks like the Internet (Gartner, Pagnia, & Vogt, 1999).

The rapid development of e-commerce creates problems for firms trying to develop e-commerce strategies. Electronic commerce has the potential to radically alter some economic activities and the surrounding social environment, and these changes require new frameworks for conducting business and pose new challenges to policy makers (Colecchia, 1999). Today, the dust has settled and many of the promising new e-commerce companies have failed or are struggling for economic survival (Delfmann, Albers, & Gehring, 2002). Kao and Decou (2003) believe that observed frequency of failures of e-commerce ventures may be due to lack of planning. Electronic Commerce (E-Commerce) has become a popular topic for business and academic research since the early 1990's, and different researchers focus on different areas: applications, services, marketing, strategy, the Internet, extranets and technologies in E-Commerce, to name but a few (Chan & Swatman, 1999).

Therefore, since E-commerce can be viewed from different perspectives by different people (Poong, Zaman, & Talha, 2006), experts are defining various concepts for e-commerce. i) Qin (2009) defines E-commerce refers to various online commercial activities focusing on commodity exchanges by electronic means, Internet in particular, by companies, factories, enterprises, industrial undertakings and consumers. ii) Wigand (1997) defines that electronic commerce denotes the seamless application of information and communication technology from its point of origin to its endpoint along the entire value chain of business processes conducted electronically and designed to enable the accomplishment of a business goal. And, iii) Tatsiopoulos, Panayiotou and Ponis (2002) refers to e-commerce as the undertaking of normal commercial, government and personal activities by computers and telecommunication

networks and constitutes of a wide variety of activities involving the exchange of information, data or value-based exchanges between two or more parties. iv) Meng (2009) defines e-commerce as a whole business activities process using electronic tools, especially internet, to realize Commodity exchanging in high efficiency and low cost. v) Storey, Straub, Stewart and Welke (2000) defines electronic commerce as activities that directly support commerce by means of electronic (networked) connections and redefines the very foundations of competitiveness in terms of information content and information delivery mechanisms.

On the other hand, electronic services emerged as a concept different from e-commerce. Scupola (2008) defined that e-services can be conceptualized as a subset of e-commerce. And, Jahanshahi, Mirzaie and Asadollahi (2011) defined M-Commerce as activity of conducting E-commerce transactions using mobile terminals over a wireless network. Based on the definition of the concept of e-commerce and e-service by experts, this study intends to define e-commerce as follows. Considering that e-commerce is a business transaction between economic actors, it is intended to define business through computer and communication networks between companies, customers, and governments as e-commerce.

2) Function of e-commerce

Unlike conventional commerce, the functions of e-commerce transactions target cyberspace, so there are various functions that cannot be found in existing transaction systems.

First, e-commerce can reduce transaction costs compared to traditional commerce (Wigand, 1995). Electronic channels are more attractive to customers (or consumers) since they offer reduced transaction costs: the overall transaction costs for the consumer were lower although the processes involved in e-commerce transactions (e.g., in coordination and logistics) might have been more complex (Alt, 2017). Electronic commerce decreases distribution costs through a reduction in overhead such as inventory, retail space, and personnel (Fruhling &

Digman, 2000). In addition, advertising costs also may be lower for e-firms: purchasers worldwide are now able to use such search engines to locate sellers and products in a matter of seconds, whereas firms without websites primarily rely on newspaper, television, and radio advertising to attract customers (Willis, 2004).

Not only there are substantially more negotiations in e-commerce than in more traditional forms of commerce because it is much easier for e-commerce sellers to sell to different customers but also buyers have more choice of where to buy (Vulkan, 2003). The use of the online system has made the buyer and seller safer, and the challenge of making economic decision in online businesses can be overcame by the asymmetric information through the use of knowledge management principles (Arbi, Kausar, & Salim, 2017). Technological innovation lowers barriers to entry, once specialized products and services become commodities, every market is suddenly crowded (Kostojohn, Johnson, & Paulen, 2011). Many businesses are making the transition to integrated e-commerce business operations in the expectations of lowering operational costs and significantly improving the level of their service offerings (Kumar & Peterson, 2006). In other words, in Internet e-commerce, middlemen are excluded, and shopping mall operation costs are low, and as a result, products can be provided to consumers at low prices (Mantel, 2001; Moore, 2001; Carabello, 2001).

3) Characteristics of e-commerce

In recent years, by fast growth in information technology and communication and more important of it, developing Internet, we are observing changes in conditions and the method of process and experience new inventions every day and one of them is electronic-commerce (Marzangou, Ghorbani, Vandi, Khodami, Saadati, & Aminian, 2014). In contrast to traditional retail, most e-commerce activities are handled virtually during pre-purchase (i.e., information search), purchase, and post-purchase (i.e.,

feedback and after-sales service) stages (Ayob, 2021). First, as the distribution channel is simplified from the fourth stage of traditional commerce (company→wholesale→retailer→consumer) to the second stage of e-commerce (company→consumer), it is changed to a one-to-one transaction between companies and consumers (Bowles, 2021). In other words, in e-commerce, consumers can purchase products directly for companies through a network or the Internet, which simplifies distribution channels (Song, 2016).

Second, a basic fact of Internet retailing is that all retail websites are created equal as far as the "location, location, location" imperative of success in retailing is concerned and no site is any closer to its web customers and competitors offering similar goods and services may be only a mouse click away (Goel, 2007). In other words, business activities can be carried out 24 hours a day, regardless of time and space, thus expanding the scope of business and consumer activities (Moon, 2020). E-commerce, the electronization of the traditional commerce, is the commercial activity carried out by making use of the electronic information technology and the fundamental patterns of e-commerce match those of traditional commerce (Qin, 2009). Third, in the case of customer information acquisition, in traditional commerce, salespersons acquire customer information through market research, but e-commerce can be obtained from time to time through online, and one-on-one interactive marketing can be performed through two-way communication (Internet). (Samsung Economic Research Institute, 1997). Fourth, the Internet has fundamentally changed the competition environment of firms, offering business and consumers an increasingly powerful channel to acquire product quality, price, and demand information (ex. with the fast adoption of web 2.0 driven user communities and the prevalent implementation of online reviews, a large number of consumers resorting to use these consumer generated media to voice their opinions on the products they have purchased) (Hu, Dow, Chong,

& Liu, 2016). Fifth, in the case of required capital, traditional commerce requires a lot of initial capital such as land and buildings, but Internet e-commerce requires relatively little cost to build an Internet server and homepage (Samsung Economic Research Institute, 1997).

4) Types of e-commerce

i) B2C

The term e-commerce refers to all online transactions, but B2C stands for "Business-to-Consumer" and applies to any business or organization that sells its products or services to consumers over the Internet for its own use (Nemat, 2011). A look at the definition of the concept of experts on such B2C e-commerce is as follows. Kumar and Raheja (2012) defines B2C commerce as activities of business serving end consumers with products and/ or services. In addition, Gong (2009) defines B2C (business-to-consumer) as retailers' selling of goods and services to consumers via the internet, a web medium, whereby the payment is made online through the web platform. Furthermore, the importance of B2C e-Commerce with its ties to the internet are defined by IBM (2001): the use of Web-based technologies to sell goods or services to an end-consumer. As powerful and transformative as use of Internet infrastructure is, Rose, Khoo and Straub (1999) showed that technological limitations can affect the advancement and development of commercial activities taking place over the Web and the Internet. For example, Internet and the World Wide Web have amended the business competitions and tailored the Business-to-Consumer (B2C) relationship by introducing an innovative retailing platform that provides for electronic one-on-one communication with the customers (Sheikh & Basti, 2015). The number of Internet users is growing; therefore, the influence of e-commerce stretches farther and the infrastructure is necessary to take full advantage of Internet in B2C e-commerce (Terzi, 2011). These two simple factors have affected the development of e-commerce, over the last decade in the three studied geographical areas namely the USA, China, and the

European Union (Drigas & Leliopoulos, 2013). B2C e-commerce is now being used not only in retail, but also in four main areas of logistics operations: transportation planning and management, warehousing, packaging, and distribution network design (Mangiaracina, Marchet, Perotti, & Tumino, 2015). In the future, the direct (short-term) mobility effect of B2C e-commerce spreading from retail to logistics is relatively clear, and an overall increase is expected in both individual travel and freight transport (Visser & Lanzendorf, 2004).

ii) C2C

C2C (Consumer-to-Consumer) e-commerce is a revolutionary and popular model of e-commerce, where consumers form a market to sell and buy products online (Chu & Liao, 2007). The consumer to consumer (C2C) e-commerce market is a global online marketplace offering convenience, easy choice, competitive price, and access to a broad range of merchandise (Jing & Peng, 2010). In recent years, with the development of the Internet, e-commerce grew rapidly (Piao, An, & Fang, 2007). Digitalization is strongly shaping the nature and content of C2C commerce, and through various C2C e-commerce platforms, consumers are given efficient and convenient access to an affordably priced assortment of product categories such as clothes, accessories, electronics, sports equipment, furniture, and home decorations (Yrjölä, Rintamäki, Saarijärvi, & Joensuu, 2017). For example, consumer-to-consumer (c2c) e-commerce is becoming popular and may have important implications for mobility and c2c e-commerce led to an increase in both personal travel and freight transport (Weltevreden & Rotem-Mindali, 2009).

C2C e-commerce is a growing area for interactions, and ultimately, transactions and both trust of the seller and risk of the seller influence the buyer's attitude towards purchasing, but the risk is not found to be an influence the seller's attitude towards selling (Leonard, 2012). Satisfaction with merchants and trust in platform providers were factors that directly affected

repurchase intention, while perceived quality of merchants, perceived quality of platform providers, perceived value, and trust in merchants were factors that affected repurchase intention indirectly (Shihab, Maulana, & Hidayanto, 2018). In particular, social capital variables can be used to effectively measure the cyber credit of online sellers in C2C businesses (Liang, Jiang, Lin, Ning, & Jia, 2016).

iii) G2B

E-government is not simply a question of putting thousands of government forms or reams of information online, it involves governments making systematic use of technology to better serve citizens and businesses while at the same time improving the efficiency of governmental functions (Awan, 2007). With the advancement of Internet and Web technologies, e-government sites have been evolving from the pure information-sharing phase to interactive, transactional, intelligent or integration phases for better serving the constituencies (Zhao, Truell, Alexander, & Davis, 2007). Government-to-Business (abbreviated G2B) is the online non-commercial interaction between local and central government and the commercial business sector, rather than private individuals (G2C) (Nemat, 2011). G2B interactions concern relationships between the public authority and for-profit tourism-related businesses including transportation, hospitality, catering, entertainment, and other service providers that operate within the jurisdiction of this authority (Kalbaska, Janowski, Estevez, & Cantoni, 2017).

In addition, Government-to-Business (G2B) e-services involve information distribution, transactions, and interactions with businesses in various aspects through e-government web sites (Lu, Shambour, Xu, Lin, & Zhang, 2010). In other words, the business services offered include obtaining current business information, new regulations, downloading application forms, lodging taxes, renewing licenses, registering businesses, obtaining permits, and many others (Alshehri & Drew, 2010). And, Government-to-Business (G2B) e-service involves

information distribution, transactions, and interactions with businesses in varying ways through e-government Web sites (Shambour & Lu, 2011). Online presence of information for businesses about government include services and forms online and databases to support businesses transactions with government (Reddick, 2004). This kind of interaction through G2B is changing the relationship between government and business, therefore, it changes the relationship between government and business from rule-based to trust-based regulation, the main reason because it can reduce the transaction (or implementation) cost of the regulation (den Butter, Liu, & Tan, 2012). The effect of trust on user satisfaction in the relationship between government and business is evidenced by e-G2B system efficiency measurements (eg, system quality, service quality and information quality) and operational efficiency (Santa, MacDonald, & Ferrer, 2019).

iv) G2C

G2C government emphasizes how to benefit the citizen and that citizens should be able to access government services in electronic forms by using a friendly interface and from a one-stop point, i.e. delivering multiple services from one single point or one single contact, which is not a feature of traditional methods (Alzahrani, 2011). Electronic service consumption involves several stages that range from simple information provision to interaction and transaction services: information on what the service is, what-is-required, where-to go or who to contact in order to receive additional information about the service (information), downloading and submitting application forms for public services (contracting), handling a complete service (transaction) and citizen relationship management or complaints management (aftercare) (Pappa & Stergioulas, 2006). Although the Internet offers safe and convenient new ways to provide G2C services at any point of time, online payment security issues have become one of the most important concerns of today (Jeberson, Singh, & Sahu, 2011). One of the major

challenges of the governments are the citizens‘ acceptance to the e-Government (G2C) systems and having interest in using the services, because people do not have the strong bond of trust when it comes to online technologies because of fear of security breaches (Marzooqi, Nuaimi, & Qirim, 2017). Elgarah and Courtney (2002) propose a web-based system to support citizen participation as a new way to facilitate and integrate citizen input into all stages of public decision processes.

The level of interaction between e-government and citizens depends on the efforts of e-government. Špaček, Csótó2 and Urs (2020) state that the current situation in digitalization of the core administrative services for citizens (G2C) may be determined by the national approach to e-government policy and coordination of the e-government policy, the level and readiness of legislation for digitalization and the way the service delivery is organized, regardless of technology. Jing and Wenting (2014) said that perceived online service quality has a great influence on citizens' satisfaction with e-government services.

v) Definition of e-CRM

CRM is a management approach that enables organisations to identify, attract and increase retention of profitable customers, by managing relationships with them (Adebanjo, 2003). While implementing CRM is certain to involve the deployment of new technologies, it requires a re-examination of business processes, which should lead technology decisions, and not vice versa (Bradshaw & Brash, 2001). The deployment of new technologies gives an insight into the rate of growth of CRM applications (e-CRM) (Adebanjo, 2003). E-CRM applications have the power to create an enormous amount of value by allowing companies to collect, organize, and disseminate a wealth of customer information, so, the e-CRM concept is designed to understand who the customers are and the products that are of interest to them - only then is

it possible to provide them with the products and services they want (Pan & Lee, 2003).

e-CRM refers to the marketing activities, tools and techniques, delivered over the Internet (using technologies such as Web sites and e-mail, data-capture, warehousing and mining) with a specific aim to locate, build and improve long-term customer relationships to enhance their individual potential (Lee-Kelley & Gilbert, 2003). The most effective e-CRM implementations gather data gradually from a customer as they become more comfortable with sharing information (Fairhurst, 2001). The importance of effective CRM implementation is intensified in the e-business environment since customer loyalty is much more difficult to establish in this domain (Kımıloğlu & Zaralı, 2009).

2.5.3. CRM and e-CRM Technology Comparison

1) Comparison between CRM and e-CRM

The CRM framework can be divided into two: operational CRM and analytical CRM (Berson, Smith, & Thearling, 2000). Basically, operational CRM refers to the automation of business processes, whereas analytical CRM refers to the analysis of customer characteristics and behaviours so as to support the organization's customer management strategies (Ngai, Xiu, & Chau, 2009). The internet is advancing e-CRM, and it provides features that are attractive to customer and business organization, so the difference between CRM and e-CRM is very delicate but important (Farooqi & Dhusia, 2011).

First, in terms of customer data, data warehousing is the main customer data in CRM, whereas e-CRM is that the web house on an internet website is the main customer data (Pan & Lee, 2003). Data warehousing technology makes CRM possible because it consolidates, correlates and transforms customer data into customer intelligence that can used to form a better understanding of customer behavior (Chen & Popovich, 2003). In order to developing a common customer database across the business, the company decided to invest in a web-

enabled e-CRM solution, and the system requirements included ability to enable several concurrent users and queries, maintenance of customer details and contact history as well as storage of contractual and legal documentation alongside customer records (Adebanjo, 2008).

Second, in terms of customer characteristics analysis, CRM is the main content of transaction analysis, with customer attitude and past transaction details, whereas e-CRM includes customer attitude and past transaction details as well as exploratory behavior of customers (Pan & Lee, 2003). The typical information collection methods present of CRM are mainly transaction database, customer service database and survey to get customer history, and firms using CRM systems typically consider transaction data on purchase frequency as a measure of behavioral customer loyalty, an important predictor of customer value (Stringfellow, Nie, & Bowen, 2004). E-CRM is able to provide all facets of customer interaction like sales, marketing, and customer service through the web, paying attention to a customer through online services, checking order status, reviewing the purchase date, requesting additional product information, sending emails, and capturing data in one place and integrating it absolutely throughout various departments and processes (Ebrahimi, 2019). Third, in terms of customer service, CRM is a target marketing method, whereas e-CRM is a one-to-one marketing method (Pan & Lee, 2003). Ahn, Kim and Han (2003) provide a comprehensive review of CRM and marketing data sources that because companies are changing to customer-oriented strategies and marketing environments are changing repeatedly, mass marketing of the past is now changing into one-to-one marketing via target marketing. Technology has a vital role to play in e-CRM as it has potential to deliver the foundation for one-to-one marketing, and heightened use of up-to-date technologies will assist hoteliers in their efforts to integrate CRM systems in their online operations although technology is only an “enabler” of e-CRM (Luck & Lancaster, 2003).

Table 3. The differences between CRM and e-CRM (Pan & Lee, 2003).

Division	Customer Data	Analysis of Customer Characteristics	Customer Service
CRM	Data Warehouse - Customer Information - Transaction History - Products Information	Transaction Analysis - Customer Profile - Past Transaction History	Target Marketing - Static Service - One-way Service - Time and Space Limit
e-CRM	WebHouse - Customer Information - Transaction History - Products Information - Click Stream - Contents Information	Transaction Analysis - Customer Profile - Past Transaction History Activity Analysis - Exploratory Activities (Navigation, shopping cart, shopping pattern, etc.	1-to-1 Marketing - Real Time Service - Two-way Service - At Any Time - From Anywhere

The IT enabled CRM is also known as E-CRM (or eCMR) meaning electronic customer relationship management (Bezhovski & Hussain, 2016). In addition, CMR and e-CRM in terms of customer contact channels, customer request processing, cost, online service response, and time and spatial range are as follows (Pan & Lee, 2003).

Electronic customer relationship management (e-CRM) involves the integration of web channels into the overall enterprise CRM strategy with the goal of driving consistency within all channels relative to sales, customer service and support (CSS) and marketing initiatives (Chen & Chen, 2004). In contrast, CRM is a business strategy for acquiring and maintaining the right customer over the long term within this frame work a number of channels exist for interacting with customer one of these channel is electronic and has been labeled e-commerce or e-business, and this electronic channel does not replace the sales force, call centre or ever the fax (Greenberg, 2001, as cited in Farooqi & Dhusia, 2011). Second, implementation is longer and management is costly in CRM because the system is situated at various location and on several servers, but e-CRM has reduced time and cost in system implementation and

expansion as it can be managed in one location and on server (Chandra & Strickland, 2004). Furthermore, in contrast to CRM, e-CRM can save time and effort, and reduce administrative and operational costs that directly impact sales performance, by offering a lower price and improving the quality of consumers' interaction, which is not limited to time and space, since the interaction can be carried out 24 hours a day without the need for direct company involvement (Bugaje,2015; Jih, 2011; Hamid, 2005, as cited in Farmania, Elsyah, & Tuori, 2021).

In summary, compared to CRM, e-CRM enables real-time customer orientation analysis and personalizes one-on-one marketing and marketing strategies (Pan & Lee, 2003). The initial introduction cost is high, while the ongoing management and maintenance cost is low (Chandra & Strickland, 2004). It also has the advantage of being free from local and time constraints (Kim & Lee, 2005).

2) Technology comparison between CRM and e-CRM

CRM technologies support front-office customer-facing processes such as call centre management, customer service, sales force automation and marketing strategy automation (operational CRM) as operational tools, and CRM software apply statistical and/or data mining techniques to analyse customer data generated through operational CRM and provide insight for strategic decision making (analytical CRM) as analytical tools (Abdul-Muhmin, 2012). Operational System technology refers to technologies that occur through customer contact, and Decision Support System technology refers to technologies related to decision support systems (Kim, 1999). In other words, it can be said that Operational System technology refers to customer management technology, and Decision Support System technology refers to customer analysis technology (Kim, 2001).

i) CRM technology

Using digital technology to manage voice, web, interactive TV, email, mobile, and fax-originated messages, contact centres enable customers to complain about a product performance and related experience, seek product-related advice, make suggestions regarding product or packaging development, product-related advice, and comment about an action or development concerning the brand as a whole (Baines, Fill, & Page, 2013). Here, digital TV refers to a TV that has an accurate and free information processing function with the addition of memory or calculation functions (Korea University Korean Dictionary, 2021). In addition, the customer center refers to a facility (Naver Korean Dictionary, 2021) that is in charge of consulting related to goods or services for the convenience of customers.

Technologies for customer analysis include data warehouse and data mining, and the data warehouse is a collection of subject-oriented, integrated, and temporal data to support the corporate decision-making process (Inmon, 2011). In addition, data mining (knowledge discovery in databases, KDD) is the field of discovering novel and potentially useful information from large amounts of data (Baker, 2010). Benefiting from technologies such as data warehousing, data mining and other CRM tools, businesses can seize opportunities of working on relationship marketing concepts (Sedighi, Mokfi, & Golrizgashti, 2012).

ii) e-CRM information technology

eMarketing channels such as e-mail, mobile, call centers, and IM and chat rooms are great for helping organizations and companies communicate (Stokes, 2012).

Sales force automation (SFA) has offered technological support to sales people and managers since the beginning of the 1990's (Buttle, 2005). The biggest advantage of SFA is that it aims to organically combine individual sales through the network as if they were operating across the team (Shin, 2002).

E-CRM refers to CRM using internet technology plus a database, OLAP, data warehouse,

data mining, etc. (Wang, 2008). First, data from the web can be stored into a DSDB such as a data warehouse, in order to be explored by on-line analysis or data mining techniques (Darmont, Boussaid, & Bentayeb, 2007). Second, web data mining is a process of discovering useful information or knowledge unknown in advance from web data by using data mining techniques to automatically discover and extract information from web documents and services (Kosala, 2000). Third, On-Line Analytical Processing can be said to be a process in which the end-user directly accesses multidimensional information, analyzes the information interactively, and utilizes it for decision-making (Cho & Park, 1996). OLAP is a user interface tool that can quickly search databases and data (Kim, 2001). Fourth, recommender systems are personalized tools used by ecommerce sites to proactively suggest products to customers to help them make purchase decisions (Lu & Lihua, 2005). This recommendation system is a personalization engine that personalizes the experiences of all customers, sets a unique message to individual customers, and is in charge of providing them (Shin, 2001).

2.5.4. Success factors of e-CRM and information technology

1) Success factors of e-CRM

Companies that are successful in their e-CRM implementations experience a wide range of improvements in measures ranging from customer satisfaction to cost reductions, from fine-tuned and targeted marketing strategies to technological or functional optimization of business processes (Kımıloğlu & Zaralı, 2009). The critical success factors of e-CRM implementation to the small and medium enterprises (SMEs) include operational and strategic benefits, top management support, technological readiness, and knowledge management capabilities (Ali, Ishaya, & Hassan, 2015). Four factors (access to information, service, security and trust) can affect and improve customer satisfaction in e-commerce if the customer can easily find the information needed, provide friendly service, provide a sense of security and a sense of trust

(Zatalini & Pamungkas, 2017). Service quality has a significant, positive influence on behavioral intentions through the customer satisfaction (Tran & Le, 2020). In turn, customer satisfaction was found to have a significant effect on trust (Kassim & Abdullah, 2010). Therefore, the quality of service, trust and privacy, through customer satisfaction, significantly affects the success of E-CRM systems (Dehghanpouri, Soltani, & Rostamzadeh, 2020). From the customer point of view customers' satisfaction, customer profitability, customer trust and commitment were the strong predictors of successful eCRM (Salameh, Hatamleh, Azim, & Kanaan, 2020). The results emphasize on the importance of customer orientation dimensions in addition to technological ones as the determinants of the CRM system success, and the degree of pleasure of contact persons and the commitment of senior management influence the technological variables of the CRM system quality such as the system efficiency and the customer information quality (Khlif & Jallouli, 2014). It has been observed that the highest agreement with regard to Key Success Factors is 'Management support is vital for installation and implementation of e-CRM system in retail markets' followed by the statement 'The implementation team should develop customer-centric interface design" (Manjunatha & Gajendra, 2020).

2) Information technology as a success factor of e-CRM

The success factors of e-CRM include operational and strategic benefits, top management support, technological readiness, and knowledge management capabilities (Ali, Ishaya, & Hassan, 2015). First, Eckerson (1998) suggested the establishment of possible infrastructure as technical success factors of e-CRM, selection of an appropriate e-CRM system, maintenance of e-CRM project process roadmap, and data clarity. Second, Brown and Goolsbee (2002) argued that software for database, data mining, decision support, and tools for campaign management are necessary as technical success factors of e-CRM. Third, Binggelt, Gupta, and

Pommes (2002) suggested five factors affecting CRM performance, such as information utilization, interaction, efficient delivery of information, personalization, and system integration. Fourth, Chen and Popovich (2003) suggested data warehouse management, connection with ERP system, Internet connection, and system integration as the success factors as a comprehensive approach related to the successful development of CRM system. Fifth, Raman, Wittmann, and Rauseo (2006) argue that process orientation and technology are essential requirements of CRM. Sixth, Jayachandran, Sharma, Kaufman, and Raman (2005) argue that the use of CRM technology affects CRM performance. In addition, Croteau and Li (2003) argue that technical readiness affects information management ability and CRM performance.

III. Theoretical Background for Customer Satisfaction

3.1. Concept of customer satisfaction

There is a growing body of evidence that customer satisfaction is predictive of firms' future financial performance (Bhattacharya, Morgan, & Rego, 2020). Customer satisfaction has received considerable attention both in the marketing literature and practice in recent years (Tsaur, Chiu, & Wang, 2007). The satisfaction judgment is generally agreed to originate in a comparison of the level of product or service performance, quality, or other outcomes perceived by the consumer with an evaluative standard (Westbrook & Oliver, 1991).

Hunt (1977) defined (customer) satisfaction as an evaluation of an emotion. Emotions having the potential to be evoked in the consumption experience were related to attribute-specific and overall judgments of satisfaction/dissatisfaction in an effort to more fully understand the role of emotion in consumption, and the attribute and emotion solution suggests a consumption-stage interpretation of the evocation of emotions in usage (Oliver, 1992).

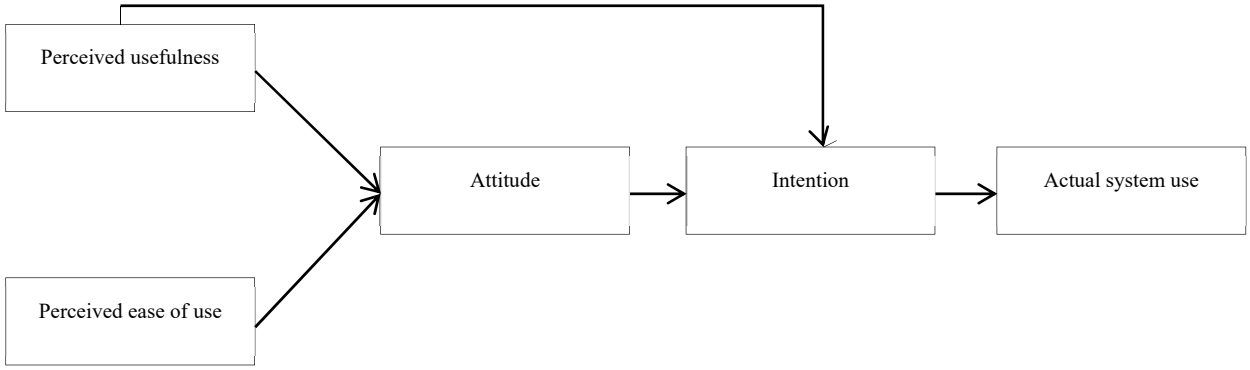
Machleit and Mantel (2001) demonstrate that the effect of emotions on shopping satisfaction is moderated by the attributions that shoppers make for their feelings. For example, measuring and managing customer satisfaction is crucial for the survival, development, and success of service industries like tourism (Sirakaya, Petrick, & Choi, 2004).

Both retrospective global judgments of consumption emotions as well as their in-process experience (i.e. their experience during the sequence of episodes composing the transaction) determine post-purchase satisfaction in multiple ways (Dubé & Morgan, 1998). Direction of change in satisfaction judgements is contingent on several factors (Zins, 2001). The study done by Maguire and Geiger (2015) suggests that the temporal perspective is a dominant cause of consumption emotions in services, influencing consumers' emotions from before the service encounter commences to its conclusion and, in some cases, beyond the conclusion of the service event, and other antecedents of consumption emotions such as interactions with staff and the services cape are influenced by and interwoven with this temporal aspect.

3.2. Introduction and Intention to Use and Degree of Use of Technology (Technology Acceptance Theory

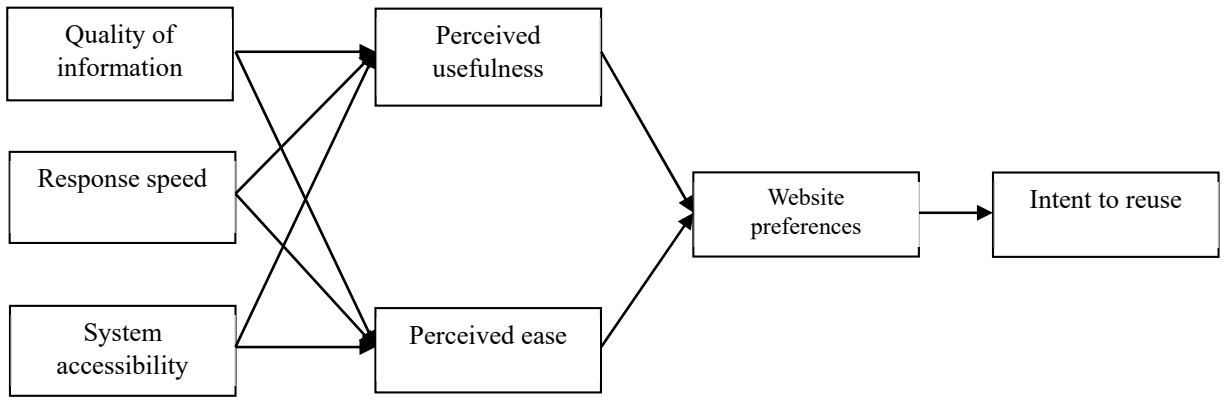
The technology acceptance model is a model that explains the use of technology, and since it was proposed by Davis in 1989, it has been widely applied by various researchers to gain an understanding of the use or acceptance of technology in various fields (Jin, 2007). In the technology acceptance model, i) results supported the theory's proposition as that science lecturer's intention to use ICT influenced by perceived usefulness, attitude and perceived ease of use, attitude are also supported (Bundot, Yunos, & Mohammed, 2017). ii) perceived usefulness are considered the one of the two most critical internal beliefs that affects user acceptance (Septiani, Handayani, & Azzahro, 2017).

Figure 1. Technology acceptance model (Davis, 1989).



In Lin and Lu (2000)'s study on the impact on Internet use, using DeLone and McLean's (1992) information system success factors as an external factor affecting users' intention to reuse in Internet use, information quality, response time, and system accessibility affect the satisfaction factors of Internet users (Kang, 2013). TAM (technology acceptance model) have assessed the factors influencing usage of IS and Internet/Web-based services including e-shopping malls, Internet banking and websites, and the information quality, system quality, and service quality of the IS success model have been employed previously to assess the performance and efficacy of IS and Internet/Web services (Aladwani & Palvia, 2002; Delone & McLean, 2004; Pitt, Watson, & Kavan, 1995 as cited in Kim & Lee, 2014).

Figure 2. Model of the impact on Internet use (Lin & Lu, 2000).



3.3. Introduction of Information Technology and User Satisfaction

3.3.1. Effect of Information Technology Introduction: User Satisfaction

Business information systems and business information technology are integral aspects of modern business, and managers in these areas are now expected to have knowledge of human and managerial issues as well as technical ones such as development and implementation of information systems (Lehaney, Lovett, & Shah, 2011). In general, experts evaluate the introduction of information technology by measuring organizational performance, industrial performance, user satisfaction, and loyalty (Kim, 2011).

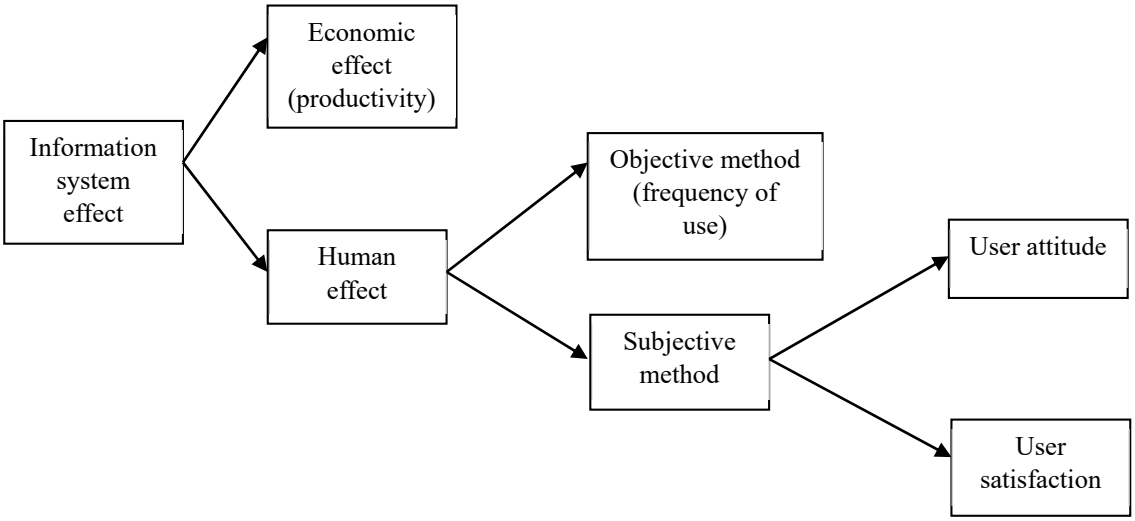
Table 4. A Study on the Effectiveness Evaluation of Information Systems in the Business Field (Kim, 2011)

Effect factor	Measure	Researcher
Satisfied	User satisfaction	Waite and Harrison (2002), Negash, Tsegaye, van Treuren and Visser (2002), Palmer (2002), Liu and Arnett (2002)
Loyalty	Use frequency, revisit rate	Hagel and Armstrong (1997), Palmer (2002)
Organizational performance	Net profit, market share sales	Goldfarb (2002), Olson and Boyer (2003)
Industrial performance	Increase production, decision making	D'Ambra and Rice (2001)

In general, the effect of the introduction of information technology has economic (quantitative) effects, such as a decrease in the input cost for building information technology, a reduction in processing speed, and an increase in output, and there are human effects (qualitative) such as user satisfaction using information technology (Gallagher, 1974). The economic effect evaluation of information technology can be evaluated as productivity improvement such as cost reduction and output increase, and productivity improvement such as cost reduction and output increase (Jin, 2007). Human effectiveness evaluation can be divided into an objective method and a subjective method, and the objective method is to

evaluate the degree of use of information technology and judge that the more effective the information system is used by users while the subjective method is divided into the user's attitude and the user's satisfaction (Lucas, 1975).

Figure 3. Information system effectiveness evaluation (Lucas, 1975).



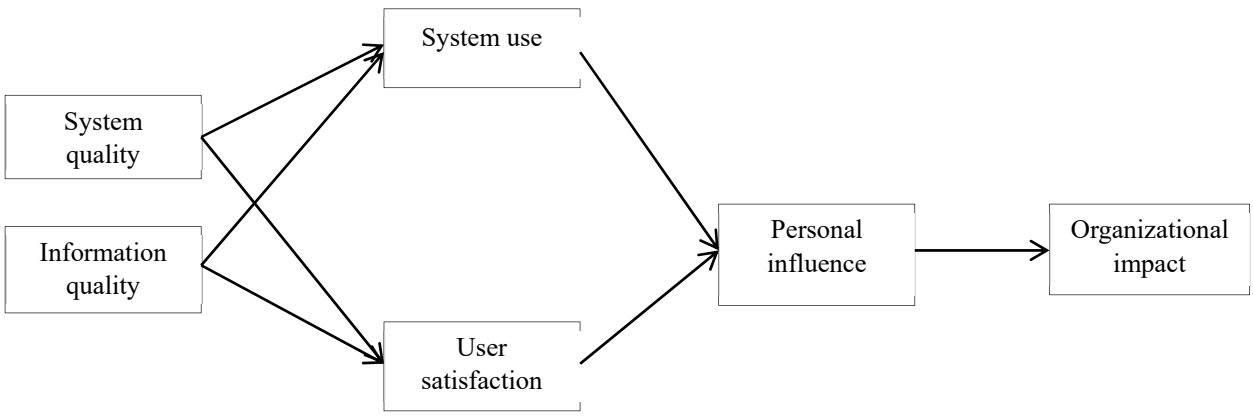
3.3.2. Measurement of user satisfaction

The measurement of user satisfaction in information technology is based on the concept of an expectation discrepancy theory and user information satisfaction, and expectation discrepancy theory states that whether or not the expectations for the performance of information technology are consistent has a significant influence on the satisfaction of information systems (Caudle, Gorr, & Newcormer , 1991). User information satisfaction (UIS) is one such evaluation mechanism, and UIS is defined as the extent to which users believe the information system available to them meets their information requirements (Ives, Olson, & Baroudi, 1983). Authors posit that three primary dimensions of social capital (structural, cognitive, relational) impact user satisfaction with IT service provision, and all three dimensions will be more important for user satisfaction when users' perception of IT

SERVQUAL is higher (Sun, Fang, Lim, Straub, 2012).

A representative study on such user satisfaction is the study of Parasuraman, Zeithaml, and Berry (1985) and propose that an appropriate approach for companies to evaluate service quality is to measure the difference between customer expectations and perceptions of service quality, and for this purpose, a multi-item scale called SERVQUAL was developed for the first time. Serqual measures consist of 6 criteria; tangibility, reliability, responsiveness, assurance, courtesy, and empathy (Zaim, Bayyurt, & Zaim, 2010). The SERVQUAL dimensions were used on Customer Satisfaction and Repurchase Intention (Naik, Gantasala, & Prabhakar, 2010). In the revised information system success model of Delone and Mclean (2003), service quality was added to the quality factor and the definition and measurement of the net effect by integrating individual and organizational impacts to define the success of information systems as net effects differs depend on the characteristics of the organization and the purpose of the information system.

Figure 4. Information system success model (Delone & Mclean, 1992)



IV. Research Model and Hypotheses Development

4.1. Research Model Formation

4.1.1. Characteristics of virtual reality technology

1) Definition of virtual reality technology

This study intends to define virtual reality technology as virtual mirror technology. The definition of virtual mirror technology differs according to the research focus of scholars. Cho and Schwarz (2012) claims virtual mirror technology allows consumers to create a virtual model by uploading a digital image of themselves, offering them the opportunity to see how a product would look “on them” when they cannot physically test or see the product.

Baek, Yoo and Yoon (2016) stated that virtual mirror, an increasingly popular application of augmented reality, allows consumers to view their visages overlaid with product images on digital displays. Kim, Baek and Kim (2017) claimed online retailers are increasingly adopting augmented reality (AR) as a digital marketing tool to create a “virtual mirror technology” through which consumers can view interactive 3-D product images of themselves wearing products such as jewelry, clothing, shoes, and eyeglasses. Cho and Schwarz (2012) stated such simulation technologies are not limited to online retailers; conventional stores can take advantage of them by inviting shoppers to snap a self-portrait at a virtual mirror kiosk in the store, allowing for more efficient initial product trials.

Based on these scholars' definitions of virtual mirror technology, this study intends to define virtual mirror technology as a technology that allows customers to upload their digital images and test how products look to them.

2) Characteristics of virtual reality technology

Virtual reality refers to an interface between human computers that makes a specific environment or situation into a computer and makes it as if the person experiencing it is interacting with the real surroundings environment, and is also called artificial reality (Choi &

Yoo, 2001). Gartner, Inc., an information technology research and advisory firm in the United States, selected Virtual & Augumented Reality as one of the top 10 strategic technology trends that companies should pay attention to in 2017 (Gartner, 1999).

Researchers have also analyzed users' intention to use VR technology, and the technology acceptance model (TAM) has been used to explain user attitudes and behavior toward information technology and devices (Legris, Ingham, & Collerette, 2003 as cited by Lee, Kim, & Choi, 2019). In the technology acceptance model, the user's perception of ease of use and usefulness affects attitudes and behavioral intentions, thus affecting acceptance of technology (Davis, 1989). And Lin and Lu (2000) is an information system success factor, i) quality of information, response speed, and system accessibility affect perceived usefulness and ease, ii) perceived usefulness and perceived ease of use affect website preference It is said that iii) website preference influences the intention of reuse. Since the technology acceptance model is a theory that explains general technology, there is a limit to explaining virtual reality technology. Therefore, it is necessary to review theories explaining virtual reality technology. A look at the technology acceptance of representative virtual reality technology is as follows. Steuer (1992) argues that the greatest feature of virtual reality is telepresence, and two technologies that contribute to the sense of remote reality are interaction and clarity.

3) Setting direction of the research model

This study intend to establish a research model based on sensory marketing theory. In particular, a research model is set under the assumption that sensory technology affects the user's customer satisfaction. The main variables of this study were set using the SOR model (Stimulus-Organism-Response model) of Mehrabian and Russel (1974): the first stage (environmental stimulation) of the SOR model was external environmental stimulation, the second stage (emotional reaction) was divided into perception of environmental stimuli and the

inner state of emotion, and the third stage (behavioral response) was divided into environmental stimulus and consumer's behavioral response according to emotional response.

When the research model was established based on the SOR model, the independent variable was set as i) sensory stimulation of virtual reality technology, ii) emotional response according to sensory stimulation of virtual reality technology, and the dependent variable was behavior according to sensory stimulation and emotional response set to reaction (Mehrabian & Russel, 1974).

4.1.2. Setting up a research model

1) Independent Variable

i) Sensory stimulation of virtual reality technology

Sensory stimulation is analyzed to have a greater influence than the measurement of goods or services itself in shaping users' preferences in the overall experience (Hultén, Broweus, & Dijk, 2009). In particular, in the case of sensory stimulation of virtual reality technology, most of the virtual reality technologies commercialized at the present time are visual and auditory, and through virtual reality technology, visual and auditory stimulation can be created and an immersive experience can be provided (Radianti, Majchrzak, Fromm, & Wohlgenannt, 2020). The user's indirect experience through this virtual reality technology affects the user's senses through the virtual reality interface (Chen, Ching, Luo, & Liu, 2008). Therefore, this study intends to define the sensory stimulation of virtual reality technology as creating visual and auditory stimulation through virtual reality technology.

ii) Emotional Response

The sensory stimulation of virtual reality technology induces the user's emotional response. Previous studies on user's emotional response according to sensory stimulation of

representative virtual reality technology include Enjoyment, Perceived Product Quality, Telepresence, Interactivity, immersion, flow, self-congruence, ownership, need for contact, and curiosity. In this study, among the emotional responses of users, enjoyment, Perceived Product Quality, Telepresence, Interactivity, and immersion, which account for the majority in scholars' studies, are set as main independent variables.

Independent variables representing emotional responses are defined as follows. i) Enjoyment means that sensory stimulation of virtual reality technology represents positive emotions (Kim & Forsythe, 2008a,b; Lee & Chung, 2008; Nah, Eschenbrenner, & Dewester, 2011; Yim, Chu, & Sauer, 2017); ii) Perceived Product Quality is understanding the product through virtual reality technology (Ottosson, 2002; Bordegoni & Ferrise, 2013); iii) Telepresence is formed by technological means and gives a feeling of being in reality (Animesh, Pinsonneault, Yang & Oh, 2011; Klein 2003); iv) Interactivity indicates a specific relationship established between the digital model and the user (Huang, 2012); and v) Immersion is being absorbed in virtual reality technology (Yim, Chu, & Sauer, 2017; Koh, 2018).

2) Dependent variable: behavioral response

In general, factors affecting user satisfaction for information systems are classified into information quality, system quality, and service quality (Delone & Mclean, 2003), and many scholars have conducted research. In the case of virtual reality, research has been conducted on satisfaction and intention to use virtual reality technology, such as satisfaction of virtual reality information and intention to accept technology (Huang, Backman, Backman, & Moore, 2013). In these studies, the interaction, sense, and information quality of virtual reality technology affect user satisfaction (Fiore, Jin, & Kim, 2005; Kim & Forsythe, 2007; Schlosser, 2003; Mathwick, 2002). The definition of user satisfaction has been defined differently depending on the research focus of scholars, and user satisfaction (customer satisfaction) generally refers to

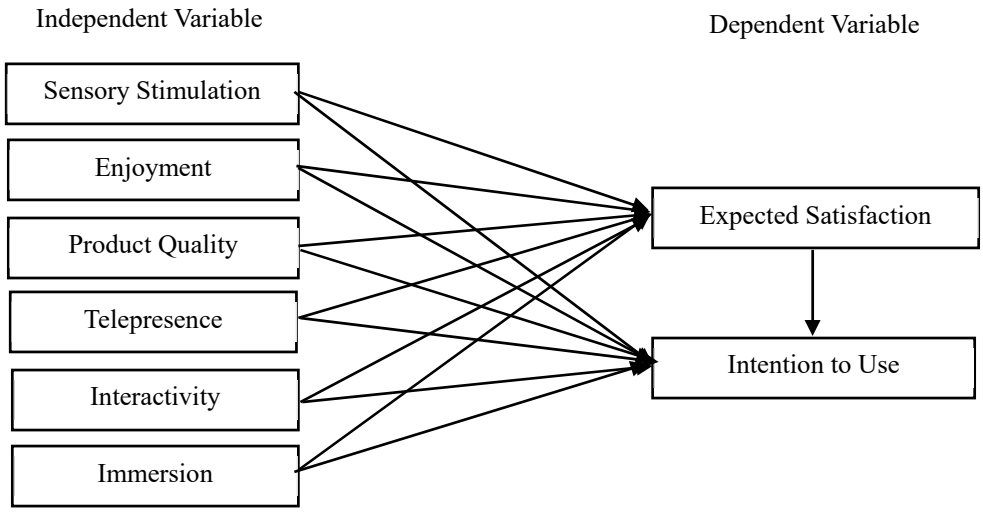
the measurement of satisfaction is defined as the disconfirmation beliefs between consumer expectation before purchase and perceived actual performance of the product or service (Kao, Huang, & Yang, 2007). In the case of information technology, user satisfaction is measured with the concept of expectation discrepancy theory and user information satisfaction (Kang, 2013). With reference to these scholars' discussions, this study intends to define user satisfaction as information satisfaction for virtual reality technology. In general, an individual's behavior can be predicted through behavioral intentions, so it is essential to understand behavioral intentions to understand individual behaviors (Bai, Law, & Wen, 2008; March & Woodside, 2005). Correlations with overall customer satisfaction and behavioral intentions of customer satisfaction and service quality perceptions for each major service act in computer media surroundings were found to be significant (Woodside, Frey, & Daly, 1989). In other words, website quality affects customers' perceived playfulness and perceived flow, and in turn, would influence their satisfaction and purchase intention, notably, the service quality is more important than information and system quality in influencing customer satisfaction and purchase intention (Hsu, Chang, & Chen, 2012).

In this way, satisfaction affects behavioral intentions toward the service provider (Mittal, Kumar, & Tsiros, 1999). Recommendation intention is informal communication between private parties concerning evaluations of goods and services to other consumer (Anderson & Gerbing, 1988). Satisfaction is then the major determinant of behavioral intentions, including the intention to recommend the website to other consumers, mediating the effects of disconfirmation (Finn, Wang, & Frank, 2009). In this study, behavioral intention is a phenomenon that appears as a result of satisfaction. Action intention is a comprehensive concept of intention to use, intention to recommend, intention to visit again, intention to convert, and intention to purchase. In this study, it is intended to be defined as an intention to use, a term

suitable for the intention of action of virtual reality technology.

By schematizing the variable rules for the sensory stimulation, emotional response, and behavioral response of virtual reality technology as described above as causal relationships, the research model is set up as follows. First, it is assumed that the sensory stimulation and emotional response of virtual reality technology affect the customer's expected satisfaction. It is also assumed that the higher the customer's expected satisfaction level, the higher the customer's intention to use the virtual reality technology.

Figure 5. Establishment of Research Model



4.2. Hypothesis Development

In order to achieve the purpose of the study, three research hypotheses and a total of 13 sub hypotheses are tested. Research hypothesis H1-1 established a hypothesis on sensory stimulation and expectation satisfaction of virtual reality technology. Research hypothesis H1-2 established a hypothesis on the enjoyment and expectation satisfaction of virtual reality technology. Research hypothesis H1-3 established hypotheses about product quality and expectation satisfaction of virtual reality technology. Research hypothesis H1-4 established a hypothesis about remote reality and expectation satisfaction of virtual reality technology.

Research hypothesis H1-5 established a hypothesis on the interaction and expectation satisfaction of virtual reality technology. Research hypothesis H1-6 established hypotheses about immersion and expectation satisfaction of virtual reality technology.

Research hypothesis H2-1 established a hypothesis on sensory stimulation and intention to use virtual reality technology. Research hypothesis H2-2 established a hypothesis on the enjoyment and intention to use virtual reality technology. Research hypothesis H2-3 established a hypothesis on product quality and intention to use virtual reality technology. Research hypothesis H2-4 established a hypothesis on the remote reality and intention to use virtual reality technology. Research hypothesis H2-5 established a hypothesis on the interaction and intention to use virtual reality technology. Research hypothesis H2-6 established a hypothesis on the degree of immersion and intention to use virtual reality technology. Lastly, the research hypothesis H3 established a hypothesis on the expectation satisfaction and intention to use virtual reality technology.

H1. Sensory stimulation and emotional response of virtual reality technology will have a positive (+) effect on expected satisfaction.

H1-1. The user's sensory stimulation will have a positive (+) effect on the user's expected satisfaction.

H1-2. The user's emotional response, pleasure, will have a positive (+) effect on the user's expected satisfaction.

H1-3. Product quality, which is the user's emotional response, will have a positive (+) effect on the user's expected satisfaction.

H1-4. Remote reality, which is the user's emotional response, will have a positive (+) effect on the user's expected satisfaction.

H1-5. Interaction, which is the user's emotional response, will have a positive (+) effect on the user's expected satisfaction.

H1-6. The user's emotional response, immersion, will have a positive (+) effect on the user's expected satisfaction.

H2. The user's sensory stimulation and emotional response will have a positive (+) effect on the user's intention to use.

H2-1. The user's sensory stimulation will have a positive (+) effect on the user's intention to use.

H2-2. The user's emotional response, pleasure, will have a positive (+) effect on the user's intention to use.

H2-3. Product quality, which is the user's emotional response, will have a positive (+) effect on the user's intention to use.

H2-4. Remote reality, which is the user's emotional response, will have a positive (+) effect on the user's intention to use.

H2-5. Interaction, which is the user's emotional response, will have a positive (+) effect on the user's intention to use.

H2-6. The user's emotional response, immersion, will have a positive (+) effect on the user's intention to use.

H3. The user's satisfaction with virtual reality technology expectations will have a positive (+) effect on the user's intention to use it.

V. Survey design and analysis

5.1. Research Design

5.1.1. Composition of the survey

The composition of the questionnaire for analyzing the results of the impact of virtual reality technology on customer behavior. First, the independent variables consisted of sensory stimulation and emotional responses (pleasure, product quality, remote reality, interaction, and immersion), and dependent variables consisted of expected satisfaction and intention to use. A total of 38 items were composed by combining the demographic variables of the survey respondents and general questionnaire items. All scales used a Likert 5-point scale. The measurement items and contents of the variables of this study are as follows.

Table 5. Survey Structure

Division	Item		Contents
Independent Variable	Sensory Stimulation		A1-1. If you use virtual mirror technology, you will feel your image well.
			A1-2. If you use virtual mirror technology, you feel like you are actually wearing it.
			A1-3. Using virtual mirror technology, it will be possible to try on, change, and resize.
	Emotional Reaction	Enjoyment	B1-1. It will be fun to explore products with virtual mirror technology.
			B1-2. It will be very interesting to me to explore products with virtual mirror technology.
			B1-3. Exploring products with virtual mirror technology will make me feel special.
			B1-4. The products I have experienced with virtual mirror technology will arouse my curiosity.
		Product Quality	B2-1. Mirror service using virtual reality technology will help customer understand about products well.
			B2-2. While using the mirror service using virtual reality technology, customers can easily perceive products.
			B2-3. While using mirror services using virtual mirror technology, customers can get more accurate information about products and services.
		Telepresence	B3-1. The mirror service using virtual mirror technology seems to create a new space for me.
			B3-2. The mirror service using virtual mirror technology will make you feel as if you are in that place.

			B3-3. By looking at the main screen of the mirror using virtual reality technology, you will be able to easily grasp the screen composition.
		Interactivity	B4-1. If you use a virtual mirror service using virtual reality technology, you will want to use the product.
			B4-2. If you use virtual mirror service using virtual reality technology, you will feel familiarity with products and brands.
			B4-3. If you use the virtual mirror service using virtual reality technology, you will establish a lasting relationship with your product and brand (membership registration, etc.)
			B4-4. Mirror service using virtual reality technology is a helpful tool for communication and transactions between providers and customers.
		Immersion	B5-1. If you use a mirror service using virtual reality technology, you will be well devoted to virtual service.
			B5-2. If you use a mirror service using virtual reality technology, you will be well immersed in virtual service.
			B5-3. When using a mirror service using virtual reality technology, it is likely that interest will be focused on virtual services.
			B5-4. It seems that you will forget that the time passes while using the mirror service using virtual reality technology.
Dependent Variables	Expected satisfaction	Expected satisfaction	C1-1. Virtual mirror technology will satisfy expectations.
			C1-2. Virtual mirror technology is satisfactory by providing new information.
			C1-3. Overall, I think I will be satisfied with the pleasure of virtual mirror technology.
	Intention to Use	Intention to Use	C2-1. I think that I will want to use virtual mirror technology again.
			C2-2. Virtual mirror technology services will continue to be used if upgraded.
			C2-3. I will use a shopping mall with a mirror using virtual mirror technology.
			C2-4. I will introduce a shopping mall with a mirror using virtual mirror technology to others.

5.1.2. Data collection and analysis

The subjects of the study were random sampling, which is a non-probability sampling method, and the subjects were easily accessible by the researcher and those who had experience in shopping malls were selected. To understand the impact of virtual reality technology on customer behavior to promote better customer relationship management through customers, this study was conducted on online and offline shopping mall experiencers from May 00, 2021 to May 00, 2021. Using the questionnaire, a total of 120 copies were distributed and 120 copies were collected (100%). Among them, 117 questionnaires were analyzed excluding 3 copies of non-response and insincere respondents. The data collected in this study were analyzed using IBM SPSS statistics 22.0. As an analysis technique, frequency analysis is performed to organize general characteristic samples, reliability analysis is performed to test the reliability of each variable, and factor analysis is performed to verify the construct validity of each variable and regression analysis was performed to find out the influence between the variables using the representative values of each variable that secured reliability and validity. Through this process, we tried to analyze how virtual reality technology affects customer behavior.

5.2. Demographic Characteristics of the Sample

The general characteristics of the survey respondents were gender, age, educational background, occupation, experience of use, and area of residence. First, there were 66 women (56.4%) out of the total respondents, more than men 51 (43.6%). The most common age was 20-29 years with 43 (36.8%), followed by 30-39 years with 28 (23.9%). As for the educational background of the respondents, 54 (46.2%) graduated from university, followed by high school graduation with 32 (27.4%). By occupation, 34 professionals (29.1%), 26 students (22.2%), 22 office/management workers (18.8%), 14 civil servants (12.0%), and 8 housewives (6.8%) were found in that order. Regarding the shopping experience using virtual reality technology, 7

experienced (6.0%) and 110 inexperienced (94.0%) were found. As for the residential area, 61 people in Seoul (52.1%), 33 people in Gyeonggi (28.2%), and 5 people in Incheon (4.3%) were found.

Table 6. Demographic Characteristics of Samples

Division	Total	
(N = 117)	*%*	*N*
Gender		
Female	56.4%	(66)
Male	43.6%	(51)
Age		
20 ~ 29 years old	36.8%	(43)
30 ~ 39 years old	23.9%	(28)
40 ~ 49 years old	12.0%	(14)
50 ~ 59 years old	17.9%	(21)
Over 60 years old	9.4%	(11)
Education		
High School graduation	27.4%	(32)
University graduation	46.2%	(54)
Master's graduation	19.7%	(23)
Ph.D. graduation	6.8%	(8)
Job		
Practitioner	22.2%	(26)
Office/Administrative Position	6.8%	(8)
Production	12.0%	(14)
Self-Employment	18.8%	(22)
Official	29.1%	(34)
Student	2.6%	(3)
Housewife	2.6%	(3)
Inoccupation	6.0%	(7)
Other		
Experience		
Yes	6.0%	(7)
No	94.0%	(110)

Resident registration area		
Seoul	52.1%	(61)
Incheon	28.2%	(33)
Busan	4.3%	(5)
Daejeon	1.7%	(2)
Daegu	2.6%	(3)
Gwangju	1.7%	(2)
Ulsan	0.9%	(1)
Sejong	0.9%	(1)
Gyeonggi	0.9%	(1)
Gangwon	3.4%	(4)
Chungbuk	1.7%	(2)
Chungnam	0.9%	(1)
Jeonbuk	0.9%	(1)
Jeonnam		
Gyeongbuk		
Gyeongnam		
Jeju		
Average household income per month (in Ten Thousand Won)		
Less than 200		
Over 200~Less than 300	15.4%	(18)
Over 300~ Less than 400	28.2%	(33)
Over 400~Less than 500	12.0%	(14)
Over 500~ Less than 600	12.8%	(15)
Over 600	8.5%	(10)
	22.2%	(26)

Table 7. Component Matrix: Dependent Variable (Expected Satisfaction & Intention to Use)

Independent Variables		Components					
Factors	Scale Items	1	2	3	4	5	6
A1-1	If you use virtual mirror technology, you will feel your image well.	.870					
A1-2	If you use virtual mirror technology, you feel like you are actually wearing it.	.864					
A1-3	Using virtual mirror technology, it will be possible to try on, change, and resize.	.594					
B1-1	It will be fun to explore products with virtual mirror technology.		.923				
B1-2	It will be very interesting to me to explore products with virtual mirror technology.		.873				
B1-3	Exploring products with virtual mirror technology will make me feel special.		.853				
B1-4	The products I have experienced with virtual mirror technology will arouse my curiosity.		.832				
B2-1	Mirror service using virtual reality technology will help customer understand about products well.			.848			
B2-2	While using the mirror service using virtual reality technology, customers can easily perceive products.			.808			
B2-3	While using mirror services using virtual mirror technology, customers can get more accurate information about products and services.			.754			
B3-1	The mirror service using virtual mirror technology seems to create a new space for me.				.818		
B3-2	The mirror service using virtual mirror technology will make you feel as if you are in that place.				.811		
B3-3	By looking at the main screen of the mirror using virtual reality technology, you will be able to easily grasp the screen composition.				.746		
B4-1	If you use a virtual mirror service using virtual reality technology, you will want to use the product.					.826	
B4-2	If you use virtual mirror service using virtual reality technology, you will feel familiarity with products and brands.					.810	
B4-3	If you use the virtual mirror service using virtual reality technology, you will establish a lasting relationship with your product and brand (membership registration, etc.)					.759	
B4-4	Mirror service using virtual reality technology is a helpful tool for communication and transactions between providers and customers.					.744	
B5-1	If you use a mirror service using virtual reality technology, you will be well devoted to virtual service.						.869
B5-2	If you use a mirror service using virtual reality technology, you will be well immersed in virtual service.						.839
B5-3	When using a mirror service using virtual reality technology, it is likely that interest will be focused on virtual services.						.787
B5-4	It seems that you will forget that the time passes while using the mirror service using virtual reality technology.						.761

C1-1	Virtual mirror technology will satisfy expectations.	.926					
C1-2	Virtual mirror technology is satisfactory by providing new information.	.881					
C1-3	Overall, I think I will be satisfied with the pleasure of virtual mirror technology.	.816					
C2-1	I think that I will want to use virtual mirror technology again.		.859				
C2-2	Virtual mirror technology services will continue to be used if upgraded.		.830				
C2-3	I will use a shopping mall with a mirror using virtual mirror technology.		.804				
C2-4	I will introduce a shopping mall with a mirror using virtual mirror technology to others.		.733				

5.3. Verification of validity and reliability of measurement tools

Factor analysis was performed to verify the validity of the scale for the impact of virtual reality technology used in this study on customer behavior. Factor analysis is a multivariate analysis technique that analyzes how several variables are connected to each other and explains the relationship between these variables using co-factors (intrinsic dimensions). Validity refers to the degree to which a measurement tool correctly measures a specific object that an investigator intends to measure. In this study, we analyzed whether the independent variables, emotional stimulation, emotional response (pleasure, product quality, remote reality, interaction, immersion) and dependent variables, expected satisfaction and intention to use, secure validity. Next, the validity of each factor was analyzed. In this study, the Varimax method of orthogonal rotation was used as a factor extraction model through Principal Component Analysis. In the factor extraction process, eigenvalues were applied as a standard to extract factors greater than 1. As a result, 6 independent variables and 2 dependent variables were extracted for factors with eigenvalues greater than or equal to 1.

Table 8. Component Matrix: Dependent Variable (Expected Satisfaction & Intention to Use)

Dependent Variable		Components	
Factors	Scale Items	1	2
C1-1	Virtual mirror technology will satisfy expectations.	.926	
C1-2	Virtual mirror technology is satisfactory by providing new information.	.881	
C1-3	Overall, I think I will be satisfied with the pleasure of virtual mirror technology.	.816	
C2-1	I think that I will want to use virtual mirror technology again.		.859
C2-2	Virtual mirror technology services will continue to be used if upgraded.		.830
C2-3	I will use a shopping mall with a mirror using virtual mirror technology.		.804
C2-4	I will introduce a shopping mall with a mirror using virtual mirror technology to others.		.733

Most of all factor values showed more than 0.70, ensuring the validity of each variable, and it was also analyzed that the factors set in the study were appropriately grouped. Based on these results in this study, the validity of constructing the scale of each factor into one concept was proved. Reliability analysis refers to the degree of measurement error that appears when measurements are repeated for the same concept. In this study, the reliability of the questionnaires was verified using Cronbach's Alpha. In the internal consistency method using Cronbach's Alpha coefficient, each item is expressed as a test score.

Table 9. Reliability Analysis Results

Factor	Number of Questions	Cronbach's Alpha
Sensory Stimulation	3(A1)	.666
Enjoyment	4(B1)	.891
Product Quality	3(B2)	.719
Telepresence	3(B3)	.697
Interactivity	4(B4)	.783
Immersion	4(B5)	.822

Expected Satisfaction	3(C1)	.843
Intention to Use	4(C2)	.821

As a result of the reliability analysis, the structural factor Cronbach's Alpha coefficient was 0.666 for sensory stimulation, 0.891 for pleasure, 0.719 for product quality, 0.697 for remote reality, 0.783 for interaction, 0.822 for immersion, 0.843 for satisfaction with use, and 0.821 for intention to use, all showing values above 0.6. Reliability was found to be very good.

5.4. Analysis Results and Hypothesis Verification

5.4.1. Analysis

In this study, differences between groups were verified according to gender, educational background, income level, and usage experience, but there was no significant difference between groups. So, a regression analysis result was derived to analyze factors affecting expected satisfaction and intention to use. As a result of ANOVA analysis on the effect of sensory stimulation and emotional response of virtual reality technology on expected satisfaction, the F value was 26.595 (R-square = .605) at the significance level below 0.001. When examining the relative influence of factors affecting the satisfaction level through the size of the standardized regression coefficient, it was found that the degree of engagement (β=.291) had the greatest influence, followed by the sense of remote reality (β=.242), and sensory stimuli (β=.219) were found to be influential.

Table 10. Effects of Determinants of Expected Satisfaction

Variable (Independent → dependent)	Standardized Coefficient (*t*-value-Sig)
Sensory Stimulation → Expected Satisfaction (H1-1)	0.219 (2.420**)
Enjoyment →Expected Satisfaction (H1-2)	-0.027 (-0.303)
Product Quality →Expected Satisfaction (H1-3)	-0.006 (-0.071)
Telepresence →Expected Satisfaction (H1-4)	0.242 (2.747***)
Interactivity →Expected Satisfaction (H1-5)	0.191 (1.970)

Immersion →Expected Satisfaction (H1-6)	0.291 (2.598**)

*** p < 0.01, ** p < 0.05, * p < 0.1 denotes statistical significance.

As a result of ANOVA analysis on the effect of sensory stimulation and emotional response of virtual reality technology on intention to use, the F value was 27.285 (R-square = .616) at the significance level of 0.001 or less. When examining the relative influence of factors affecting intention to use through the size of the standardized regression coefficient, pleasure (β=.470) was found to have the greatest influence, followed by commitment (β=.235), Product quality (β=.174) was found to have an influence in the order.

Table 11. Effects of Determinants of Intention to Use

Variable (Independent → dependent)	Standardized Coefficient (*t*-value-Sig)
Sensory Stimulation → Intention to Use (H2-1)	0.028 (0.323)
Enjoyment →Intention to Use (H2-2)	0.470 (5.422***)
Product Quality →Intention to Use (H2-3)	0.174 (2.092**)
Telepresence →Intention to Use (H2-4)	-.128 (-1.518)
Interactivity →Intention to Use (H2-5)	0.116 (1.240)
Immersion →Intention to Use (H2-6)	0.235 (2.179**)

*** p < 0.01, ** p < 0.05, * p < 0.1 denotes statistical significance.

As a result of ANOVA analysis on the effect of virtual reality technology's expected satisfaction on intention to use, the F value was 65.975 (R-square = .373) at the significance level of 0.001 or less. The size of the standardized regression coefficient on the relative influence of the expected satisfaction factor affecting the intention to use was found to have an influence as β=.611.

Table 12. Effects of Expected Satisfaction on Intention to Use

Variable (Independent → Dependent)	Standardized Coefficient (*t*-value-Sig)
Expected Satisfaction → Intention to Use (H2-1)	0.611 (8.123***)

*** p < 0.01, ** p < 0.05, * p < 0.1 denotes statistical significance.

5.4.2. Hypothesis test

1) H1: Hypothesis on sensory stimulation, emotional response, and expected

satisfaction of virtual reality technology

The results of analysis on the effect of sensory stimulation and emotional response of virtual reality technology on expected satisfaction are as follows. Hypothesis H1-1 is a hypothesis that the user's sensory stimulation will have a positive (+) effect on the user's expected satisfaction. The standardized path coefficient for determining the effect of sensory stimulation of virtual reality technology on expected satisfaction was 0.219, and the test statistic was 2.420, which showed a positive effect at the significance level of 5%. Hypothesis H1-1 was adopted. Hypothesis H1-2 is a hypothesis that the user's emotional response, pleasure, will have a positive (+) effect on the user's expected satisfaction. The standardized path coefficient for determining the effect of pleasure, an emotional response of virtual reality technology, on expected satisfaction is -0.027, and the test statistic is -0.303, indicating that it does not have a positive effect at the significance level of 5%. Hypothesis H1-2 is rejected. Hypothesis H1-3 is the hypothesis that product quality, which is the user's emotional response, will have a positive (+) effect on the user's expected satisfaction. The standardized path coefficient for determining the effect of product quality, which is the emotional response of virtual reality technology, on expected satisfaction is -0.006, and the test statistic is -0.071, which does not appear to have a positive effect at the significance level of 5%. Hypothesis H1-3 is was rejected. Hypothesis H1-4 is a hypothesis that remote reality, which is the user's emotional response, will have a positive (+) effect on the user's expected satisfaction. The standardized path coefficient to determine the effect of remote reality, an emotional response of virtual reality technology, on expected satisfaction was 0.242, and the test statistic was 2.747, which was found to have a positive effect at the significance level of 1%. Hypothesis H1-4 was adopted. Hypothesis H1-5 is the hypothesis that the user's emotional response, the interaction,

will have a positive (+) effect on the user's expected satisfaction. The standardized path coefficient for determining the effect of interaction, which is the emotional response of virtual reality technology, on expected satisfaction was 0.191, and the test statistic was 1.970, which did not have a positive effect at the significance level of 5%, so hypothesis H1-5 was rejected. Hypothesis H1-6 is a hypothesis that the user's emotional response, immersion, will have a positive (+) effect on the user's expected satisfaction. The standardized path coefficient for determining the effect of immersion, an emotional response of virtual reality technology, on expected satisfaction was 0.291, and the test statistic was 2.598, which showed a positive effect at the significance level of 1%. Hypothesis H1-6 was adopted.

2) H2: Hypothesis on sensory stimulation, emotional response and intention to use virtual reality technology

The results of the analysis on the effect of sensory stimulation and emotional response of virtual reality technology on the intention to use are as follows. Hypothesis H2-1 is a hypothesis that the user's sensory stimulation will have a positive (+) effect on the user's intention to use. The standardized path coefficient for determining the effect of sensory stimulation of virtual reality technology on the intention to use is 0.028, and the test statistic is 0.323, indicating that it does not have a positive effect at the significance level of 5%. Hypothesis H2-1 was rejected. Hypothesis H2-2 is a hypothesis that the user's emotional response, pleasure, will have a positive (+) effect on the user's intention to use. The standardized path coefficient for determining the effect of pleasure, an emotional response of virtual reality technology, on the intention to use is 0.470, and the test statistic is 5.422, which shows a positive effect at the significance level of 1%. Hypothesis H2-2 was adopted. Hypothesis H2-3 is the hypothesis that product quality, which is the user's emotional response, will have a positive (+) effect on the

user's intention to use. The standardized path coefficient for determining the effect of product quality, which is the emotional response of virtual reality technology, on the intention to use was 0.174, and the test statistic was 2.092, which showed a positive effect at the significance level of 5%. Hypothesis H2-3 was adopted. Hypothesis H2-4 is a hypothesis that remote reality, which is the user's emotional response, will have a positive (+) effect on the user's intention to use. The standardized path coefficient for determining the effect of remote reality, an emotional response of virtual reality technology, on the intention to use is -0.128, and the test statistic is -1.518, which does not appear to have a positive effect at the significance level of 5%. Hypothesis H2-4 is It was rejected. Hypothesis H2-5 is a hypothesis that the user's emotional response, interaction, will have a positive (+) effect on the user's intention to use. The standardized path coefficient for determining the effect of interaction, which is the emotional response of virtual reality technology, on the intention to use is 0.116, and the test statistic is 1.240, which does not have a positive effect at the significance level of 5%. Hypothesis H2-5 was rejected. Hypothesis H2-6 is a hypothesis that the user's emotional response, immersion, will have a positive (+) effect on the user's intention to use. The standardized path coefficient for determining the effect of immersion, an emotional response of virtual reality technology, on the intention to use is 0.235, and the test statistic is 2.179, which shows a positive effect at the significance level of 5%. Hypothesis H2-6 was adopted.

3) H3: Hypothesis about satisfaction of expectations and intention to use virtual reality technology

Hypothesis H3 is the hypothesis that the user's virtual reality technology expectation satisfaction will have a positive (+) effect on the user's intention to use. The standardized path coefficient for determining the effect of the expected satisfaction level of virtual reality

technology on the intention to use is 0.611, and the test statistic is 8.123, which shows a positive effect at the significance level of 1%. Hypothesis H2-6 was adopted.

Table 13. Summary of Determinants of Expected Satisfaction & Intention to Use Hypotheses Testing

Division	Variable (Independent → dependent)	Standardized Coefficient (*t*-value-Sig)	Whether the Hypothesis is Accepted
H1	Sensory Stimulation → Expected Satisfaction (H1-1)	0.219 (2.420**)	Accepted (+)
	Enjoyment →Expected Satisfaction (H1-2)	-0.027 (-0.303)	Dismissed
	Product Quality →Expected Satisfaction (H1-3)	-0.006 (-0.071)	Dismissed
	Telepresence →Expected Satisfaction (H1-4)	0.242 (2.747***)	Accepted (+)
	Interactivity →Expected Satisfaction (H1-5)	0.191 (1.970)	Dismissed
	Immersion →Expected Satisfaction (H1-6)	0.291 (2.598**)	Accepted (+)
H2	Sensory Stimulation →Intention to Use (H2-1)	0.028 (0.323)	Dismissed
	Enjoyment →Intention to Use (H2-2)	0.470 (5.422***)	Accepted (+)
	Product Quality →Intention to Use (H2-3)	0.174 (2.092**)	Accepted (+)
	Telepresence →Intention to Use (H2-4)	-.128 (-1.518)	Dismissed
	Interactivity →Intention to Use (H2-5)	0.116 (1.240)	Dismissed
	Immersion →Intention to Use (H2-6)	0.235 (2.179**)	Accepted (+)
H3	Expected Satisfaction → Intention to Use (H3)	0.611 (8.123***)	Accepted (+)

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denotes statistical significance.

VI. Conclusion

6.1. Summary of Study Results

The purpose of this study is to investigate how high-tech technologies provided by customers in offline and online businesses affect customer behavior in the 4th industrial

revolution environment. First, the independent variables consisted of sensory stimulation and emotional responses (pleasure, product quality, remote reality, interaction, and immersion), and the dependent variables consisted of expected satisfaction and intention to use and a total of 38 including demographic variables. The subjects of the survey were random sampling, which is a non-probability sampling method, and were easily accessible to the researcher. A total of 117 questionnaires were analyzed. The data collected in this study were regressed to find out the influence between variables using the representative values of each variable for which frequency analysis, factor analysis, and reliability and validity were secured using IBM SPSS statistics 22.0. Through the analysis, the effect of virtual reality technology on customer behavior was analyzed. The general characteristics of the survey respondents were gender, age, educational background, occupation, experience of use, and region of residence. First, among the total respondents, 66 (56.4%) were female, more than male 51 (43.6%), and the age was 20-29 years old. The largest number was 43 (36.8%), and as for the educational background of the respondents, 54 (46.2%) were university graduates, and occupations were professional 34 (29.1%), student 26 (22.2%), office/manager 22 People (18.8%) followed by 14 civil servants (12.0%) and 8 housewives (6.8%). And, as the residential area, Seoul 61 (52.1%), Gyeonggi 33 (28.2%), and Incheon 5 (4.3%) were found. In this study, differences between groups were verified according to gender, educational background, income level, and usage experience, but there was no significant difference between groups, so a regression analysis result was derived to analyze factors affecting expected satisfaction and intention to use. As a result of ANOVA analysis on the effect of sensory stimulation and emotional response of virtual reality technology on expected satisfaction, the F value was 26.595 (R-square = .605) at the significance level of 0.001 or less, and the degree of immersion (β = .291).), remote reality (β=.242), and sensory stimulation (β=.219) were found to have a (+) effect. As a result of

ANOVA analysis on the effect of sensory stimulation and emotional response of virtual reality technology on intention to use, the F value was 27.285 (R-square = .616) at the significance level of 0.001 or less, and pleasure (β = .470). , immersion (β=.235), and product quality (β=.174) were found to have a positive influence in the order. As a result of ANOVA analysis on the effect of the expected satisfaction of virtual reality technology on the intention to use, the F value was 65.975 (R-square = .373) at the significance level of 0.001 or less, and β = .611, showing a positive influence.

Table 13. Summary of Determinants of Expected Satisfaction & Intention to Use Hypotheses Testing

Division	Variable (Independent → dependent)	Standardized Coefficient (*t*-value-Sig)	Whether the Hypothesis is Accepted
H1	Sensory Stimulation → Expected Satisfaction (H1-1)	0.219 (2.420**)	Accepted(+)
	Enjoyment →Expected Satisfaction (H1-2)	-0.027 (-0.303)	Dismissed
	Product Quality →Expected Satisfaction (H1-3)	-0.006 (-0.071)	Dismissed
	Telepresence →Expected Satisfaction (H1-4)	0.242 (2.747***)	Accepted (+)
	Interactivity →Expected Satisfaction (H1-5)	0.191 (1.970)	Dismissed
	Immersion →Expected Satisfaction (H1-6)	0.291 (2.598**)	Accepted (+)
H2	Sensory Stimulation →Intention to Use (H2-1)	0.028 (0.323)	Dismissed
	Enjoyment →Intention to Use (H2-2)	0.470 (5.422***)	Accepted (+)
	Product Quality →Intention to Use (H2-3)	0.174 (2.092**)	Accepted (+)
	Telepresence →Intention to Use (H2-4)	-.128 (-1.518)	Dismissed
	Interactivity →Intention to Use (H2-5)	0.116 (1.240)	Dismissed
	Immersion →Intention to Use (H2-6)	0.235 (2.179**)	Accepted (+)
H3	Expected Satisfaction → Intention to	0.611 (8.123***)	Accepted (+)

	Use (H3)		

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denotes statistical significance.

6.2. Significance of the study

6.2.1. Major Findings of Study

First, in general, previous studies on sensory marketing conducted empirical analysis using a small number of independent variables among sensory stimuli or sensory responses. However, this study is a very comprehensive study in that seven sensory stimuli or sensory responses were used as independent variables. That is, by empirically analyzing most independent variables related to sensory stimuli or sensory responses, it is possible to grasp the factors that affect the user's expectation satisfaction and intention to use it in various ways. Second, as a result of analyzing the effect of sensory stimulation and emotional response of virtual reality technology on expected satisfaction, it was found that there was a positive influence in the order of i) immersion, ii) remote reality, and iii) sensory stimulation. Third, as a result of analyzing the effect of sensory stimulation and emotional response of virtual reality technology on intention to use, it was found that there was a positive influence in the order of i) pleasure, ii) immersion, and iii) product quality. Fourth, as a result of the analysis on the effect of the expected satisfaction level of virtual reality technology on the intention to use, it was found to have a positive influence. Fifth, the independent variable that has a (+) effect on both the user's expectation satisfaction and intention to use is the user's emotional response variable, which is the degree of commitment. In other words, the degree of immersion affects the user's expected satisfaction and intention to use. Sixth, the independent variable that does not have a positive effect on both user's expectation satisfaction and intention to use is interaction as a user's emotional response variable. That is, interaction does not have a positive

effect on expectation satisfaction and intention to use.

6.2.2. Managerial Implications of Study

First, as a result of analyzing the effect of sensory stimulation and emotional response of virtual reality technology on expected satisfaction, it was found that there was a positive influence in the order of i) immersion, ii) remote reality, and iii) sensory stimulation. According to these analysis results, when using virtual reality technology, managements should continuously seek ways to increase customer satisfaction by stimulating the senses of buyers and improving the sense of remote reality and immersion. As a result of analyzing the effect of sensory stimulation and emotional response of virtual reality technology on intention to use, it was found that there was a positive influence in the order of i) pleasure, ii) immersion, and iii) product quality.

According to the results of this analysis, the CEO should devise a way to increase the intention to use by inducing interest of customers, improving immersion through enjoyment, and improving product quality. In conclusion, the CEO needs a more effective marketing strategy through re-verification of various and specific services of online and offline shopping malls. When customers purchase a product, it should be possible to generate profits by analyzing the degree to which the values of immersion, remote reality, sensory stimulation, enjoyment, and product quality act on online and offline shopping mall selection and repurchase. In addition, empirical analysis showed that interaction did not affect expected satisfaction and intention to use, so virtual reality technology is used as a device to describe the product in detail, and in order to improve access to shopping malls, it is necessary to induce subscription or use mileage.

On the other hand, in terms of CRM (Customer Relationship Management), businesses

needs the following customer management strategies. First, CRM (Customer Relationship Management) refers to the integration of marketing and high-quality services through information technology to increase customer satisfaction and loyalty in order to achieve the goal of improving business efficiency (Wang, Wang, Chang, Yan, & Lin, 2014). Therefore, it is necessary for the businesses to continuously develop virtual reality technology to meet the needs of customers to integrate marketing and high-quality services. Second, Payne and Frow (2000) suggest that it is necessary for business organizations to increase customer satisfaction by adopting customer relationship marketing as a strategy for collecting and using data to increase customer value. Therefore, it is necessary for the businesses to continuously improve customer satisfaction and intention to use virtual reality technology through a survey on customer satisfaction in marketing. Third, data mining is said to be the process of finding meaningful patterns or rules through exploration and analysis from large databases (Cho, 2000). Therefore, it is necessary for the businesses to find meaningful patterns or rules by age, occupation, and income of customers through a survey on customer satisfaction in marketing using virtual reality technology to improve customer satisfaction and intention to use it.

6.3. Limitations of Research and Future Research Directions

First, the bias of the survey response layer can be given priority. Most of the surveys did not reflect the views of the people who purchased the product through experiencing virtual reality technology. In other words, the sample of the survey conducted for the empirical analysis is not sufficient to explain all the customers who use the online and offline shopping malls using real technology. In future research, it is necessary to conduct a survey by diversifying the survey area and the proportion of samples. Second, the effects of online and offline shopping mall products on user satisfaction and intention to use could not be considered.

Factors affecting satisfaction and intention to use are also different depending on the items or types of items handled between online and offline shopping malls. In future research, it is necessary to study the characteristics of shopping malls from various viewpoints such as the size, industry, and items of online and offline shopping malls. Third, studies on product quality of internet shopping malls are still lacking. Therefore, the existing offline product quality was taken, corrected and supplemented, but in particular, it is necessary to distinguish the characteristics of the online internet shopping mall more clearly (design, composition, etc.). Fourth, in future research, it is necessary to try to increase the explanatory power of the model by considering various variables other than product quality, satisfaction, and intention to use presented in this study. The limitations of this study and suggestions for future research were aimed at those who had experience purchasing online and offline products when composing the sample, but it was thought that new implications could be derived if analyzed in consideration of the perception level of buyers who directly experienced virtual reality technology. If online and offline shopping malls were analyzed separately, new strategies or advice could be suggested. In the case of a survey, there is no guarantee that the actual perception level of the respondents is sufficiently reflected because the survey is conducted through subjective entries, so a qualitative research method is additionally required.

References

Aaltonen, P. G. (2004). *Customer Relationship Marketing and Effect of Demographic and Technology on Customer Satisfaction and Loyalty in Financial Services* [Unpublished doctoral dissertation]. Old Dominion University. Norfolk, United States.

Abdul-Muhmin, A. G. (2012). CRM technology use and implementation benefits in an emerging market. *Journal of Database Marketing & Customer Strategy Management*, *19*(2), 82–97. https://doi.org/10.1057/dbm.2012.13

Adebanjo, D. (2003). Classifying and selecting e-crm applications: An analysis-based proposal. *Management Decision, 41*(6), 570-577. doi:10.1108/00251740310491517

Adebanjo, D. (2008). E-crm Implementation — a comparison of three approaches. *2008 4th IEEE International Conference on Management of Innovation and Technology*. Bangkok, Thailand. https://doi.org/10.1109/icmit.2008.4654408

Adeosun, L., & Ganiyu, R. (2012). Experiential Marketing: An Insight into the Mind of the Consumer. *Asian Journal of Business and Management Sciences, 2*(7), 21-26.

Ahmad, A. H., Masri, R., Chong, C. V., Fauzi, R. U. A., & Idris, I. (2020). Evolution of Technology and Consumer Behavior: The Unavoidable Impacts. *EVOLUTION, 7*(11), 3206-3217.

Ahn, Y., Kim, S. K., & Han, K. S. (2003). On the design concepts for CRM system. *Industrial Management & Data Systems*, *103*(5), 324–331. https://doi.org/10.1108/02635570310477370

Ariely, D. (2008). *Predictably irrational: the hidden forces that shape our decisions*. Harper Collins. New York, United States.

Ariely, D., & Berns, G. S. (2010). Neuromarketing: The hope and hype of Neuroimaging in

business. *Nature Reviews Neuroscience, 11*(4), 284-292. doi:10.1038/nrn2795

Aladwania, A. M., & Palvia, P. C. (2002). Developing and validating an instrument for measuring user-perceived web quality. *Information & Management, 39*(6), 467-476. http://dx.doi.org/10.1016/S0378-7206(01)00113-6

Ali, Z., Ishaya, I., & Hassan, H. (2015). The Critical Success Factors of e-CRM Implementation to Small and Medium Enterprises. In *ICoEC 2015* (pp. 1-5). Kuching, Sarawak: Proceedings of the International Conference on E-Commerce.

Alt, R. (2017). Electronic markets on transaction costs. *Electronic Markets*, *27*(4), 297–301. https://doi.org/10.1007/s12525-017-0273-2

Alli, H. (2019). *Users' emotional responses and perceived product quality towards sustainable design*. UPM Press. Serdang, Malaysia.

Animesh, A., Pinsonneault, A., Yang, S. B., & Oh, W. (2011). An Odyssey into Virtual Worlds: Exploring the Impacts of Technological and Spatial Environments on Intention to Purchase Virtual Products. *MIS Quarterly*, *35*(3), 789–810.

Alshehri, M., & Drew, S. (2010). E-government fundamentals. In *IADIS International Conference ICT*. Society and Human Beings. Freiburg, Germany.

Alzahrani, A. I. (2011). *Web-based e-government services acceptance for g2c: A structural equation modelling approach* [Master's thesis, De Montfort University] De Montfort University. Leicester, England.

Anderson, J. C., & Gerbing, W. D. (1988). Structural equation modeling in practice – A review and recommended 2-step approach. *Psychological Bulletin, 103*(3), 411–423.

Apăvăloaie, E. I. (2014). The impact of the internet on the business environment. *Procedia Economics and finance, 15*, 951-958.

Arbi, K. A., Kausar, A. R., & Salim, I. (2017). Minimizing Asymmetric Information in Online

Markets through Knowledge Management. *International Journal of Management Excellence*, *8*(2), 924-931. https://doi.org/10.17722/ijme.v8i2.310

Awan, M. A. (2007). Dubai e-Government: An evaluation of g2b websites. *Journal of Internet Commerce, 6*(3), 115-129. doi:10.1300/j179v06n03_06

Ayob, A. H. (2021). E-commerce adoption in ASEAN: who and where?. *Future Business Journal*, 7(1), 1-11.

Baek, T. H., Yoo, C. Y., & Yoon, S. (2016). Augment yourself through virtual mirror: the impact of self-viewing and narcissism on consumer responses. *International Journal of Advertising*, *37*(3), 421–439. https://doi.org/10.1080/02650487.2016.1244887

Bai, B., Law, R., & Wen, I. (2008). The impact of website quality on customer satisfaction and purchase intentions: Evidence from Chinese online visitors. *International Journal of Hospitality Management*, *27*(3), 391-402.

Baines, P., Fill, C., & Page, K. (2013). *Essentials of marketing*. Oxford University Press. Oxford, England.

Baker, R. (2010). Data Mining. In R. Tierney , P. Peterson, E. Baker , & B. McGaw (Eds.), *International Encyclopedia of Education* (3rd ed., pp. 112–118). Essay, Elsevier Science. Amsterdam, Netherlands.

Batat, W. (2019). Experiential marketing: Consumer Behavior, Customer Experience and The 7Es. New York, NY: Routledge.

Beck, M. & Crié, D. (2018). I Virtually Try It… I Want It! Virtual Fitting Room: A Tool to Increase On-Line and Off-Line Exploratory Behavior, Patronage and Purchase Intentions. *Journal of Retailing and Consumer Services*, *40*, 279–86.

Becker, G. S. (1976). *The economic approach to human behavior*. Univ. of Chicago Press. Chicaco, United States.

Berson, A., Smith, S., & Thearling, K. (2000). Building data mining applications for CRM. McGraw-Hill. New York, United States.

Bettman, J. R. (1979). Issues in research on consumer choice. *ACR North American Advances*. Ann Abor, Michigan.

Bettman, J., Luce, M., & Payne, J. (1998). Constructive Consumer Choice Processes. *Journal of Consumer Research, 25*(3), 187-217. doi:10.1086/209535

Bezhovski, Z., & Hussain, F. (2016). The Benefits of the Electronic Customer Relationship Management to the Banks and their Customers. *Research Journal of Finance and Accounting*, *7*(4), 112-116

Bhattacharya, A., Morgan, N. A., & Rego, L. L. (2020). Customer satisfaction and firm profits IN MONOPOLIES: A study of utilities. *Journal of Marketing Research, 58*(1), 202-222. doi:10.1177/0022243720962405

Binggelt, U., Gupta, S., & Pommes, C. (2002). CRM in the air. *McKinsey Quarterly, 3*, 6-11.

Bordegoni, M., & Ferrise, F. (2013). Designing interaction with consumer products in a multisensory virtual reality environment: this paper shows how virtual reality technology can be used instead of physical artifacts or mock-ups for the new product and evaluation of its usage. *Virtual and Physical Prototyping*, *8*(1), 51-64.

Bove, J. (2008). What makes shoppers tick? *Chemist & Druggist, 257*(6327), 45-45.

Bowles, R. (2021). *Your Company's Guide to B2B & B2C & DTC Fulfillment Business Models*. Logiwa. https://www.logiwa.com/blog/b2b-b2c-dtc-business-models.

Bradshaw, D., & Brash, C. (2001). Managing customer relationships in the e-business world: How to personalise computer relationships for increased profitability. *International*

Journal of Retail & Distribution Management, 29(12), 520-530. doi:10.1108/09590550110696969

Brengman, M., Willems, K., & Van Kerrebroeck, H. (2019). Can't touch this: the impact of augmented reality versus touch and non-touch interfaces on perceived ownership. *Virtual Reality, 23*(3), 269-280.

Brown, J. R., & Goolsbee, A. (2002). Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry. *Journal of Political Economy 110*(3), 481-507.

Bugaje, I. B. (2015). Effect of Electronic-Customer Relationship Management (e-CRM) on Business Organisations. *Abuja Journal of Business and Management, 1*(1), 73-80.

Bundot, G. Y., Yunos, J. M., & Mohammed, M. (2017). Technology Acceptance Model Of Intention To Use ICT By Academics In Nigerian Higher Education. *Online Journal for TVET Practitioners, 2*(1), 1-7.

Burkitt, L. (2009). Battle For The Brain. *Forbes*, *184*(9), 76–78.

Buttle, F. (2005). *Sales Force Automation: What Do We Know?* [Unpublished thesis]. Macquarie Graduate School of Management. Sydney, Australia.

Butler, M. J., & Senior, C. (2007). Toward an organizational cognitive neuroscience. *Annals of the New York Academy of Sciences, 1118*(1), 1-17. doi:10.1196/annals.1412.009

Carabello, L. (2001). E-procurement can reduce expenses. *Healthcare Financial Management, 55*(12), 82-3.

Caudle, S. L., Gorr, W. L., & Newcomer, K. E. (1991). Key Information Systems Management Issues for the public sector. *MIS Quarterly, 15*(2), 171-188.

Chan, E. & Swatman, P.M.C. (1999). "Electronic Commerce: A Component Model" 3rd Annual CollECTeR Conference on Electronic Commerce, 29 November, 1999, Wellington, New Zealand.

Chandra, S., & Strickland, T. J. (2004). Technological differences between CRM and eCRM. *Issues in Information Systems, 5*(2), 408-413.

Chen, Q., & Chen, H. M. (2004). Exploring the success factors of eCRM strategies in practice. *Journal of Database Marketing & Customer Strategy Management*, *11*(4), 333-343.

Chen, J., Ching, R. K., Luo, M. M., & Liu, C. C. (2008, January). Virtual experiential marketing on online customer intentions and loyalty. In *Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008)* (pp. 271-271). IEEE. Hawaii, United States.

Chen, I. J., & Popovich, K. (2003). Understanding customer relationship management (CRM): People, process and technology. *Business Process Management Journal, 9*(5), 672-688.

Cho, H., & Schwarz, N. (2012). I like your product when I like my photo: Misattribution using interactive virtual mirrors. *Journal of Interactive Marketing, 26*(4), 235-243.

Cho, J. H. & Park, S. J. (1996). Data Warehousing Department OLAP, *Daechung.* Seoul, South Korea.

Cho, S. J. (2000). *Data Mining for CRM*. Korean Database Society Spring Conference, pp.85~105. Seoul, Korea.

Choi J. H. & Yoo J (2001). Dead CRM, Living CRM, *Han Eon*. Seoul, South Korea.

Choi, Y. K., & Taylor, C. R. (2014). How do 3-dimensional images promote products on the Internet? *Journal of Business Research*, *67*(10), 2164-2170.

Chu, H., & Liao, S. (2007). Exploring the Motivations of Consumer Resale Behavior in C2C E-commerce. *International Journal of Business and Management, 2*(5), 178-185.

Cian, L., Krishna, A. & Elder, R. (2014). This Logo Moves Me: Dynamic Imagery From Static Images. *Journal of Marketing Research, 51*(2), 184–97.

Colecchia, A. (1999), Defining and measuring electronic commerce: Towards the development of an OECD methodology. In *International Statistical Institute Cutting Edge Conference on the Measurement of E-Commerce*. Singapore.

Croteau, A. M., & Li, P. (2003). Critical success factors of CRM technological initiatives. *Canadian Journal of Administrative Sciences/Revue Canadienne des Sciences de l'Administration, 20*(1), 21-34.

D'Ambra, J., & Rice, R. E. (2001). Emerging factors in user evaluation of the World Wide Web. *Information & management, 38*(6), 373-384.

Darmont, J., Boussaid, O., & Bentayeb, F. (2007). Warehousing web data. *4th International Conference on Information Integration and Web-based Applications and Services* (iiWAS 02) (09/2002). 148-152. Bandung, Indonesia.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and End-user Acceptance of Information Technology. *MIS Quarterly*. *13*(3), 319-334.

De Figueiredo, J. M. (2000). Finding Sustainable Profitability in Electronic Commerce. *Sloan Management Review, 41*(4), 41–52.

Dehghanpouri, H., Soltani, Z., & Rostamzadeh, R. (2020). The impact of trust, privacy and quality of service on the success of E-CRM: the mediating role of customer satisfaction. *Journal of Business & Industrial Marketing*, *35*(11), 1831–1847. https://doi.org/10.1108/jbim-07-2019-0325

Delfmann, W., Albers, S., & Gehring, M. (2002). The impact of electronic commerce on logistics service providers. *International Journal of Physical Distribution & Logistics Management, 32*(3), 203-222. doi:10.1108/09600030210426539

Delone, W. H. & Mclean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research, 3*(1), 60-95.

Delone, W. H. & Mclean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-year Update. *Journal of Management Information Systems, 19*(4), 9-30.

Delone, W. H., & Mclean, E. R., (2004). Measuring e-Commerce success: Applying the DeLone & McLean information systems success model. *International Journal of Electronic Commerce, 9*(1), 31-47.

den Butter, F. A., Liu, J., & Tan, Y. (2012). Using it to engender trust in government-to-business relationships: The Authorized economic Operator (AEO) as an example. *Government Information Quarterly, 29*(2), 261-274. doi:10.1016/j.giq.2011.05.004

Dimpfel, W. (2015). Gender dependent different electric signatures of the brain in response to watching TV commercials: A combined EEG and eye-tracking study. In *Cognitive and emotional challenges tv commercial* (pp. 30-33). Dresden, Germany: NeuroPsychoEconomics Conference Proceedings.

Dowling, G. (2002). Customer relationship management: In B2C Markets, often less is more. *California Management Review, 44*(3), 87-104. doi:10.2307/41166134

Drigas, A., & Leliopoulos, P. (2013). Business to Consumer (B2C) E-Commerce decade evolution. *International Journal of Knowledge Society Research, 4*(4), 1-10. doi:10.4018/ijksr.2013100101

Dubé, L., & Morgan, M. S. (1998). Capturing the dynamics of in-process consumption emotions and satisfaction in extended service transactions. *International Journal of Research in Marketing, 15*(4), 309-320.

Dunham, R. (2012). Neuromarketing Arrives at Your Local Grocer. *Progressive Grocer, 91*(5), 106-106.

Ebrahimi, M. (2019). *Private sector innovations and technological growth in the Mena region*. IGI Global. Hershey, Pennsylvania.

Eckerson, W. W. (1998). Post-chasm warehousing. *Journal of Data Warehousing*. *3*(3), 38-45.

Eelen, J., Dewitte, S., & Warlop, L. (2013). Situated Embodied Cognition: Monitoring Orientation Cues Affects Product Evaluation and Choice. *Journal of Consumer Psychology*, *23*(4), 424–33

Elder, R. & Krishna, A. (2012). The "Visual Depiction Effect" in Advertising: Facilitating Embodied Mental Simulation Through Product Orientation. *Journal of Consumer Research*, *38*(6), 988–1003.

Elgarah, W., & Courtney, J. (2002). Enhancing the G2C relationship through new channels of communication: Web-based citizen input. In *Americas Conference on Information Systems (AMCIS)* (pp. 564-568). Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). Dallas, United States.

Everitt, M. (2009). Consumer-targeted sensory quality. In G. Barbosa-Cánovas, A. Mortimer, D. Lineback, W. Spiess, K. Buckle and P. Colonna (Eds.). Global Issues in Food Science and Technology (pp. 117–28). London: Academic Press.

Fairhurst, P. (2001). E-crm. *Journal of Database Marketing & Customer Strategy Management, 8*(2), 137-142. doi:10.1057/palgrave.jdm.3240028

Falk, E. B., Berkman, E. T., & Lieberman, M. D. (2012). From neural responses to population behavior. *Psychological Science, 23*(5), 439-445. doi:10.1177/0956797611434964

Farmania, A., Elsyah, R. D., & Tuori, M. A. (2021). Transformation of CRM Activities into e-CRM: The Generating e-Loyalty and Open Innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(2), 109-109. https://doi.org/10.3390/joitmc7020109

Farooqi, R. & Dhusia, D. (2011). A Comparative Study of CRM and E-CRM technologies. *Indian Journal of Computer Science and Engineering*, *2*(4), 624-627.

Finn, A., Wang, L., & Frank, T. (2009). Attribute Perceptions, Customer Satisfaction and Intention to Recommend E-Services. *Journal of Interactive Marketing*, *23*(3), 209–220. https://doi.org/10.1016/j.intmar.2009.04.006

Fiore, A. M., Jin, H. J., & Kim, J. (2005). For fun and profit: Hedonic value from image interactivity and responses toward an online store. *Psychology & Marketing, 22(8)*, 669-694

Fruhling, A., & Digman, L. (2000). The Impact of Electronic Commerce on Business Level Strategies. *Journal of Electronic Commerce Research*, *1*(1), 13-22.

Fugate, D. L. (2007). Neuromarketing: A layman's look at neuroscience and its potential application to marketing practice. *Journal of Consumer Marketing, 24*(7), 385-394. doi:10.1108/07363760710834807

Gallagher, C. A. (1974). Perceptions of the Value of a Management Information System. *Academy of Management Journal. 17*(1), 46-55.

Garczarek-Bąk, U. (2018). Explicit and implicit factors that determine private LABELS' Possible PURCHASE: Eyetracking and EEG Research. *International Journal of Management and Economics, 54*(1), 36-49. doi:10.2478/ijme-2018-0004

Gartner, F., Pagnia, H., & Vogt, H. (1999). Approaching a formal definition of fairness in electronic commerce. *Proceedings of the 18th IEEE Symposium on Reliable Distributed Systems*. Lausanne, Switzerland. doi:10.1109/reldis.1999.805123

Gautier, A. (2003). Think again: Why experiential marketing is the next big thing. *New Zealand Marketing Magazine, 22*(8), 8-15.

Gobe, M. (2001). *Emotional Branding: The New Paradigm for Connecting Brands to People*. New York, New York: Skyhorse Publishing.

Goel, R. (2007). *E-commerce*. New Age International. New Dehli, India

Goldfarb, A. (2002). *Online marketing metrics and financial performance*. Working paper, Department of Economics, Northwestern University. Chicago, Illinois.

Gong, W. (2009). National culture and global diffusion of business-to-consumer e-commerce. *Cross Cultural Management: An International Journal, 16*(1), 83-101. doi:10.1108/13527600910930059

Greenberg, P. (2001).CRM at the Speed of Light:Capturing and Keeping Customers In Internet Real Time .New York:Osborne/McGraw-Hill

Gupta, A. (2014). E-Commerce: Role of E-Commerce in today's business. *International Journal of Computing and Corporate Research, 4*(1), 1-8.

Haase, J., & Wiedmann, K. (2018). The sensory perception item set (spi): An exploratory effort to develop a holistic scale for sensory marketing. *Psychology & Marketing, 35*(10), 727-739. doi:10.1002/mar.21130

Hagel, J., & Armstrong, A. (1997). *Net gain: Expanding markets through virtual communities*. Harvard Business School. Boston, United States.

Harrell, E. (2019). Neuromarketing what you need to know. *HBR Special Issue*, 64-70.

Hamid. (2005). E-CRM: Are we there yet? *Journal of American Academy of Business, 6*(1), 51-57.

Heinonen, K. (2014). Multiple perspectives on customer relationships. *International Journal of Bank Marketing, 32*(6), 450-456. doi:10.1108/ijbm-06-2014-0086

Hobby, J. (1999), Looking after the one who matters. *Accountancy Age*, *28*, 28–30.

Holbrook, M. B., & Hirschman, E. C. (1982). The experiential aspects of consumption: Consumer fantasies, feelings, and fun. *Journal of Consumer Research*, *9*(2), 132. doi:10.1086/208906

Holsapple, C. W., & Singh, M. (2000). Toward a unified view of electronic commerce, electronic business, and collaborative commerce: A knowledge management approach. *Knowledge and Process Management, 7*(3), 151-164. doi:10.1002/1099-1441(200007/09)7:33.0.co;2-u

Howard, J.A., & Sheth J.N. (1969). The Theory of Buyer Behavior. *Journal of the American Statistical Association, 65*(331), 1406-1407. doi: 10.2307/2284311.

Hsu, C. L., Chang, K. C., & Chen, M. C. (2012). The impact of website quality on customer satisfaction and purchase intention: perceived playfulness and perceived flow as mediators. *Information Systems and e-Business Management*, *10*(4), 549–570. https://doi.org/10.1007/s10257-011-0181-5

Hu, N., Dow, K. E., Chong, A. Y., & Liu, L. (2016). Double learning or double blinding: an investigation of vendor private information acquisition and consumer learning via

online reviews. *Annals of Operations Research*, *270*(1-2), 213–234. https://doi.org/10.1007/s10479-016-2243-z

Huang, Y. C., Backman, S. J., Backman, K. F., & Moore, D. (2013). Exploring user acceptance of 3D virtual worlds in travel and tourism marketing. *Tourism Management*, *36*(C), 490-501.

Huang, E. (2012). Online experiences and virtual goods purchase intention. *Internet Research*, *22*(3), 252–74.

Huang, Z., & Benyoucef, M. (2013). From e-commerce to social commerce: A close look at design features. *Electronic Commerce Research and Applications, 12*(4), 246-259. doi:10.1016/j.elerap.2012.12.003

Huang, T. & Liao, S. (2017). Creating e-Shopping Multisensory Flow Experience Through Augmented-Reality Interactive Technology. *Internet Research*, 27(2), 449–75

Hughes, A. (2021). How the web has changed database marketing. https://www.dbmarketing.com/articles/Art200.htm.

Hultén, B., Broweus, N., & Dijk, M. V. (2009). *Sensory Marketing.* Basingstoke: Palgrave Macmillan.

Hultén, B. (2011). Sensory marketing: The multi-sensory brand-experience concept. *European Business Review, 23*(3), 256-273. doi:10.1108/09555341111130245

Hultén, B., Broweus, N., & Van Dijk, M. (2009). *What is Sensory Marketing?*(pp. 1-23). Palgrave Macmillan UK. London, England.

Hussain, S. (2019). Sensory marketing strategies and consumer behavior: Sensible selling using all five senses. *The IUP Journal of Business Strategy, 16*(3), 34-44.

Hunt, H. K. (1977). i Conceptualization and measurement of consumer satisfaction and dissatisfaction. Cambridge, MA: *Marketing Science Institute*, 455-488.

IBM (2001) Business to business what is Business-to-Consumer (B2C)?, *IBM Corporation*, URL http://www1.ibm.com/servers/eserver/iseries/btob/b2c_definition.htm

Indah, M. K., & Suryadinatha, G. A. A. N. O. (2019). Consumer behavior in the era of industrial revolution 4. 0. *Russian Journal of Agricultural and Socio-Economic Sciences, 94*(10), 152 – 157.

Inmon, W. H. (2011). *Building the data warehouse*. Wiley. Hoboken, New Jersey.

Ives, B., Olson, M.H. and Baroudi, J.J. (1983) The Measurement of User Information Satisfaction. *Communications of the ACM, 26*(10), 785-793.

Jahanshahi, A., Mirzaie, A., & Asadollahi, A. (2011). Mobile commerce beyond electronic commerce: Issue and challenges. *Asian Journal of Business and Management Sciences, 1*(2), 119-129.

Jayachandran, S., Sharma, S., Kaufman, P., & Raman, P. (2005). The role of relational information processes and technology use in customer relationship management. *Journal of marketing, 69*(4), 177-192.

Jeberson, W., Singh, G., & Sahu, G. (2011). Analysis of security measures implemented on G2C online payment systems in India. *MIT International Journal of Computer Science & Information Technology, 1*(1), 19-27.

Jiang & Benbasat (2004). Virtual product experience: Effects of visual and functional control of products on perceived diagnosticity and flow in electronic shopping. *Journal of Management Information Systems*, *21*(3), 111–47.

Jih, W. J. (2011). Impact of e-CRM on website loyalty of a public organization's customers. *Information Resources Management Journal, 24*(2), 46-60.

Jin, D. W. (2007). *Empirical study on factors affecting acceptance of mobile internet services* [Doctoral Thesis, Kwangwoon University]. Kwangwoon University. Seoul, South Korea.

Jing, P., & Peng, W. (2010, May). Model and empirical study on factors influence consumers' apparel purchasing intention in the C2C e-commerce market. In *2010 International Conference on Networking and Digital Society* (Vol. 1, pp. 187-190). IEEE. Wenzhou, China.

Jing, F., & Wenting, Y. (2014, June). A study of G2C e-government citizen's satisfaction: Perspectives of online service quality and offline service quality. In *2014 11th International Conference on Service Systems and Service Management (ICSSSM)* (pp. 1-5). IEEE. Beijing, China

Jones, S. (2016, May 29). Use culture to design packaging that impresses. Retrieved April 19, 2021, from https://www.packagingstrategies.com/articles/93712-use-culture-to-design-packaging-that-impresses

Kalbaska, N., Janowski, T., Estevez, E., & Cantoni, L. (2017). When digital government matters for tourism: A stakeholder analysis. *Information Technology & Tourism, 17*(3), 315-333. doi:10.1007/s40558-017-0087-2

Kang, D. (2013). *A study on the determinants of user satisfaction of e-government services* [Unpublished master's thesis]. Sung Kyun Kwan University. Seoul, South Korea.

Kao, D., & Decou, J. (2003). A strategy-based model for e-commerce planning. *Industrial Management & Data Systems, 103*(4), 238-252. doi:10.1108/02635570310470638

Kao, Y. F., Huang, L. S., & Yang, M. H. (2007). Effects of experiential elements on experiential satisfaction and loyalty intentions: A case study of the super basketball league in Taiwan. *International Journal of Revenue Management, 1*(1), 79-96.

Kassim, N., & Abdullah, N. (2010). The effect of perceived service quality dimensions on customer satisfaction, trust, and loyalty in e-commerce settings. *Asia Pacific Journal of Marketing and Logistics*, *22*(3), 351–371. https://doi.org/10.1108/13555851011062269

Khalili, M. M. R. (2005): *Market orientation, relationship marketing environmental factors and business performance: A study in Malaysian services organizations* [Unpublished doctoral dissertation]. Universiti Sains Malaysia. Penang, Malaysia.

Khlif, H., & Jallouli, R. (2014). The success factors of CRM systems: An explanatory analysis. *Journal of Global Business & Technology, 10*(2), 25-42.

Kim, B. H. (2001). Response to the expansion of internet e-commerce. *Korea Electronic Commerce Management Association.*

Kim, J. & Forsythe, S. (2008a). Sensory enabling technology acceptance model (SE-TAM): A multiple-group structural model comparison. *Psychology & Marketing*, *25*(9), 901–22.

Kim, J. & Forsythe, S. (2008b). Adoption of virtual try-on technology for online apparel shopping. *Journal of Interactive Marketing*, *22*(2), 45–59.

Kim, M. T. (1999). *A study on the implementation plan of customer relationship management system using information technology* [Master's thesis, Yonsei University]. Yonsei University. Seoul, South Korea.

Kim, S., Baek, T. H., & Kim, S. H. (2017). The effect of presence on consumers' responses to virtual mirror technology. St. Petersburg, Florida. https://doi.org/10.31274/itaa_proceedings-180814-314

Kim, Y. J., & Lee, H. S. (2014). Quality, perceived usefulness, user satisfaction, and intention to use: An empirical study of ubiquitous personal robot service. *Asian Social Science*, *10*(11), 1-16.

Kim, Y. S. (2011). *A study on the factors affecting the performance of the e-government system by applying the performance of business administration research: Focusing on the user evaluation of the e-government (G4G) between government departments* [Master's Thesis, Yonsei University]. Department of Business Administration, Yonsei University. Seoul, South Korea.

Kim, Y. K. (2001). *An empirical study on the impact of information technology components of E-CRM on business performance* [Master's thesis, Kwangwoon University]. Graduate School of Kwangwoon University, Department of Management Information. Seoul, South Korea.

Kımıloğlu, H., & Zaralı, H. (2009). What signifies success in e-crm? *Marketing Intelligence & Planning, 27*(2), 246-267. doi:10.1108/02634500910945011

Kim, J., & Forsythe, S. (2007). Hedonic usage of product virtualization technologies in online apparel shopping. *International Journal of Retail and Distribution Management, 35*(6), 502-514.

Kim, Y. T., & Lee, Y. S. (2005). Focusing on research trust, commitment, and intention to maintain relationships on e-CRM of fashion brand homepage. *Chungnam Life Science Research Journal*. *18*(1), 51-52.

Kini, A., & Choobineh, J. (1998). Trust in electronic commerce: Definition and theoretical considerations. *Proceedings of the Thirty-First Hawaii International Conference on System Sciences*. Hawaii, United States. doi:10.1109/hicss.1998.655251

Koh, G. G. (2018). *A study on factors influencing the intention of continuous use of virtual reality chatting service* [Master's thesis, Chung-Ang University]. Chung-Ang University.

Seoul, South Korea.

Korea University. (n.d.). Citation. *In Korea University Korean Dictionary.* Retrieved June 9, 2021, from https://klceng.korea.ac.kr

Kosala, R., & Blockeel, H. (2000). Web mining research: A survey. *ACM Sigkdd Explorations Newsletter, 2*(1), 1-15.

Kostojohn, S., Johnson, M., & Paulen, B. (2011). *CRM Fundamentals*. Apress. Berkeley, CA. https://doi.org/10.1007/978-1-4302-3591-0_6

Krishna, A. (2012). An integrative review of sensory marketing: Engaging the senses to affect perception, judgment and behavior. *Journal of Consumer Psychology, 22*(3), 332-351. doi:10.1016/j.jcps.2011.08.003

Krishna, A., Cian, L., & Sokolova, T. (2016). The power of sensory marketing in advertising. *Current Opinion in Psychology, 10*, 142-147. doi:10.1016/j.copsyc.2016.01.007

Kuczamer-Kłopotowska, S. (2017). Sensory marketing as a new tool of supporting the marketing communication process in tourism services sector. *Handel Wewnetrzny, 2*(367), 226-235.

Kumar, S., & Petersen, P. (2006). Impact of e-commerce in lowering operational costs and raising customer satisfaction. *Journal of Manufacturing Technology Management*, *17*(3), 283–302. https://doi.org/10.1108/17410380610648263

Kumar, V., & Reinartz, W. J. (2006). *Customer relationship management: A databased approach*. Hoboken, NJ: Wiley.

Kumar, V., & Raheja, E. G. (2012). Business to business (b2b) and business to consumer (b2c) management. *International Journal of Computers & Technology, 3*(3b), 447-451.

Klein, L. (2003), Creating virtual product experiences: The Role of telepresence. *Journal of Interactive Marketing*, *17*(1), 41–55.

Klosse, P. R., Riga, J., Cramwinckel, A. B., & Saris, W. H. (2004). The formulation and evaluation of culinary success factors (csfs) that determine the palatability of food. *Food Service Technology, 4*(3), 107-115. doi:10.1111/j.1471-5740.2004.00097.x

Lee, J., Kim, J., & Choi, J. Y. (2019). The adoption of virtual reality devices: The technology acceptance model integrating enjoyment, social interaction, and strength of the social ties. *Telematics and Informatics*, *39*, 37–48. https://doi.org/10.1016/j.tele.2018.12.006

Lee, K. C., & Chung, N. (2008). Empirical analysis of consumer reaction to the virtual reality shopping mall. *Computers in Human Behavior*, *24*(1), 88-104.

Lee, N., Broderick, A. J., & Chamberlain, L. (2007). What is 'neuromarketing'? A discussion and agenda for future research. *International Journal of Psychophysiology, 63*(2), 199-204. doi:10.1016/j.ijpsycho.2006.03.007

Lee-Kelley, L., Gilbert, D., & Mannicom, R. (2003). How e-crm can enhance customer loyalty. *Marketing Intelligence & Planning, 21*(4), 239-248. doi:10.1108/02634500310480121

Lehaney, B., Lovett, P., & Shah, M. (2011). *Business Information Systems and Technology*. Routledge. Abingdon, United Kingdom.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management, 40*(3), 191-204.

Leonard, L. (2012). Attitude Influencers in C2C E-commerce: Buying and selling. *The Journal of Computer Information Systems, 52*(3), 11-17.

Li, H., Daugherty, T., & Biocca, F. (2001). Characteristics of virtual experience in electronic commerce: A protocol analysis. *Journal of Interactive Marketing*, *15*(3), 13–30

Liang, K., Jiang, C., Lin, Z., Ning, W., & Jia, Z. (2016). The nature of sellers' cyber credit in c2c e-commerce: The perspective of social capital. *Electronic Commerce Research, 17*(1), 133-147. doi:10.1007/s10660-016-9231-x

Lin, J. C. C., & Lu, H. (2000). Towards an understanding of the behavioural intention to use a web site. *International journal of information management, 20*(3), 197-208.

Lindstrøm, M. (2005). *Brand sense: Sensory secrets behind the stuff we buy*. London, United Kingdom: Kogan page.

Lintelle, P. (2014). Sensory marketing Aspects: Priming, expectations, Crossmodal Correspondences & more. *Vikalpa: The Journal for Decision Makers, 41*(3), 264-266. doi:10.1177/0256090916652045

Liu, C., & Arnett, K. P. (2002). An examination of privacy policies in Fortune 500 Web sites. *American Journal of Business, 17*(1), 13-22.

Lu, J., Shambour, Q., Xu, Y., Lin, Q., & Zhang, G. (2010). BizSeeker: A hybrid semantic recommendation system for personalized government-tobusiness e-services. *Internet Research, 20*(3), 342-365. doi:10.1108/10662241011050740

Lu, L. I. U., & Lihua, W. U. (2005). User Modeling for Personalized Recommender Systems. *Tsinghua Science and Technology*, *10*(1), 772–777.

Lucas, H. C. (1975), Performance and the Use of an Information System. *Management Science*, *21*(8), 908-919.

Luck, D., & Lancaster, G. (2003). E-CRM: Customer relationship marketing in the hotel industry. *Managerial Auditing Journal*, *18*(3), 213–231. https://doi.org/10.1108/02686900310469961

MacMillan, K., Money, K., Money, A., & Downing, S. (2005). Relationship marketing in the not-for-profit sector: an extension and application of the commitment–trust theory. *Journal of business research, 58*(6), 806-818.

Machleit, K. A., & Mantel, S. P. (2001). Emotional response and shopping satisfaction: Moderating effects of shopper attributions. *Journal of Business Research, 54*(2), 97-106.

Madlenak, R., & Kianickova, E. (2016). Advertising emails optimisation by eyetracking technology. *Marketing Identity: Brands We Love, Pt I*, 186-194. Praha, Czech Republic.

Magasi, C. (2016). The role of customer trust and commitment as mediator for the relation between customer satisfaction and loyalty at Central African banks. *International Journal of Economics, Commerce and Management, 4*(2), 574-588.

Maguire, L., & Geiger, S. (2015). Emotional timescapes: The temporal perspective and consumption emotions in services. *Journal of Services Marketing, 29*(3), 211-223. doi:10.1108/jsm-02-2014-0047

Mangiaracina, R., Marchet, G., Perotti, S., & Tumino, A. (2015). A review of the environmental implications of B2C E-commerce: A logistics perspective. *International Journal of Physical Distribution & Logistics Management, 45*(6), 565-591. doi:10.1108/ijpdlm-06-2014-0133

Manjunatha, S., & Gajendra, J. (2020). Factors of e-CRM services by the service providers and their key success factors – An empirical study. *Alochana Chakra Journal, 9*(6), 6417-6426.

Mansor, A., & Isa, S. (2018). The Impact of Eye Tracking on Neuromarketing for Genuine Value-Added Applications. *Global Business and Management Research: An International Journal, 10*(1), 1-11.

Mantel, B. (2001). E-money and e-commerce: Two alternative views of future innovations. *Available at SSRN 263781*. Chicago, United States.

March, R., & Woodside, A. (2005). *Tourism behaviour: Travellers' decisions and actions.* Cabi Publishing. Wallingford, Connecticut https://doi.org/10.1079/9780851990217.0000

Marzooqi, S. A., Nuaimi, E. A., & Qirim, N. A. (2017). E-governance (G2C) in the public sector. *Proceedings of the Second International Conference on Internet of Things, Data and Cloud Computing*. Cambridge, United Kingdom https://doi.org/10.1145/3018896.3025160

Marzangou, A.A., Ghorbani, M., Vandi, S.R., Khodami, S., Saadati, S., & Aminian, M. (2014). E-commerce in a digital economy, the challenges and advantages. *International J. Soc. Sci. & Education, 4*, 1-7.

Mathwick, C. (2002). Understanding the online consumer: A typology of online relational norms and behavior. *Journal of interactive marketing*, *16*(1), 40-55.

Maymand, M., Ahmadinejad, M., & Nezami, P. (2012). Sensory brand: Studying relationship between 5 senses and brand value at world's 100 top companies. *Australian Journal of Basic and Applied Sciences, 6*(8), 337-343.

Mehrabian, A. & Russel, J. A. (1974), *An Approach to environmental psychology.* the MIT Press. Cambridge, Massachusetts.

Meilgaard, M. C., Carr, B. T., & Civille, G. V. (2006). *Sensory evaluation techniques* (4th ed.). Boca Raton, FL: CRC press.

Meilgaard, M. C., Carr, B. T., & Civille, G. V. (2015). *Sensory evaluation techniques* (5th ed.). Boca Raton, FL: CRC press

Meng, X. (2009). Developing Model of E-commerce E-marketing. In *2009 International Symposium on Information Processing* (pp. 225-228). Huangshan, P.R.: Academy Publisher.

Merle, Senecal, & St-Onge (2012). Whether and How Virtual Try-On Influences Consumer Responses to an Apparel Web Site. *International Journal of Electronic Commerce*, *16*(3), 41–64

Meullenet, J. (2004). Consumers and texture: Understanding their perceptions and preferences. *Texture in Food: Solid Foods, 2,* 33-52. doi:10.1533/978185538362.1.33

Miller, R. K., & Washington, K. (2012). Chapter 83: Sensory marketing. In *Consumer Behavior* (pp. 459-462). Richard K. Miller & Associates. Loganville, Georgia.

Mittal, V., Kumar, P., & Tsiros, M. (1999). Attribute-level performance, satisfaction, and behavioral intentions over time: A consumption-system approach. *Journal of Marketing*, *63*(2), 88. https://doi.org/10.2307/1251947

Mityko, D. (2012). The Search Experience Credence Product Classification Paradigm in the Eyes of the Electronic Consumer. *Management & Marketing Challenges for the Knowledge Society, 7*(3), 449-464.

Moon, H. W. (2000). *The Current Status and Vitalization of E-Commerce: On the Potential of Growth in Korea* [Master's Thesis, Hoseo University]. Department of Economics, Hoseo University. Asan, South Korea.

Moore, M. (2001). The challenges and opportunities of e-commerce. *BUSINESS CREDIT-NEW YORK, 103*(1), 52-54.

Moskowitz, H. R., Jacobs, B., & Firtle, N. (1980). Discrimination testing and product decisions. *Journal of Marketing Research, 17*(1), 84. doi:10.2307/3151121

Mumani, A. (2018). *User-packaging interaction (Upi): A comprehensive research platform and techniques for improvement, evaluation, and design* (dissertation). Iowa State University, Ames, Iowa.

Murphy, C. (2020). 100,000 Retail Stores could Close by 2025, accelerated by COVID-19, analysts say. Retrieved October 13, 2020, from https://www.usatoday.com/story/money/2020/04/21/100-000-retail-stores-could-close-by-2025-ubs-report/2997122001/

Nadanyiova, M., Kliestikova, J., & Kolencik, J. (2018). Sensory marketing from the perspective of a support tool for building brand value. *Economics and Culture, 15*(1), 96-104. doi:10.2478/jec-2018-0011

Nah, Eschenbrenner, & Dewester (2011). Enhancing Brand Equity Through Flow and Telepresence: A Comparison of 2D and 3D Virtual Worlds. *MIS Quarterly*, *35*(3), 731–47.

Naik, C., Gantasala, S., & Prabhakar, G. (2010). SERVQUAL, Customer Satisfaction and Behavioural Intentions in Retailing. *European Journal of Social Sciences*, *17*(2), 200-213.

Nasır, S. (2015). Customer Relationship Management Strategies in the Digital Era. *Advances in Marketing, Customer Relationship Management, and E-Services*. https://doi.org/10.4018/978-1-4666-8231-3

Naver. (n.d.). Citation. In Naver Korean Dictionary. Retrieved June 9, 2021, from https://dict.naver.com/

Negash, A., Tsegaye, A., van Treuren, R., & Visser, B. (2002). AFLP analysis of enset clonal diversity in south and southwestern Ethiopia for conservation. *Crop Science, 42*(4), 1105-1111.

Nemat, R. (2011). Taking a look at different types of e-commerce. *World Applied Programming, 1*(2), 100-104.

Ngai, E. W. T., Xiu, L., & Chau, D. C. K. (2009). Application of data mining techniques in customer relationship management: A literature review and classification. *Expert Systems with Applications*, *36*(2), 2592–2602. https://doi.org/10.1016/j.eswa.2008.02.021

Novak, Hoffman, & Yung (2000). Measuring the Customer Experience in Online Environments: A Structural Modeling Approach. *Marketing Science*, *19*(1), 22–42.

O'Leary, C., Rao, S., & Perry, C. (2004). Improving customer relationship management through database/internet marketing. *European Journal of Marketing, 38*(3/4), 338-354. doi:10.1108/03090560410518585

Oliver, R. L. (1992). An investigation of the attribute basis of emotion and related affects in consumption: suggestions for a stage-specific satisfaction framework. *ACR North American Advances, 19*, 237-244.

Olson, J. R., & Boyer, K. K. (2003). Factors influencing the utilization of Internet purchasing in small organizations. *Journal of Operations Management, 21*(2), 225-245.

O'Mahony, M., & Rousseau, B. (2003). Discrimination testing: A few ideas, old and new. *Food Quality and Preference, 14*(2), 157-164. doi:10.1016/s0950-3293(02)00109-x

Ottosson, S. (2002). Virtual reality in the product development process. *Journal of Engineering Design*, *13*(2), 159-172.

Palmer, J. W. (2002). Web site usability, design, and performance metrics. *Information systems research, 13*(2), 151-167.

Pan, S. L., & Lee, J. (2003). Using e-crm for a unified view of the customer. *Communications of the ACM, 46*(4), 95-99. doi:10.1145/641205.641212

Pappa, D., & Stergioulas, L. (2006). G2C AND C2G: EMERGING PRINCIPLES AND ARCHITECTURES IN E-GOVERNMENT AND EPARTICIPATION. In *EGovernment Workshop '06 (eGOV06)*. West London: Brunel University.

Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1985) A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal of Marketing, 49*(4), 41-50.

Payne, A., & Frow, P. (2005). A Strategic Framework for Customer Relationship Management. *Journal of Marketing, 69*, 167-176.

Peck, J., & Wiggins, J. (2006). It just feels good: Customers' affective response to touch and its influence on persuasion. *Journal of Marketing, 70*(4), 56-69. doi:10.1509/jmkg.70.4.56

Pereira, M., Coelho, A., & Bairrada, C. (2016). The Impact of Senses on Brand Attitude: Inditex Case Study. In *International Journal of Marketing Communications and New Media, 4*(7), 67-84.

Petit, O., Basso, F., Merunka, D., Spence, C., Cheok, A., & Oullier, O. (2016). Pleasure and the Control of Food Intake: An Embodied Cognition Approach to Consumer Self-Regulation. *Psychology & Marketing, 33*(8), 608–19.

Petit, O., Velasco, C., & Spence, C. (2019). Digital sensory marketing: Integrating new technologies into multisensory online experience. *Journal of Interactive Marketing, 45*, 42-61.

Petit, O., Velasco, C., & Spence, C. (2018). Multisensory consumer-packaging interaction (CPI): The role of new technologies. *Multisensory Packaging,* 349-374. London, England. doi:10.1007/978-3-319-94977-2_13

Petkus, E. (2004). Enhancing the application of experiential marketing in the arts. *International Journal of Nonprofit and Voluntary Sector Marketing, 9*(1), 49-56. doi:10.1002/nvsm.232

Piao, C., An, J., & Fang, M. (2007). Study on credit evaluation model and algorithm for c2c e-commerce. *IEEE International Conference on E-Business Engineering (ICEBE'07).* Hong Kong, China. doi:10.1109/icebe.2007.77

Pine, B. J., & Gilmore, J. H. (2013). The experience economy: Past, present and future. In *Handbook on the experience economy*. Edward Elgar Publishing. Cheltenham, England.

Pitt, L. F., Watson, R. T., & Kavan, C. B. (1995). Service quality: A measure of information systems effectiveness. *MIS Quarterly, 19*(2), 173-187. http://dx.doi.org/10.2307/249687

Poong, Y., Zaman, K., & Talha, M. (2006). E-commerce today and tomorrow. *Proceedings of the 8th International Conference on Electronic Commerce The New E-commerce: Innovations for Conquering Current Barriers, Obstacles and Limitations to Conducting*

Successful Business on the Internet - ICEC '06. Fredericton, Canada. doi:10.1145/1151454.1151459

Prahalad, C. K., & Ramaswamy, V. (2000). Co-opting customer competence. *Harvard Business Review, 78*(1), 79-87.

Prahalad, C.K., & Ramaswamy, V. (2004a). Co-creation experiences: The next practice in value creation. *Journal of Interactive Marketing*, *18*(3), 5-14.

Prahalad, C.K., & Ramaswamy, V. (2004b). Co-creating unique value with customers. *Strategy & Leadership*. *32*(3), 4-9.

Qin, Z. (2009). *Introduction to e-commerce*. Berlin: Springer.

Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers & Education*, *147*, 103-778. https://doi.org/10.1016/j.compedu.2019.103778

Raichle, M. E., & Snyder, A. Z. (2007). A default mode of brain function: A brief history of an evolving idea. *NeuroImage, 37*(4), 1083-1090. doi:10.1016/j.neuroimage.2007.02.041

Raman, P., Wittmann, C. M., and Rauseo, N. A. (2006). Leveraging CRM for Sales: The role of organizational capabilities in successful CRM implementation. *Journal of Personal Selling & Sales Management, 26*(1), 39-53.

Ramsøy, T. Z. (2019). Building a foundation for Neuromarketing and Consumer neuroscience research. *Journal of Advertising Research, 59*(3), 281-294. doi:10.2501/jar-2019-034

Rao, S., & Perry, C. (2002): Thinking about relationship marketing: Where are we now? *Journal of Business & Industrial Marketing, 17*(7), 598-614

Reddick, C. G. (2004). A two-stage model of e-government growth: Theories and empirical evidence for U.S. cities. *Government Information Quarterly, 21*(1), 51-64. doi:10.1016/j.giq.2003.11.004

Rose, G., Khoo, H. M., & Straub, D. (1999). Current technological impediments to business-to-consumer electronic commerce. *Communications of the Association for Information Systems, 1*(1), 16. doi:10.17705/1cais.00116

Rouse, M. (2020). *What is CRM (Customer Relationship Management)?* TechTarget. https://searchcustomerexperience.techtarget.com/definition/CRM-customer-relationship-management

Saarijärvi, H., Karjaluoto, H., & Kuusela, H. (2013). Customer relationship management: the evolving role of customer data. *Marketing Intelligence & Planning*, *31*(6), 584–600. https://doi.org/10.1108/mip-05-2012-0055

Salameh, A., Hatamleh, A., Azim, M., & Kanaan, A. (2020). Customer oriented determinants of e-CRM success factors. *Uncertain Supply Chain Management, 8*(4), 713-720.

Samsung Economic Research Institute (1997). Internet Round and Corporate Response. *CEO Information*, 102.

Santa, R., MacDonald, J. B., & Ferrer, M. (2019). The role of trust in e-Government effectiveness, operational effectiveness and user satisfaction: Lessons from Saudi Arabia in e-G2B. *Government Information Quarterly*, *36*(1), 39–50. https://doi.org/10.1016/j.giq.2018.10.007

Schlosser, A. E. (2003). Experiencing products in the virtual world: the role of goal and imagery in influencing attitudes versus purchase intentions. *Journal of consumer research*, *30*(2), 184-198.

Schmitt, B. H. (1999). *Experiential marketing: How to get customers to sense, feel, think, act, and relate to your company and brands*. New York, New York: Free Press.

Schmitt, B. H. (2003). *Customer experience management: A revolutionary approach to connecting with your customers*. Hoboken: Wiley.

Schultz, D. E. (2009). *Building Customer-Brand Relationships*. M E Sharpe Incorporated. Armonk, NY

Schwab, K. (2016). *The fourth industrial Revolution: What it means and how to respond.* World Economic Forum. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/.

Scupola, A. (2008). i E-Services: Definition, characteristics and taxonomy [Editorial]. *Roskilde University*. Roskilde, Denmark.

Sedighi, M. M., Mokfi, T., & Golrizgashti, S. (2012). Proposing a customer knowledge management model for customer value augmentation: A home appliances case study. *Journal of Database Marketing & Customer Strategy Management*, *19*(4), 321–347. https://doi.org/10.1057/dbm.2012.32

Septiani, R., Handayani, P. W., & Azzahro, F. (2017). Factors that affecting behavioral intention in online transportation service: Case study of GO-JEK. *Procedia Computer Science*, *124*, 504–512. https://doi.org/10.1016/j.procs.2017.12.183

Shambour, Q., & Lu, J. (2011). A hybrid trust-enhanced collaborative filtering recommendation approach for personalized government-to-business e-services. *International Journal of Intelligent Systems, 26*(9), 814-843. doi:10.1002/int.20495

Sheikh, S. M., & Basti, M. (2015). Customer satisfaction in business to Consumer (B2C) E-commerce: A comparative study of Turkey and Pakistan. *Eurasian Journal of Business and Economics, 8*(16), 73-100. doi:10.17015/ejbe.2015.016.05

Shihab, M. R., Maulana, D., & Hidayanto, A. N. (2018). Determinants of repurchase intention in c2c e-commerce. *Information Resources Management Journal, 31*(3), 54-76. doi:10.4018/irmj.2018070104

Shin, I. G. (2002). *A study on the major success factors of CRM implementation* [Master's thesis, Chung-Ang University]. Graduate School of Industrial Management, Chung-Ang University. Seoul, South Korea.

Shin, J. H. (2001). *A study on data mining for e-CRM construction in internet shopping malls* [Master's thesis, Honam University]. Honam University. Gwangju, South Korea.

Shiv, B., & Yoon, C. (2012). Integrating neurophysiological and psychological approaches: Towards an advancement of brand insights. *Journal of Consumer Psychology, 22*(1), 3-6. doi:10.1016/j.jcps.2012.01.003

Shukla T. (2007), Experiential Marketing. The new paradigm. *Indian Journal of Marketing*, *37*(4), 10-12.

Simmons, R. (2015). *The Relationship Between Customer Relationship Management Usage, Customer Satisfaction, and Revenue* [Doctoral dissertation]. Walden Dissertations and Doctoral Studies, Minneapolis.

Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics*, *69*(1), 99-118.

Simonson, A. & Schmitt, B. H. (1997). *Marketing Aesthetics: The Strategic Management of Brands, Identity and Image.* Simon and Schuster. New York, United States.

Singh, S. (2020). Impact of neuromarketing applications on consumers. *Journal of Business and Management, 26*(2), 33-52.

Sirakaya, E., Petrick, J., & Choi, H.S. (2004). The role of mood on tourism product evaluations. *Annals of Tourism Research, 31*(3), 517-539.

Smilansky, S. (2009). *Experiential marketing: A practical guide to interactive brand experiences*. London: Kogan Page.

Smith, K., & Hanover, D. (2016). *Experiential marketing secrets, strategies, and success stories from the world's greatest brands*. Hoboken, NJ: Wiley.

Song H. S. (2002), e-CRM Establishment and Management Strategy. New Proposal. Seoul, South Korea.

Song H. S. (2001). e-CRM construction and operation strategy. New Proposal. Seoul, South Korea.

Song, J., & Zinkhan, G. (2008). Determinants of Perceived Web Site Interactivity. *Journal of Marketing*, *72*(2), 99–113.

Song, Y. K. (2016). 2016 Modularization of economic development experience: Government policy for e-commerce promotion, Ministry of Strategy and Finance. *Korea Development Institute.*

Špaček, D., Csótó, M., & Urs, N. (2020). Questioning the real citizen-centricity of e-government development: Digitalization of G2C services in selected CEE countries. *The NISPAcee Journal of Public Administration and Policy, 8*(1), 213-243.

Spence C., & Deroy, O. (2013). Crossmodal mental imagery. *Multisensory Imagery*, New York, NY: Springer, 157–183.

Srivastava, R. (2008). How experiential marketing can be used to build brands - a case study of two specialty stores. *Innovative Marketing, 4*(2), 70-76.

Stoll, M., Baecke, S., & Kenning, P. (2008). What they see is what they get? An fmri-study on neural correlates of attractive packaging. *Journal of Consumer Behaviour, 7*(4-5), 342-359. doi:10.1002/cb.256

Stone, H., & Sidel, J. L. (2004). Introduction to sensory evaluation. Sensory Evaluation Practices (Third Edition). *Academic Press, San Diego*, 1-19.

Storey, V. C., Straub, D. W., Stewart, K. A., & Welke, R. J. (2000). A conceptual investigation of the e-commerce industry. *Communications of the ACM, 43*(7), 117-123. doi:10.1145/341852.341871

Steuer, J. (1992). Defining Virtual Reality: Dimensions Determining Telepresence. *Journal of Communication*, *42*(4), 73–93. https://doi.org/10.1111/j.1460-2466.1992.tb00812.x

Stokes, R. (2012). *EMarketing: the essential guide to online marketing*. BCcampus. Vancouver, Canada.

Stringfellow, A., Nie, W., & Bowen, D. E. (2004). CRM: Profiting from understanding customer needs. *Business Horizons*, *47*(5), 45–52. https://doi.org/10.1016/j.bushor.2004.07.008

Sun, Y., Fang, Y., Lim, K. H., & Straub, D. (2012). User Satisfaction with Information Technology Service Delivery: A Social Capital Perspective. *Information Systems Research*, *23*(4), 1195–1211. https://doi.org/10.1287/isre.1120.0421

Sunaga, T., Park, J., & Spence, C. (2016). Effects of lightness-location congruency on consumers' purchase decision-making. *Psychology & Marketing, 33*(11), 934-950.

Swift, R. S. (2000). *Accelerating customer relationships using Crm and relationship technologies*. Prentice Hall. Upper Saddle River, New Jersey.

Tatsiopoulos, I., Panayiotou, N., & Ponis, S. (2002). A modelling and evaluation methodology for E-COMMERCE enabled bpr. *Computers in Industry, 49*(1), 107-121. doi:10.1016/s0166-3615(02)00062-3

Terzi, N. (2011). The impact of e-commerce on international trade and employment. In *Encyclopedia of E-Commerce Development, Implementation, and Management* (pp. 2271-2287). IGI Global. Hershey, Pennsylvania.

Thesen, T., Vibell, J. F., Calvert, G. A., & O'sterbauer, R. A. (2004). Neuroimaging of multisensory processing in vision, audition, touch, and olfaction. *Cognitive Processing, 5*(2), 84-93. doi:10.1007/s10339-004-0012-4

Thompson, C. (2003). There's a Sucker Born in Every Medial Prefrontal Cortex. *New York Times Magazine, 1*(1), 34-42.

Tinnsten, C. (2013). *Implementing a system of Customer Relationship Management* (thesis). UMEA University, Umea.

Tran, V. D., & Le, N. M. (2020). Impact of Service Quality and Perceived Value on Customer Satisfaction and Behavioral Intentions: Evidence from Convenience Stores in Vietnam. *The Journal of Asian Finance, Economics and Business*, *7*(9), 517–526. https://doi.org/10.13106/jafeb.2020.vol7.no9.517

Trentmann, F. (2011). Consumer Society–RIP. A Comment1. *Contemporary European History, 20*(1), 27-31.

Trepper, C. (2000). *Customer care goes end-to-end*. InformationWeek. http://www. informationweek.com

Tsaur, S. H., Chiu, Y. T., & Wang, C. H. (2007). The visitors behavioral consequences of experiential marketing: An empirical study on Taipei Zoo. *Journal of Travel & Tourism Marketing, 21*(1), 47-64.

Van Noort, G., Voorveld, H., & Van Reijmersdal, E. (2012). Interactivity in Brand Web Sites: Cognitive, Affective, and Behavioral Responses Explained by Consumers' Online Flow

Experience. *Journal of Interactive Marketing*, *26*(4), 223–234.

Velasco, C., Wan, X., Knoeferle, K., Zhou, X., Salgado-Montejo, A., & Spence, C. (2015). Searching for Flavor Labels in Food Products: The Influence of Color-Flavor Congruence and Association Strength. *Frontiers in Psychology*, *6*(301), 1-10.

Velasco, C., Woods, A., Cheok, A., & Spence, C. (2016). Crossmodal Correspondences Between Taste and Shape, and Their Implications for Product Packaging: A Review. *Food Quality and Preference*, *52*, 17–26.

Visser, E., & Lanzendorf, M. (2004). Mobility and accessibility effects of b2c e-commerce: A literature review. *Tijdschrift Voor Economische En Sociale Geografie, 95*(2), 189-205. doi:10.1111/j.0040-747x.2004.00300.x

Vulkan, N. (2003). The economics of e-Commerce: A strategic guide to understanding and designing the online marketplace. Princeton University Press. Princeton, New Jersey.

Wahab, S., & Ali, J. (2010). The Evolution of Relationship Marketing (RM) Towards Customer Relationship Management (CRM): A Step towards Company Sustainability. *Information Management and Business Review*, *1*(2), 88–96. https://doi.org/10.22610/imbr.v1i2.875

Waite, K., & Harrison, T. (2002). Consumer expectations of online information provided by bank websites. *Journal of Financial Services Marketing, 6*(4), 309-322.

Wang, M. Y. (2008). Measuring e-CRM service quality in the library context: a preliminary study. *The Electronic Library*, *26*(6), 896–911. https://doi.org/10.1108/02640470810921655

Wang, S. C., Wang, S. S., Chang, C. M., Yan, K. Q., & Lin, Y. P. (2014). Systematic Approach for Digital Marketing Strategy through Data Mining Technology. *Journal of Computers*. *25*(3), 32-51.

Wansink, B., & Ittersum, K. (2005). Shape of glass and amount of alcohol poured: Comparative study of effect of practice and concentration. *BMJ, 331*(7531), 1512-1514. doi:10.1136/bmj.331.7531.1512

Webber, R. (2013). The evolution of direct, data and digital marketing. *Journal of Direct, Data and Digital Marketing Practice*, *14*(4), 291–309. https://doi.org/10.1057/dddmp.2013.20

Weltevreden, J. W., & Rotem-Mindali, O. (2009). Mobility effects of b2c and C2c e-commerce in the Netherlands: A quantitative assessment. *Journal of Transport Geography, 17*(2), 83-92. doi:10.1016/j.jtrangeo.2008.11.005

Westbrook, R. A., & Oliver, R. L. (1991). The dimensionality of consumption emotion patterns and consumer satisfaction. *Journal of consumer research, 18*(1), 84-91.

Wigand, R. (1995). Electronic Commerce Reduced Transaction Costs. *Electronic Markets*, *5*(3), 1–5. https://doi.org/10.1080/10196789500000028

Wigand, R. T. (1997). Electronic commerce: Definition, theory, and context. *The Information Society, 13*(1), 1-16. doi:10.1080/019722497129241

Williams, A. (2006). Tourism and hospitality marketing: Fantasy, feeling and fun. *International Journal of Contemporary Hospitality Management, 18*(6/7), 482-495

Willis, J. L. (2004). What impact will e-commerce have on the US economy? *Economic Review-Federal Reserve Bank of Kansas City, 89*(QII), 53-68.

Woods, A., & Spence, C. (2016). Using Single Colors and Color Pairs to Communicate Basic Tastes. *i-Perception, 7*(4), 1-15.

Woodside, A. G., Frey, L. L., & Daly, R. T. (1989). Linking service quality, customer satisfaction, and behavioral intention. *Journal of Health Care Marketing, 9*(4), 5 – 17.

Yim, Chu, & Sauer (2017). Is Augmented Reality Technology an Effective Tool for e-

Commerce? An Interactivity and Vividness Perspective. *Journal of Interactive Marketing*, *39*(C), 89–103.

Yoon, J. H., & Kim, Y. M. (2006). *A Study on the Influence of e-CRM Components of Internet Shopping Malls on Customer Satisfaction and Post-Purchase Behavior. Korean Society for Management Information Systems*. Seoul, South Korea.

Young, S. (2011). Neuroscience Explains the Emotional Buy. *Brand Packaging*, *15*(5), 16-22.

Yrjölä, M., Rintamäki, T., Saarijärvi, H., & Joensuu, J. (2017). Consumer-to-consumer e-commerce: Outcomes and implications. *The International Review of Retail, Distribution and Consumer Research, 27*(3), 300-315. doi:10.1080/09593969.2017.1314864

Yuan, Y., & Wu, C. (2008). Relationships among Experiential Marketing, Experiential Value, and Customer Satisfaction. *Journal of Hospitality & Tourism Research, 32*(3), 387-410. doi:10.1177/1096348008317392

Zaim, H., Bayyurt, N., & Zaim, S. (2010). Service Quality and Determinants of Customer Satisfaction in Hospitals: Turkish Experience. *International Business & Economics Research Journal (IBER)*, *9*(5). https://doi.org/10.19030/iber.v9i5.8145

Zins, A. (2001). Timing and Contextual Effects on Satisfaction Measurement. *E - European Advances in Consumer Research*, *5*, 37–45.

Zatalini, M., & Pamungkas, T. (2017). Exploring the success factors of e-crm implementation on B2C e-commerce: Satisfaction and loyalty a conceptual framework. *Jurnal Ekonomi Bisnis, 22*(2), 94-106.

Zhao, J., Truell, A., Alexander, M., & Davis, R. (2007). E-GOVERNEMENT-TO-BUSINESS service quality and USER SATISFACTION: An assessment of the U.S. State G2B web portals. *Issues In Information Systems, 8*(2), 140-145. doi:10.48009/2_iis_2007_140-145

Zielinski, L. (2016). Neuromarketing: Going beyond focus groups. *Brand Packaging*, *20*(5), 36-39.

Zoldan, A. (2021, May 3). *Council post: The Fourth Revolution: Its challenges for businesses and individuals.* Forbes. https://www.forbes.com/sites/forbesbusinesscouncil/2021/05/03/the-fourth-revolution-its-challenges-for-businesses-and-individuals/?sh=79f4a9249bc4.

.Zurawicki, L. (2011). Neuromarketing: Exploring the Brain of the Consumer. *Journal of Retailing and Consumer Services, (53)*2, 378-379.

Appendix A.

ID			

A Study on the Impact of Marketing Using Virtual Mirror Technology on Customer Satisfaction

Hello?

In the process of the 4th industrial revolution, the virtual mirror technology provided by offline and online businesses (e.g. department stores or online or mobile shopping malls) (a technology that appears to be worn without actually wearing clothes) affects customer behavior. Research is in progress. Your valuable opinions will be used as research data.

We would appreciate it if you could take the time to complete the survey. This investigation is confidential in accordance with Article 33 of the Statistical Law and is conducted anonymously. All of the information you respond to will be used for research purposes only. Once again, thank you for your comments.

May 2021

SQ0-1. Collection of personal information • Use • Do you agree to provide it to a third party? This survey is for research purposes only. If you agree to the use of personal information, we will conduct a survey. Would you like to take part in the survey?

① Participate in survey after consenting to personal information ② I do not agree with personal information, and do not survey ☞ End of survey

SQ0-2. Have you ever made a purchase through virtual mirror technology experience?

① Yes ② No

SQ0-2-1. If you use virtual mirror technology, which product would you buy first?

1) Online purchase

① Clothing ② Accessories (necklaces, earrings) ③ Beauty (hairstyles, etc.) ④ Home appliances ⑤ Furniture ⑥ Others( )

2) Offline purchase

① Clothing ② Accessories (necklaces, earrings) ③ Beauty (hairstyles, etc.) ④ Home appliances ⑤ Furniture ⑥ Others ( )

■ The figure below is an image to help you understand during this survey. Even if you don't have experience in using it, please answer what it would be like to assume use.

Photo source: Samsung Newsroom

○ Offline (department stores, etc.) and online or mobile shopping malls (e-commerce) provide a new shopping opportunity that combines virtual mirror technology (a technology that looks like you've been wearing clothes without actually wearing clothes).

• Delivery of various information to customers

• Resolve customer complaints through virtual simulation

• Considering the convenience and satisfaction of customers and stores

• Maximization of convenience for various consumers

PART A. Recognition of sensory stimulation of virtual mirror technology

A1. The following is a questionnaire on perception of sensory stimulation.

Item evaluation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
A1-1. If you use virtual mirror technology, you will feel your image well.	①	②	③	④	⑤

A1-2. If you use virtual mirror technology, you feel like you are actually wearing it.	①	②	③	④	⑤
A1-3. Using virtual mirror technology, it will be possible to try on, change, and resize.	①	②	③	④	⑤

PART B. Recognition of emotional reactions

B1. The following is a questionnaire on perceptions of enjoyment.

Item evaluation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
B1-1. It will be fun to explore products with virtual mirror technology.	①	②	③	④	⑤
B1-2. It will be very interesting to me to explore products with virtual mirror technology.	①	②	③	④	⑤
B1-3. Exploring products with virtual mirror technology will make me feel special.	①	②	③	④	⑤
B1-4. The products I have experienced with virtual mirror technology will arouse my curiosity.	①	②	③	④	⑤

B2. The following is a questionnaire on the perception of perceived product quality.

Item evaluation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
B2-1. Mirror service using virtual reality technology will help customer understand about products well.	①	②	③	④	⑤
B2-2. While using the mirror service using virtual reality technology, customers can easily perceive products.	①	②	③	④	⑤
B2-3. While using mirror services using virtual mirror technology, customers can get more	①	②	③	④	⑤

accurate information about products and services.					

B3. The following is a questionnaire on perception of telepresence.

Item evaluation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
B3-1. The mirror service using virtual mirror technology seems to create a new space for me.	①	②	③	④	⑤
B3-2. The mirror service using virtual mirror technology will make you feel as if you are in that place.	①	②	③	④	⑤
B3-3. By looking at the main screen of the mirror using virtual reality technology, you will be able to easily grasp the screen composition.	①	②	③	④	⑤

B4. The following is a questionnaire on perceptions of interaction.

Item evaluation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
B4-1. If you use a virtual mirror service using virtual reality technology, you will want to use the product.	①	②	③	④	⑤
B4-2. If you use virtual mirror service using virtual reality technology, you will feel familiarity with products and brands.	①	②	③	④	⑤
B4-3. If you use the virtual mirror service using virtual reality technology, you will establish a lasting relationship with your product and brand (membership registration, etc.)	①	②	③	④	⑤
B4-4. Mirror service using virtual reality technology is a helpful tool for communication and transactions between providers and customers.	①	②	③	④	⑤

B5. The following is a questionnaire on perception of immersion.

Item evaluation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
B5-1. If you use a mirror service using virtual reality technology, you will be well devoted to virtual service.	①	②	③	④	⑤
B5-2. If you use a mirror service using virtual reality technology, you will be well immersed in virtual service.	①	②	③	④	⑤
B5-3. When using a mirror service using virtual reality technology, it is likely that interest will be focused on virtual services.	①	②	③	④	⑤
B5-4. It seems that you will forget that the time passes while using the mirror service using virtual reality technology.	①	②	③	④	⑤

PART C. Awareness of behavioral reactions

C1. The following is a questionnaire on the perception of satisfaction with expectations.

Item evaluation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
C1-1. Virtual mirror technology will satisfy expectations.	①	②	③	④	⑤
C1-2. Virtual mirror technology is satisfactory by providing new information.	①	②	③	④	⑤
C1-3. Overall, I think I will be satisfied with the pleasure of virtual mirror technology.	①	②	③	④	⑤

C2. The following is a questionnaire on perception of intention to use.

Item evaluation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree
C2-1. I think that I will want to use virtual mirror technology again.	①	②	③	④	⑤
C2-2. Virtual mirror technology services will continue to be used if upgraded.	①	②	③	④	⑤
C2-3. I will use a shopping mall with a mirror using virtual mirror technology.	①	②	③	④	⑤
C2-4. I will introduce a shopping mall with a mirror using virtual mirror technology to others.	①	②	③	④	⑤

※ **Demographic Characteristics**

SQ1. What is your gender? ① Female ② Male

SQ2. How old are you?

① 20~29 years old ② 30~39 years old ③ 40~49 years old

④ 50~59 years old ⑤ 60~69 years old ⑥ 70 years old or older

SQ3. What is the average household income per month? (in Ten Thousand Won)

① Less than 200 ② Over 200~Less than 300 ③ Over 300~ Less than 400

④ Over 400~Less than 500 ⑤ Over 500~ Less than 600 ⑥ Over 600

SQ4. What is your final level of education?

① High School graduation ② University graduation ③ Master's graduation

④ Ph.D. graduation

SQ5. What is your job?

① Practitioner ② Office/Administrative Position ③ Production

④ Self-Employment ⑤ Official ⑥ Student

⑦ Housewife ⑧ Inoccupation ⑨ Other ( )

SQ6. Where is your resident registration area?

① Seoul ② Incheon ③ Busan

④ Daejeon ⑤ Daegu ⑥ Gwangju

⑦ Ulsan ⑧ Sejong ⑨ Gyeonggi

⑩ Gangwon ⑪ Chungbuk ⑫ Chungnam

⑬ Jeonbuk ⑭ Jeonnam ⑮ Gyeongbuk

⑯ Gyeongnam ⑰ Jeju

- Thank you for responding to the end -