

Does SMS advertising still have relevance to increase consumer purchase intention? A Hybrid PLS-SEM-Neural Network Modelling Approach

Anshuman Sharma

Assistant Professor, Department of Marketing
College of Business Administration, Ajman University, Ajman, UAE
Email: profasharma@gmail.com

Yogesh K. Dwivedi

Professor of Digital Marketing and Innovation
Director of Emerging Markets Research Centre (EMaRC)
Co-Director of Research
School of Management, Room #323
Swansea University, Bay Campus
Fabian Bay, Swansea, SA1 8EN, Wales, UK.
TEL (Office): +44 (0) 1792 602340
Email: Y.k.dwivedi@swansea.ac.uk ; Ykdwivedi@gmail.com

Vikas Arya

Assistant Professor, Department of Marketing
Rajalakshmi School of Business, Chennai, India
Email: Vikas.aryaa@yahoo.in ; Vikas.arya@rsb.edu.in

Muhammad Qutubuddin Siddiqui

Lecture, Department of Marketing
College of Business Administration, Ajman University, Ajman, UAE
Email: m.siddiqui@ajman.ac.ae

Abstract

SMS advertising perception has been found to have a significant influence over consumer purchase intention either directly or indirectly. However, there is a dearth of comprehensive studies, suggesting precursors of SMS advertising perception and the process by which it influences the purchase intention. This study concentrates on answering this particular question by developing a research model and empirically validating it, based on the stimulus–organism–response (SOR) framework. To evaluate and validate the results, the study adopted a two-stage, hybrid model using partial least square-structural equation modeling and neural network modeling. The findings suggest SMS advertising perception has a significant effect on purchase intention, mediated by advertising value and attitude toward SMS advertisement. The main contribution of this study is the introduction of a new higher-order construct, SMS advertising perception, for the first time in SMS advertising literature, and the validation of the transmittal effect of advertising value and attitude toward SMS advertising between SMS advertising perception and purchase intention. The study provides empirical evidence to support the SOR framework and helps to expand the scope of SMS advertising perception research and its effect

on purchase intention. Additionally, it benefits marketers by fostering better decision-making to devise effective advertising campaigns using mobile-based SMS service commercials.

Keywords – Advertising Value; Artificial Neural Network; Attitude toward SMS Advertising; Brand Familiarity; SMS Advertising Perception; PLS-SEM; Purchase Intention

1. Introduction

The recent decades has been witnessing a phenomenal growth in the usage of handheld devices and mobile communication technologies across the world. This advancement has opened new channels for marketers to reach their customers. Along with the expanded reach, these technologies provide customization benefits to marketers, such as targeted customer base, trends of tastes, choices, and preferences among the customers, identification of prospective customers, and so on. Mobile communications have become a prominent choice for marketers and advertisers to promote products and services among various consumer segments (Dwivedi et al., 2020; Krishen et al., 2021; Wang & Genc, 2019), because of their unique features and extreme diffusion rate (Tsang et al., 2004). Despite digitalization, the short message service (SMS), a text-based mobile communication, remains a popular and effective tool for delivering information from one person to another (Bakr et al., 2018; Muk & Chung, 2015; Shareef et al., 2017). SMS is considered an important tool to share value-added services to customers (Uddin et al., 2019). With the expansion of virtual platforms on which the credibility and authenticity of viewers and message receivers are questionable, SMS has become a trusted platform to communicate to genuine and identified customers. SMS is considered as a better advertising tool for reaching specific market segments with highly customized, responsive, and timely promotional messages, which attract young consumers (Chen & Hsieh, 2012; Drossos et al., 2013). Because of its ease of use and lesser technological dependency, SMS advertising is often preferred to other forms of mobile advertising tools (Bakr et al., 2018; Cheng et al., 2009; Lin & Chen, 2015).

SMS advertising is a form of push advertising, as it is initiated from the marketer's side and not by the customer (Rau et al., 2011). SMS advertising involves "disseminating...information with the help of short message service" (Tsang et al., 2004). In an attempt to understand the relevancy of SMS advertising in the present scenario, it has been found that more than ninety percent of received SMSs are read within a very short period of fifteen minutes after sending

(Bakr et al., 2019). Besides, SMSs enjoys an extremely higher open rate (Essany, 2014), than email marketing (Aydin & Karamehmet, 2017). SMSs also enjoy an excellent complete text-reading rate. According to Textlocal's (2017) report, ninety percent of the SMSs are read within three minutes of the delivery and around ninety-eight percent of SMSs are likely to be read by recipients by the end of the same day. These arguments and findings strongly suggest that SMSs are still the best choice for one-to-one information sharing. These benefits of SMSs make it one of the most effective ways for marketers to reach prospective and existing consumers (Bamoriya, 2012). Features such as the portability, reachability, and ubiquity of mobile phones make SMSs unique and attractive to marketing companies, meaning that, in the age of the smartphone, such companies are still emphasizing the use of SMS advertising in their cross-media advertising strategy.

The present study rests its theoretical foundation on the SOR framework, popularly known as Stimulus-Organism-Response framework, proposed by Mehrabian and Russel (1975), and a very popular model in environmental psychology (Chopdar & Balakrishnan, 2020). It is used to investigate and explain the relationship between consumers' perceptions of SMS advertising and their purchase intentions, as well as the mediating roles of advertising value (Chen et al., 2019) and attitude toward SMS advertising (Bananuka et al., 2019) on this relationship. Further, the moderating role of brand familiarity (Rhee & Jung, 2019) has also been investigated in the study on the hypothesized relationships in the research model. The study is also based on the SOR framework in an attempt to determine the mechanisms by which SMS advertising perception affects purchase intention. The SOR framework emphasizes that factors related to SMS advertising content (i.e. credibility, entertainment, informativeness, irritation, and message relevance) that generate SMS advertising perception (Stimulus), which creates advertising value and attitude toward SMS advertising (Organism), and ultimately, lead to the purchase intention (Response). This research postulates that advertising value and attitude toward SMS advertising are likely to be influenced by SMS advertising perception, thus affecting purchase intention. The study progresses in four investigative stages. First, it proposes and tests the reliability and validity of the type-two higher (second) order (reflective-formative) construct, i.e. SMS advertising perception. Second, it evaluates the direct effect of SMS advertising perception, advertising value, and attitude toward SMS advertising on purchase intention. Third, it assesses the parallel as well as serial mediation effect of advertising value and attitude toward SMS advertising between SMS advertising perception

and purchase intention. Fourth, it explores the moderating effect of brand familiarity on all of the relationships in the research model.

The present study contributes to the literature of mobile advertising in several ways by incorporating the higher-order constructs, SMS advertising perception, attitude toward SMS advertising, advertising value, purchase intention, and brand familiarity; and investigating the direct and indirect relationships among these constructs. There have been many studies on a few of the relationships among the constructs listed above (Aydin & Karamehmet, 2017; Chu, 2018; Liu et al., 2012; Malik & Dubey, 2013; Martins et al., 2019; Perera & Chaminda, 2013; Shareef et al., 2016; Wang & Genc, 2019), but there is a dearth of studies concentrating comprehensively on the direct and indirect relationships among the constructs in a single model and a single study. The majority of empirical studies (Aydin & Karamehmet, 2017; Bakr et al., 2019; Lin & Bautista, 2018; Martins et al., 2019; Tsang & Teng, 2016; Wang & Genc, 2019) used explanatory methods such as structural equation modeling (SEM) in mobile advertising. This is the first study to adopt linear and nonlinear modeling to use the SOR framework for SMS advertising.

A two-stage analytical method for testing and validation of the proposed model is used in this study. PLS-SEM was used in the first stage to test the hypothesized relationship and to understand the impact of SMS advertising perception, advertising value, and attitude toward SMS advertising on purchase intention. In the second stage, neural network modeling (NNM) was used to rank the key antecedents and validate the PLS-SEM result. In this study, we chose ANN because it outperforms traditional statistical tools in detecting both linear and nonlinear relationships, rather than just linear relationships. Many other studies used the same methodology as this one (Al-Shihi et al., 2018; Sharma et al., 2019; Sharma & Sharma, 2019). To determine and rank the relative importance of SMS advertising perception, advertising value, and attitude toward SMS advertising as a predictor of purchase intention. The sequential multi-method analytical approach derives its justification from the premise that customers choose to assess alternatives based on just a few characteristics, and therefore, the assessment process might not always be countervailing (Chiang et al., 2006; Sharma & Sharma, 2019). The use of the neural network model ensures reliability in the validation of the construct, even for the users' non-compensatory decisions. This study, therefore, presents a more robust and predictive model that can overcome the fundamental constraints of the existing model and provide a predictive analysis of the consumer's purchase intention.

In the subsequent sections, this paper presents detailed information on review of literature, research model and hypotheses, research methodology, analysis and findings. The study concludes with an elaborative discussion section at the end.

2. Literature Review

2.1. SMS advertising perception

Consumers' perception of SMS advertising is a very crucial factor in developing a positive attitude toward a brand and further leading to the intentions to purchase (Akkaya et al., 2017). The consumers perceive the relative worth and utility of the SMS advertising which directly influences their attitude building towards the advertising (Malik & Dubey, 2013). Perception acts as a process of interpretation and establishment of a meaningful experience when the consumer is exposed to a stimulus (Lindsay & Norman, 1977). This interpretation is based on consumers' previous experiences (Pickens, 2005). Since perception works as a sensory experience and may lead the behavior of a consumer toward an action (desirable or undesirable) (Reibstein et al., 1980), it becomes very important to study and include it in a comprehensive model investigating advertising influence on consumer purchase intentions.

The marketers try to create stimuli through various advertising attributes namely- credibility, entertainment, informativeness, message relevance, and irritation, which is aimed at developing a positive perception about the product/brand within the consumers' mind. The trigger of these stimuli, if controlled, can help make consumers develop a positive perception, influencing positive purchase intentions (Wee et al., 2014). Previous studies (Izquierdo-Yusta et al., 2015; Okazaki et al., 2007) demonstrated that if consumers trust the advertiser and perceive the advertisement as credible, accurate, and trustworthy, they tend to accept the advertisement positively. This perception of the credibility of the advertising has been shown to have a positive impact on attitude toward advertising (Aydin & Karamahmet, 2017; Liu et al., 2012; Tsang et al., 2004), advertising value (Brackett & Carr, 2001), and purchase intention (Baek & King, 2011).

Similarly, when the consumers are exposed to relaxing, entertaining, and amusing advertising, they tend to develop positive perception (Chang, 2013), which helps in developing positive attitude and significantly influences advertising value perception among the consumers (Pintado et al., 2017; Martins et al., 2019; Aydin & Karamahmet, 2017; Choi et al., 2008; Liu et al., 2012; Tseng & Teng, 2016). Further, the objective of an advertisement is to inform the

prospective customer on various attributes and features of the products (Rotzoll et al., 1989), so that the consumers perceive the advertisement as informative and useful and react positively towards it (Aitken et al., 2008). This informativeness of advertising plays an important role in influencing the positive attitude building towards advertising (Aydin & Karamehmet, 2017; Liu et al., 2012), the advertising value (Aydin & Karamehmet, 2017; Martins et al., 2019), and the purchase behavior (Liu et al., 2012).

In addition to this, marketers are benefitted if the consumer displays self-interest in the SMS advertising contents as it facilitates in developing positive perception towards the advertised brand. The intensity of consumers' perception of the relevancy of the advertising content has a significant influence on their attitude towards the advertised brand (Tseng & Teng, 2016; Varnali, 2014; Wang, 2006) and future purchase intentions (Rau et al., 2011; Tseng & Teng, 2016). Besides developing their positive perception, consumers often get irritated and harassed if the advertising annoys, offend, insult, or manipulates them and because of this they mostly delete the advertisement, which is frequently sent to them. This situation increases intolerance among the consumers and they tend to react negatively toward the advertised brand. This way the advertisement devalues their brand (Aydin & Karamehmet, 2017; Tseng & Teng, 2016) and leads to the development of a negative attitude towards the advertising (Tseng & Teng, 2016; Okazaki, 2004).

2.2. Advertising value

Zeithaml, (1988) have defined consumers' perceived value as the comprehensive evaluation of the utility of a product or service. It is considered as a trade-off between what was received and what was given (Yang & Peterson, 2004). Advertising value is defined as a “subjective evaluation of the relative worth or utility of advertising to consumers”, and is accepted as one of the antecedents to attitude (Ducoffe, 1995). Undervalued advertising leads to negative reactions by customers (Pintado et al., 2017; Van den Broeck et al., 2019), whereas highly valued advertising results in positive reactions. Many studies in the past that have incorporated advertising value have found it to have a positive effect on attitude (Aydin & Karamehmet, 2017; Liu et al., 2012; Martins et al., 2019; Pintado et al., 2017) as well as purchase intention (Lin & Bautista, 2018; Martins et al., 2019).

2.3. Attitude toward SMS advertising

On the other hand, the attitude of a consumer is the psychological willingness and inclination toward acting in a particular way, because of their traits (Pickens, 2005). The attitude of a

consumer is used to explain their behavior to draw out meaningful insights for marketing decisions.

An attitude is the mental approach of a consumer that portrays their positive and negative responses to the advertisement (MacKinzie & Lutz, 1989). It is an expression of inner feelings that are indicative of the behavior of a person, whether they respond favorably or unfavorably to an object. Attitude plays a significant role in determining the response toward an advertisement (MacKinzie & Lutz 1989). Attitude depends on advertising perception developed through the credibility, entertainment, informativeness, irritation, and message relevance characteristics of the advertisement and then on how the person chooses to respond to it (Aydin & Karamehmet, 2017; Ducoffe, 1995; Rau et al., 2013; Tsang et al., 2004; Tseng & Teng, 2016). A study by Drossos et al., (2013) investigated the notion that the attitude toward SMS advertising is highly associated with purchase intention. Many studies argue that a positive attitude toward SMS advertising influences behavioral intention including purchase intention (Aydin & Karamehmet, 2017; Drossos et al., 2013; Rau et al., 2011; Tseng & Teng, 2016). Some studies explore the relationships between consumer attitude and behavioral intention (Davis, 1989; Wang & Li, 2012; Wang & Genç, 2019) in the context of SMS advertising. For instance, Wang and Sun (2010) argue that a positive attitude toward online advertising might lead to increased online purchase intention. Similarly, Korgaonkar and Wolin (2002) also restate that online purchasing and spending could be increased if the consumer develops a positive attitude toward the brand's online advertisements.

2.4. Purchase Intention

The Theory of Reasoned Action (TRA) proposed by Ajzen and Fishbein (1980) states that the intentions of a consumer affect, to a major extent, their behaviour at present. A positive or favourable behaviour is more likely to be the result of a positive intention and vice-versa. In addition, the strength of the intention do have a significant influence on behavioural outcome. A strongly held intention for a particular brand, shall lead to strongly reflected behaviour for that brand. This intention is subjective and depends upon perceived value or usefulness. The intention is affected by attitude, either positively or negatively. Different studies (Chen & Chen, 2020; Duffett 2015; Kim & Han 2014; Leung et al., 2015; Tseng & Teng, 2016) have verified that attitude toward advertisement affects the intention to purchase. The positive effect of the attitude of the customer toward the product is an intention to purchase (Wang & Sun 2010). TRA has been widely accepted for its diverse explainability of human behaviour (Ajzen & Fishbein, 1980), and hence is justified to be considered in the present study for assessing the

behavioural determinants in a digital environment. Based on the evidence from previous studies, the present study proposes SMS advertising perception, advertising value, and attitude toward SMS advertising as antecedents to purchase intention for an investigation in the context of the study. Also, the study proposes to test brand familiarity as a moderator in the relationship between attitude toward SMS advertising and purchase intention.

3. Research model and Hypothesis formation

3.1. Research model

The proposed research model (see Figure 1) is based on the Stimulus-Organism-Response (SOR) framework (Mehrabian & Russell, 1974) and complemented by mobile advertising literature. The SOR framework establishes that the various environmental signals serve as stimuli (S) that stimulate the internal states of the individual organism (O), which then drives their behavioral reactions (R).

The uniqueness of SMS advertising is one of its limitations. We only considered content-related factors in this study because SMS advertising is text-based. SMS (text-based) advertising has a number of advantages over other forms of advertising, such as email and app-based advertising. It has broad coverage (no internet required), immediate reach, a high open rate, low-cost, and offers real-time analytics to track campaign visibility (Andrade-Chaico and Andrade-Arenas, 2020). It is one of the most cost-effective and efficient ways to reach customers, in addition to having a high engagement rate, tracking, short copy, a single call to action, easy reading, and the ability for the advertiser to add a personal touch (eMarketer 2021; Valuefirst, 2021). Because of these benefits and the uniqueness of SMS advertising, we attempted to investigate the SMS advertising content-related factors (credibility, entertainment, informativeness, irritation, and message relevance) on an aggregate level by combining and proposing a higher order construct and then investigating its effect on advertising value and attitude toward advertising, and finally on purchase intention.

This study proposes that advertising value and attitude toward SMS advertising mediates (organism) in parallel and through serial mechanisms by which the effect of SMS advertising perception (stimulus) is transmitted to purchase intention (response). We claim that the effect of advertising value spills over to the attitude toward SMS advertising.

The present study used the SOR framework for the operationalization of the construct. The SOR framework describes that there exist several environmental stimuli that are responsible

for initiating the internal processes such as thoughts, emotions and perception (Bagozzi, 1986), which further influences the final reactions or responses (Chopdar & Balakrishnan, 2020). So, it is inferred that the consumers' behaviour are not influenced by the environmental stimuli directly, instead it follows an indirect route with the help of a mediation mechanism, in which the stimuli lead to internal processes and that finally lead to the final behavioural outcomes by the consumers. Therefore, the SOR framework is a well-suited and logical choice for our study following the nature and ingredients of this study.

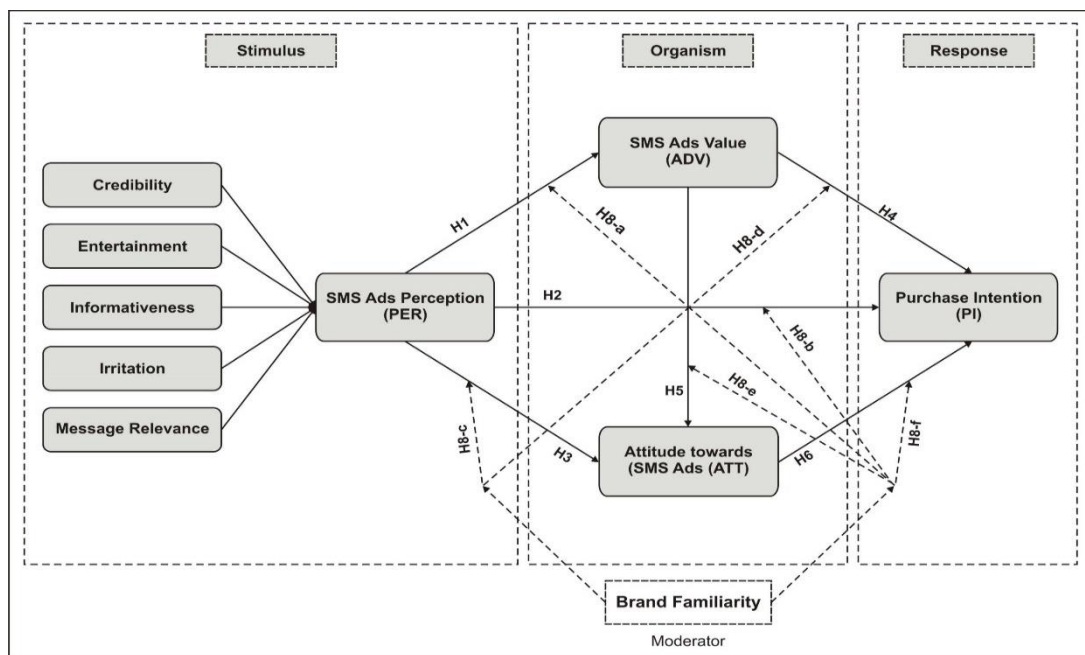


Figure 1: Research model

The pioneering study in the field of advertising effectiveness in the digital media context was Ducoffe (1995), in which he introduced a new construct called 'advertising value' and explored its effect on attitude toward advertising. SMS advertising literature has shown that attitude toward SMS advertising affects consumer purchase intention (Drossos et al., 2013; Rau et al., 2011) and suggests that SMS advertising can encourage consumers to make the purchase. Evidence from prior research on mobile advertising indicates that credibility, entertainment, informativeness, irritation, and message relevance (Aydin & Karamehmet, 2017; Martins et al., 2019) should be included as antecedents for building perceptions of the brand leading to purchase intention. The existing literature offers a strong conceptual background on the relationships proposed in the research model of this study. For instance, consumers' attitude toward SMS advertising and advertising value is significantly influenced by consumers' belief factors such as credibility, entertainment, informativeness, irritation, and message relevance (Aydin & Karamehmet, 2017; Bakr et al., 2019; Brackett & Carr, 2001; Lin & Bautista, 2018;

Wang & Genc, 2019). Further, various studies have proven that consumers' behavioral intentions, particularly purchase intentions, are significantly influenced by their attitude toward advertising (Tseng & Teng, 2016) and advertising value (Martins et al., 2019; Pintado et al., 2017).

3.2. SMS Advertising Perception as a Second Order Construct:

SMS advertising perception was proposed as a higher (second)-order reflective-formative construct with lower (first)-order reflectively measured constructs (i.e., credibility, entertainment, informativeness, irritation and message relevance). Higher order constructs were proposed from a methodological standpoint because they reduce the number of hypothesized relationships in the model, making it more parsimonious (Thien, 2020). It also helps to reduce collinearity issues (Hair et al., 2017; Sarstedt et al., 2019), makes results easier to interpret, and aids to generate reliable and valid empirical results (Thien, 2020).

The measurement model's specification as reflective or formative is based on guidelines of Jarvis et al., (2003). The configuration of a measurement model as reflective or formative, according to the guidelines, should be based on the "direction of causality, interchangeability of the items, and covariation among the items" (Jarvis et al., 2003). SMS advertising perception is referred to as a second-order construct that is measured by five first-order constructs (referred to as the dimensions of SMS advertising perception; credibility, entertainment, informativeness, irritation, and message relevance) each with its own set of items. All five dimensions have different conceptual meanings, which are reflected in their measures. As a result, all five constructs are referred to as reflective first order constructs. Following the guidelines of Jarvis et al. (2003), it can be deduced that SMS advertising perception is a higher (second)-order formative construct that is measured by five reflective lower (first) order constructs depicted in Figure 1. In summary, first order reflective or formative (LOC) constructs are measured by their own measurement item, whereas higher order constructs (HOC) are measured by their first order constructs item using either a repeated indicator or a two-stage approach (Sarstedt et al., 2019).

There are three primary reasons for proposing 'advertising perception' as a higher-order construct. To begin, many recent studies on SMS and mobile advertising used the proposed dimensions of advertising perception (credibility, entertainment, informativeness, irritation, and message relevance) to investigate the effect on advertising value (Arora & Agarwal, 2019;

Aydin & Karamehmet, 2017; Bakr et al., 2019; Kim & Han, 2014; Lin & Bautista, 2018; Martins et al., 2019; Pintado et al., 2017) and attitude towards advertising (Khasawneh & Shuhaiber, 2018; Sigurdsson et al., 2017; Wang & Genc, 2019). Using five independent variables results in five distinct paths in the structural model. In this study, we are attempting to explain the variation in advertising value and attitude toward advertising, which means we are taking ten different paths. Combining these five independent variables reduces the total number of paths, resulting in a more parsimonious model and easier interpretation of the results.

Second, many previous studies proposed and tested the concept of ‘advertising perception’ as a multidimensional construct, employing all five proposed dimensions. Earlier studies on advertising perception as a multidimensional construct included entertainment and relevance (Aaker and Bruzzone, 1981; Aaker and Stayman, 1990; Bruzzone and Tallyn, 1997; Fam 2008), informativeness (Aaker and Stayman, 1990; Bruzzone and Tallyn, 1997), irritation (Aaker and Bruzzone, 1981; Aaker and Stayman, 1990), and credibility (Aaker and Stayman, 1990; Aaker and Stayman, 1990; Bruzzone and Tallyn, 1997; Moldovan, 1985). These studies also sparked the idea of combining the most common constructs into a single higher order construct.

Third, from a theoretical standpoint, motivation and ability of customers were identified as two major factors influencing advertising information processing by the elaboration likelihood model (Petty and Cacioppo, 1986) and the heuristic-systematic model (Chaiken 1987). Opportunity was later added as a factor by MacInnis and Jaworski (1989). MacInnis et al. (1991) define motivation as a consumer's desire or proclivity to process advertising information, whereas ability is a consumer's aptitude to process and comprehend advertising information. In addition, opportunity refers to how distractions or limited exposure influence consumers' attention to advertising information. Furthermore, the action/inaction framework can shed light on the cognitive impact of advertising on perception. Consumer perception is based on selective attention and the processing of environmental stimuli, both of which are influenced by motivation, ability, and opportunity. Action goals (utilitarian motives), according to Hart and Albarracin (2012) and Wu (2016), increase selective exposure to stimuli, in this case advertising, resulting in more total information processing than inaction goals. Because of this selective exposure and information processing, they will notice information in their surroundings that meets their needs (Bradley, 2009).

The preceding discussion provided an additional foundation for combining all five proposed dimensions of advertising perception into a single higher order construct. Because many previous independent studies have shown that these five-advertising content-related factors have a significant cognitive effect on consumer perception and information processing.

3.3. Hypothesis formation

Many studies (Malik & Dubey, 2013; Martins et al., 2019; Wang & Genc, 2019) have explored relationships between advertising value, attitude toward SMS advertising, and purchase intentions, but the role of consumer perception in influencing and driving these relationships appears to have been overlooked. This study is unique in that we proposed advertising perception as a higher order formative construct made up of five factors: credibility, entertainment, informativeness, irritation, and message relevance. Many recent studies on SMS and mobile advertising used the proposed dimensions of advertising perception (credibility, entertainment, informativeness, irritation, and message relevance) to investigate the effect on advertising value (Arora and Agarwal, 2019; Aydin & Karamehmet, 2017; Bakr et al., 2019; Kim & Han, 2014; Lin & Bautista, 2018; Martins et al., 2019; Pintado et al., 2017) and attitude towards advertising (Khasawneh & Shuhaiber, 2018; Sigurdsson et al., 2017; Wang & Genc, 2019). In addition to the effect of advertising value on purchase intention (Lin & Bautista, 2017; Martins et al., 2019; Pintado et al., 2017), and effect of attitude towards advertising on purchase intention (Sigurdsson et al., 2017; Khasawneh and Shuhaiber, 2018) was studied by the researchers in great sense recently.

Advertising is effective due to various attributes such as credibility, entertainment, informativeness, irritation, and message relevance because these attributes create stimulus in consumers' minds regarding how relevant and useful the advertisement is for them. Previous studies (Aydin & Karamehmet, 2017; Bakr et al., 2019; Lin & Bautista, 2018; Wang & Genc, 2019) have examined and found that these advertisement attributes have a direct influence on advertising value, attitude toward SMS advertising, and purchase intentions. However, no study has previously attempted to incorporate consumer perception as a higher-order construct in model measuring purchase intentions through SMS advertising message related contents.

There is credible evidence, however, to substantiate that the above-mentioned SMS advertising message-related attributes are significant in building perceptions of the advertised brand

(Aydin & Karamehmet, 2017; Martins et al., 2019; Radder et al., 2010), which further leads to consumers' intentions. Based on these discussions and the evidence of significant relationships between SMS advertising perception and advertising value (Bakr et al., 2019; Brackett & Carr, 2001; Lin & Bautista, 2018), SMS advertising perception and purchase intention (Aydin & Karamehmet, 2017; Martins et al., 2019), and SMS advertising perception and attitude toward SMS advertising (Aydin & Karamehmet, 2017; Wang & Genc, 2019), the present study proposes the following hypotheses for further investigation:

H₁: SMS advertising perception has a positive impact on advertising value.

H₂: SMS advertising perception has a positive impact on purchase intention.

H₃: SMS advertising perception has a positive impact on attitude toward SMS advertising.

The findings of many studies (Aydin & Karamehmet, 2017; Liu et al., 2012; Martins et al., 2019; Pintado et al., 2017) have revealed that there is a significant relationship between advertising value and attitude toward an advertisement. This relationship is substantial in building the consumer's attitude toward the advertised brand. When a customer perceives an advertised brand to have relative worth, they are more likely to develop a positive response and respond favorably to it. Also, the existing literature suggests that consumers tend to develop a purchase intention if the advertised brand seems worthy to them. The customer evaluates the advertisement of a brand in terms of the trade-off between what is promised and what is delivered. A positive evaluation of the trade-off makes a customer feel satisfied with the brand experience and the chances of them developing a favorable intention to purchase increases. Many studies (Lin & Bautista, 2018; Martins et al., 2019) have found that advertising value significantly influences consumers' purchase intentions. Based on this discussion, we propose to explore the influential relationship of advertising value on purchase intention and attitude toward SMS advertising, through the following hypotheses:

H₄: Advertising value has a positive impact on purchase intention.

H₅: Advertising value has a positive impact on the attitude toward SMS advertising.

Many other researchers (Korgaonkar & Wolin, 2002; Wang & Li, 2012; Wang & Genç, 2019; Wang & Sun, 2010) have contended that consumers' purchasing and spending intention can be increased if the consumer develops a positive attitude toward the brand advertisements using online channels. As an intrinsic feature of a consumer, their attitude can influence their thought process toward any object or circumstance, which is reflected in their behavior. Likewise, a positive attitude toward a brand advertisement is more likely to influence a positive purchase

intention toward the brand. In the SMS advertising context, many studies have also concluded that attitude significantly influences the behavioral intention/purchase intentions of the consumer (Aydin & Karamehmet, 2017; Drossos et al., 2013; Dwivedi et al., 2019; 2017; 2007; Tseng & Teng, 2016). Based on these discussions, we propose to explore the nature of the relationship between attitude toward SMS advertising and consumers' purchase intentions. The hypothesis for this investigation is:

H₆: Attitude toward SMS Advertising has a positive impact on purchase intention.

3.3 Mediation effect of advertising value and attitude toward SMS advertising

Based on previous studies that advocate for the mediating role of advertising value between SMS advertising perception and purchase intentions (Chen et al., 2019; Kwon et al., 2007; Malik & Dubey, 2013), and the role of attitude as a mediator between SMS advertising perception and purchase intention (Bananuka et al., 2020; Chu, 2018; Hongyan & Zhankui, 2017), the present study attempts to assess the mediation effect of advertising value and attitude toward SMS advertising on the proposed relationships in the conceptual model. The literature suggests that highly perceived value tends to positively influence the purchase intention among consumers for a particular brand, and a positive attitude toward a brand can also enhance the consumers' purchase intention. These direct relationships have been successfully evaluated in previous studies; however, the indirect role of advertising value between SMS advertising perception and purchase intention has not yet been explored. Since this study is incorporating the SMS advertising perception as a variable for the first time in the context of SMS advertising, it is pertinent to investigate the mediating role of advertising value in the model. Similarly, the indirect role of attitude toward SMS advertising also has not been explored as a mediating factor between SMS advertising perception and purchase intention in the context of SMS advertising. Relying on the existing evidence and arguments given here, the present study proposes the following hypotheses for mediation effect assessment:

H_{7a}: Advertising value mediates the causal relationship of SMS advertising perception and purchase intention.

H_{7b}: Attitude toward SMS advertising mediates the causal relationship of SMS advertising perception and purchase intention.

H_{7c}: SMS advertising value and attitude toward SMS advertising serially mediate the causal relationship of SMS advertising perception and purchase intention.

3.4 Moderating effect of brand familiarity

Brand familiarity is an important source of internal information and is defined as the collection of direct or indirect brand experiences accrued by the consumer (Park & Stoel, 2005). Consumers' brand familiarity is increased by more experiences with the brand through its usage, exposure to advertisements, and so on (Alba & Hutchinson, 1987). The familiarity of a brand among consumers' minds can be enhanced by increasing the frequency of exposure to the brand. Many studies have strongly argued that advertisements of a brand in media lead to higher brand familiarity among consumers (Kent & Allen, 1993) and increases consumers' confidence in the brand (Park & Stoel, 2005; Rose, 2015). Many studies have attempted to test the moderation effect of brand familiarity on purchase intention (Laroche et al., 1996; Park & Stoel, 2005; Perera & Chaminda, 2013; Rhee & Jung, 2019; Rose, 2015) and found it to have a significant effect. Following the above discussions and available literature as evidence, the present study proposes to introduce the construct of brand familiarity to test its moderation effect on the relationships proposed in the research model of this study. The study proposes that brand familiarity moderates all of the hypothesized relationships (H1-H6), wherein the relationships are stronger for familiar brand. To assess the moderation effect, the hypotheses are:

H_{8a-f}: Brand familiarity will moderate the causal relationship of SMS Ads Perception and SMS Ads Value (H8-a); SMS Ads Perception and purchase intention (H8-b); SMS Ads Perception and attitude toward SMS Ads (H8-c); SMS Ads value and purchase intention (H8-d); SMS ads value and attitude toward SMS ads (H8-e); Attitude toward SMS ads and purchase intention (H8-f).

4. Methodology

4.1. Data collection process

This is a quantitative study based on data from a cross-section survey. Data was collected using a paper and pencil questionnaire survey. Data were collected using a purposive sampling approach (Cheah et al., 2020; Sarstedt et al., 2018) and a shopping mall intercept survey process to validate the research model. To capture respondents for a face-to-face interview and data collection, this study used a shopping mall intercept survey, a convenience sampling approach. We chose this method because of its ability to collect high-quality data (Yao et al., 2015), as well as its speed, economy, and control over respondent type (Chatzigeorgiou et al., 2019). To avoid the inherent limitations of shopping mall intercept surveys, we used a time and location-

based systematic approach, as proposed by Bruwer et al (1996). We first observed shopper traffic in the chosen malls based on time segment and location cluster, and then we used systematic sampling with the identified time and location clusters (for example, every 15th customer). To select an appropriate sample that is aware of SMS advertising, a purposive sampling approach was used. To ensure the respondent's eligibility to participate in the study, we asked a screening question: "Have you received any SMS advertising in the last six months?" They were also asked to take a moment to recall any recent SMS advertisements they had received and viewed before filling out the questionnaire with their responses (Aydin & Karamehmet, 2017).

We used an established scale to measure the constructs, but the wording of the scale items was slightly changed to be more consistent with SMS advertising. The items in the research instrument were based on a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5), to record the score of the respondents' responses. Some items were also coded in reverse to reduce response bias.

The questionnaire was split into two sections. In the first section, we requested information about the research constructs, and in the second section, we requested information about the respondent's demographic profile, such as age, gender, education, and nationality. Before the main data collection, a pre-test with two marketing professionals and three research scholars was conducted to determine the wording and sequence of questionnaire items. A pilot study with 35 respondents was conducted after minor revisions to ensure that the responses were accurate and functional (Hulland et al., 2018).

Between October and December 2019, 525 questionnaires were distributed in various shopping malls in Dubai, and 483 valid questionnaires were used for analysis after excluding incomplete questionnaires. G*power v3.1.9.2 software was used to calculate the minimum sample size required based on statistical power (Foul et al., 2009). With an effect size of 0.05, a sample size of 262 is required to achieve statistical power of 0.95. As a result, we had a sufficient sample size to conduct a statistical analysis. The majority of respondents (62.5%) were male,

aged 26-45 (69.4%), educated (90%), and non-Arab (75.8 percent). The details are given in Table 1.

Table 1: Respondents demographic profile (n=483)

Profile	Characteristics	Frequency	Percentage
Age	Below 25	91	18.8
	26-35	197	40.8
	36-45	138	28.6
	Above 45	57	11.8
Gender	Female	181	37.5
	Male	302	62.5
Education	High School & Below	48	9.9
	Diploma	203	42
	Bachelor	189	39.1
	Master & Above	43	8.9
Nationality	Non-Arab	366	75.8
	Arab	117	24.2

Source: Authors' own

4.2. Measurement procedure

To validate the research model, most of the items have been adapted from the commonly cited scales in digital advertising, in particular the SMS advertising literature. As discussed above, we proposed the 'SMS advertising perception' as a type two higher-order (reflective-formative) construct. The SMS advertising perception consists of five elements: credibility, entertainment, informativeness, irritation, and message relevance. Credibility was measured with four items adapted from Aydin and Karamehmet (2017), Liu et al. (2012), and Martins et al., (2019). To measure entertainment and informativeness, three items for each from Aydin and Karamehmet (2017), Liu et al., (2012), Martins et al., (2019), Pintando et al., (2017), and Tseng and Teng (2016) were adopted. Two items from Tseng and Teng (2016) were adopted for message relevance. Three items from Aydin and Karamehmet, (2017), Liu et al., (2012), and Pintando et al., (2017) were adopted for irritation. For advertising value, three items from Ducoffe (1995) were adopted. Five items from Aydin and Karamehmet (2017), Liu et al., (2012), and Tseng and Teng (2016) were adopted to measure attitudes toward SMS advertising and, finally, from Wu et al. (2011), three items were adopted to assess the purchase intention. The measurement items of the research constructs are shown in Appendix 1.

Brand familiarity as a categorical variable:

In this study, brand familiarity is considered as a categorical moderator (as a context; familiar/unfamiliar; Basco et al., 2020). We chose categorical moderator over continuous moderator because we wanted to test the moderating effect of brand familiarity on every hypothesized

relationship in the structural model using multi-group analysis (MGA) logic (Aguinis et al., 2017; Akrouf and Nagy, 2018; Memon et al., 2019). MGA or between group analysis, was used to test for group differences in the estimated parameters (Hair et al. 2017). According to Hair et al. (2017), "...this approach offers a more complete picture of the moderator's influence on the analysis results as the focus shifts from examining its impact on one specific model relationship to examining its impact on all model relationships." (p. 261). A continuous moderator's interaction effect affects a specific path in the model, whereas MGA examines the moderator's effect on all hypothesized paths in the model (Aguinis et al., 2017; Memon et al. 2019). Previous research suggests that converting continuous moderators to categorical moderators should be avoided because it raises concerns about the dividing point and reduces statistical power (Aguinis et al., 2017; Dawson, 2014). We chose brand familiarity as a categorical moderating variable based on the preceding discussion.

4.3. Data Analysis and Results

To explore and estimate the role of the research constructs of the present study, in the digital environment, PLS-SEM method has been used (Cheah et al., 2020; Hair et al., 2019). The justification for using this technique in our study is the ability of PLS-SEM to deal with higher-order reflective-formative constructs (Cheah et al., 2020; Sarstedt et al., 2019), sequential mediation (Nitzel et al., 2016), and moderator assessment (Becker et al., 2018) in a single model at the same time. In this study, we have proposed the 'SMS advertising perception' as a type two higher-order (reflective-formative) construct and it works on establishing a comprehensive model which makes PLS-SEM the right choice for data analysis. Another reason for the selection of PLS-SEM is the primary objective of this study to predict the key constructs (Hair et al., 2017) and a complex research model. SmartPLS v3.3.2 software (Ringle et al., 2015) was used for measurement and structural model evaluation. As suggested by Hair et al. (2019), a two-step approach to data analysis has been adopted. The measurement model was assessed in the first step and the structural model was evaluated in the second step.

4.4. Normality test

We used a web-based calculator (Zhang & Yuan, 2018) to test the data for multivariate normality using Mardia's (1970) test. Multivariate normality is one of the criteria for more accurate model prediction. The outcome of the multivariate normality analysis shows that Mardia's multivariate skewness ($\beta = 11.085$, $p < 0.01$) and multivariate kurtosis ($\beta = 122.258$,

$p < 0.01$) suggest multivariate non-normality. This is another reason for use of PLS-SEM, as it can handle non-normal data very well (Hair et al., 2019).

4.5. Common method bias (CMB)

CMB usually occurs when data are derived from a single source (Avolio et al., 1991) and is problematic in self-reported quantitative studies (Spector, 2006). CMB undermines validity (MacKenzie & Podsakoff, 2012) and affects the structural relationship (Kline, 2015). In a study, there are two ways to minimize the risk of CMB, i.e. procedural design and statistical control (Reio, 2010). In terms of procedural design, the respondents were able to respond anonymously, the questionnaire was structured to be succinct, demographic questions were positioned at the end of the questionnaire, and the questionnaire was piloted before the final stage of the data collection. We used two statistical control methods for statistical control. First, Harman's one-factor test was implemented to verify the CMB problem and it found that 39.484 percent of the total variance was the largest variance explained, which is less than the 50 percent threshold indicated (Fuller et al., 2016; Podsakoff, et al., 2012). Second, the full-collinearity test suggested by Kock (2015) was used and the results indicate that pathological VIF values ranged from 1.959 to 2.572 for all latent constructs, which is below the 3.3 thresholds, suggesting that CMB is not a problem for the current study.

4.6. Assessment of reflective constructs

To test the measurement model, we evaluated outer loading, composite reliability (CR), average variance extracted (AVE), and discriminant validity (Hair et al., 2017). All the outer loadings of the first-order reflective construct are far above the minimum threshold value, as shown in Table 2. Composite reliability $>.7$ and Cronbach alpha $>.7$ show a high degree of internal consistency, and convergent validity was shown by AVE $>.5$ (Hair et al., 2017). To determine the discriminant validity, Fornell and Larcker's (1981) criteria and Heterotrait-Monotrait ratio (HTMT) criteria were used. The entire HTMT ratio values are far below the conservative threshold of 0.85 (Henseler et al., 2015; Kline, 2015), as shown in Table 3. The results of the measurement model assessment are presented in Table 2 and Table 3. (The cross-loading results, another criterion to check discriminant validity, can be found in appendix-II). The results of the analysis indicate that the study established convergent and discriminant validity.

Table 2: Construct Validity

Construct	Item	λ	AVE	CR	Cronbach's α	rho_A
Advertising value	ADV1	0.880	0.797	0.922	0.873	0.874
	ADV2	0.905				
	ADV3	0.894				
Attitude towards advertising	ATT1	0.706	0.558	0.863	0.801	0.802
	ATT2	0.721				
	ATT3	0.813				
	ATT4	0.738				
	ATT5	0.751				
Credibility	CRE1	0.828	0.722	0.912	0.872	0.875
	CRE2	0.887				
	CRE3	0.850				
	CRE4	0.834				
Entertainment	ENT1	0.882	0.764	0.907	0.846	0.847
	ENT2	0.890				
	ENT3	0.850				
Informativeness	INF1	0.893	0.796	0.921	0.872	0.873
	INF2	0.871				
	INF3	0.912				
Irritation	IRR1	0.926	0.839	0.940	0.904	0.910
	IRR2	0.932				
	IRR3	0.890				
Message relevance	MER1	0.919	0.845	0.916	0.817	0.817
	MER2	0.920				
Purchase intention	PIN1	0.870	0.745	0.897	0.828	0.830
	PIN2	0.882				
	PIN3	0.836				

Note: Average variance extracted (AVE), Composite reliability (CR), Outer loading (λ). All the values of AVE, CR, Cronbach's alpha, and rho_A are significant at $p < .001$ level

Table 3: Discriminant validity

Fornell-Larcker Criterion (1981)								
	ADV	ATT	CRE	ENT	INF	IRR	MER	PI
Advertising value (ADV)	0.893^a							
Attitude towards SMS advertising (ATT)	0.611	0.747						
Credibility (CRE)	0.458	0.454	0.850					
Entertainment (ENT)	0.630	0.685	0.460	0.874				
Informativeness (INF)	0.479	0.495	0.380	0.424	0.892			
Irritation (IRR)	0.326	0.338	0.296	0.449	0.295	0.916		
Message relevance (MER)	0.417	0.407	0.299	0.354	0.328	0.343	0.919	
Purchase intention (PI)	0.723	0.680	0.419	0.607	0.453	0.362	0.381	0.863
Heterotrait-Monotrait Ratio								
Advertising value (ADV)								
Attitude towards SMS advertising (ATT)	0.728							
Credibility (CRE)	0.523	0.546						
Entertainment (ENT)	0.731	0.833	0.534					
Informativeness (INF)	0.549	0.592	0.435	0.494				
Irritation (IRR)	0.366	0.395	0.330	0.513	0.329			
Message relevance (MER)	0.495	0.500	0.353	0.425	0.389	0.394		
Purchase intention (PI)	0.847	0.836	0.492	0.725	0.533	0.418	0.464	

Note: The off-diagonal values (bold) in the above matrix are the square correlations between the latent constructs and diagonals are AVEs. HTMT < 0.85 (Kline, 2015)

4.7. Assessment of the formative construct

This study proposed an SMS advertising perception as a type two higher-order (reflective-formative) construct. We used a two-step approach, as suggested by Becker et al. (2012) and Hair et al. (2017), to test the higher-order reflective-formative construct. In the first step, to attain the latent variable score, we used a repeated indicator approach, and in the second step, to calculate weight and significance, we used the latent variable score obtained from the PLS algorithm. The collinearity of the indicators (VIF) and the significance of the indicator weight were used to determine the formative measure. The results are shown in Table 4. The VIF value is below the 3.3 threshold value of all measures (Hair et al., 2019), meaning that collinearity is not a serious concern. We used the 5000 resample bootstrap technique to assess the significance of the weight, and the results show that all the weight of the indicator is significant at $p < 0.001$ level. This demonstrates the relative contribution of the formative constructs to the creation of a higher-order reflective formative construct.

Table 4: Assessment of higher-order construct.

Higher-order	Formative indicators	Outer	VIF	t-value	95% BCa-CIs
SMS advertising Perception	(i) Credibility	0.345	1.365	36.717**	[0.328; 0.365]
	(ii) Entertainment	0.352	1.593	33.892**	[0.332; 0.373]
	(iii) Informativeness	0.290	1.337	32.416**	[0.274; 0.308]
	(iv) Irritation	0.246	1.331	27.435**	[0.229; 0.264]
	(v) Message relevance	0.171	1.260	29.477**	[0.161; 0.184]

Note; * $p < 0.01$, ** $p < 0.001$; VIF (Variance Inflation Factor)

4.8. Assessment of the structural model

After verifying the reliability and validity of the measurement model, the next step was to analyze the structural model to verify the hypothesized relationship (Hair et al., 2017). To ensure that there is no multi-collinearity problem, we examined the collinearity and the results show that the tolerance level in the predictor construct is far below the critical level of VIF 5. To evaluate the results of the structural model, we evaluated the significance of the path coefficient, the R-square, and the predictive relevance, Q-square.

The results of the structural model assessment are presented in Table 5, confirming that both the direct and indirect hypotheses proposed are supported. There is a significant relationship between SMS advertising perception and advertising value ($\beta=0.670$, $t=22.206$, $p<0.011$), purchase intention ($\beta=0.123$, $t=2.741$, $p<0.006$), and attitude toward SMS advertising ($\beta=0.516$, $t=9.872$, $p<0.001$). Moreover, the relationship between advertising value and

purchase intention ($\beta=0.443$, $t=7.915$, $p<0.001$) and attitude toward SMS advertising ($\beta=0.265$, $t=4.974$, $p<0.001$) is significant. Besides, the effect of attitude toward SMS advertising on purchase intention is also significant ($\beta=0.324$, $t\text{-value}=6.718$, $p<0.001$). Therefore, all direct hypothesized relationships (H1-H6) are supported.

4.9. Mediation analysis

We adopted the transmittal approach to evaluating the mediation effect as suggested by Rungtusanatham et al. (2014). The transmittal method focuses primarily on “develop[ing] the hypothesis that M mediates the effect of X on Y or that X has an indirect effect on Y through M without needing to articulate hypotheses relating to X to M and M to Y” (Rungtusanatham et al., 2014, p. 106). As suggested by Hair et al., (2017), a bootstrapping technique with 5000 subsamples was used to estimate the 95 percent bias-corrected confidence interval of the indirect effect. We have used the decision tree proposed by Nitzel et al., (2016) for the classification of mediation. Table 5 displays the outcomes of the mediation analysis. Indirect effect test results show that the two indirect pathways running from the SMS advertising perception to purchase intention through SMS advertising value ($\beta=0.297$, $t=7.782$, $p<0.001$) and attitude toward SMS advertising ($\beta=0.167$, $t=6.057$, $p<0.001$) are significant, as is the serial pathway via SMS advertising value and attitude toward SMS advertising ($\beta=0.058$, $t=3.660$, $p<0.001$). Thus, H7a, H7b, and H7c are supported. Besides, the direct effect of SMS advertising perception on purchase intention ($\beta=0.123$, $t=2.741$, $p<0.01$) is significant; therefore, complementary partial mediation prevails.

Table 5: Assessment of the structural model

Direct effects					
Parameters	β	SE	t-value	95% BCa-CIs	Remarks
H1) PER → ADV	0.670	0.030	22.206**	[0.605; 0.725]	Supported
H2) PER → PI	0.123	0.045	2.741*	[0.042; 0.218]	Supported
H3) PER → ATT	0.516	0.052	9.872**	[0.408; 0.614]	Supported
H4) ADV → PI	0.443	0.056	7.915**	[0.330; 0.546]	Supported
H5) ADV → ATT	0.265	0.053	4.974**	[0.157; 0.366]	Supported
H6) ATT → PI	0.324	0.048	6.718**	[0.233; 0.417]	Supported
Indirect effects					
H7a) PER → ADV → PI	0.297	0.038	7.782**	[0.223; 0.371]	Supported
H7b) PER → ATT → PI	0.167	0.028	6.057**	[0.120; 0.229]	Supported
H7c) PER → ADV → ATT → PI	0.058	0.016	3.660**	[0.032; 0.092]	Supported

Note; * $p < 0.01$, ** $p < 0.001$; PER=SMS advertising perception, ADV=advertising value, ATT=attitude towards SMS advertising, PI=purchase intention

Next, to assess the quality of the structural model, the coefficient of determination (R^2), effect size (f^2), and the predictive significance (Q^2_{predict}) were reported. Overall, the model has considerable explanatory power, as SMS advertising perception explains 44.9 percent of the variance in advertising value, while 52.1 percent of the variance in attitude toward SMS advertising is explained by both SMS advertising perception and advertising value combined. Finally, by explaining 61.9 percent variance in purchase intention, SMS advertising perception, advertising value, and attitude toward SMS advertising, considerable explanatory potential in the model is indicated. In terms of effect size, advertising value ($f^2=0.814$) is found to be the most significant purchase intention predictor, with a large effect size. On the other hand, attitude toward SMS advertising ($f^2=0.307$) and SMS advertising perception ($f^2=0.262$), both with medium effect size, are also important purchase intention predictors (Cohen, 2013). Finally, using Stone-Geisser Q^2 (Geisser, 1974; Stone, 1974), predictive relevance was evaluated. The Q^2_{predict} value is greater than 0 for advertising value (0.448), attitude toward SMS advertising (0.447), and purchase intention (0.413), demonstrating that the model is predictively valid (Chin et al., 2020; Shumeli et al., 2019). The findings indicate that Q^2_{predict} values are higher than Q^2 values, showing more consistency in the predictive potential of the model. The results of R^2 , f^2 , Q^2 , and Q^2_{predict} are shown in Table 6.

Table 6: The result of R^2 , f^2 , Q^2 , and Q^2_{predict} .

Constructs	R-square	Q-square	f-square	Q^2_{predict}
Advertising value	0.449	0.356	0.814	0.448
Attitude towards advertising	0.521	0.287	0.307	0.477
Purchase intention	0.619	0.455	0.262	0.413

Value effect size. 0.02= Small; 0.15=Medium; 0.35=Large; ^a Assessing predictive relevance (Q^2)

While using PLS-SEM, we also checked the goodness of fit (GoF) index. We used standardized root mean square residuals (SRMR) (Hu & Bentler, 1999), which is a measure of approximate fit, to test the structural model GoF (Henseler, 2012). The value of SRMR should be less than 0.08 in the estimated model to be considered a good fit. The estimated model's SRMR value is (SRMR=0.067), which means that it is considered a good fit.

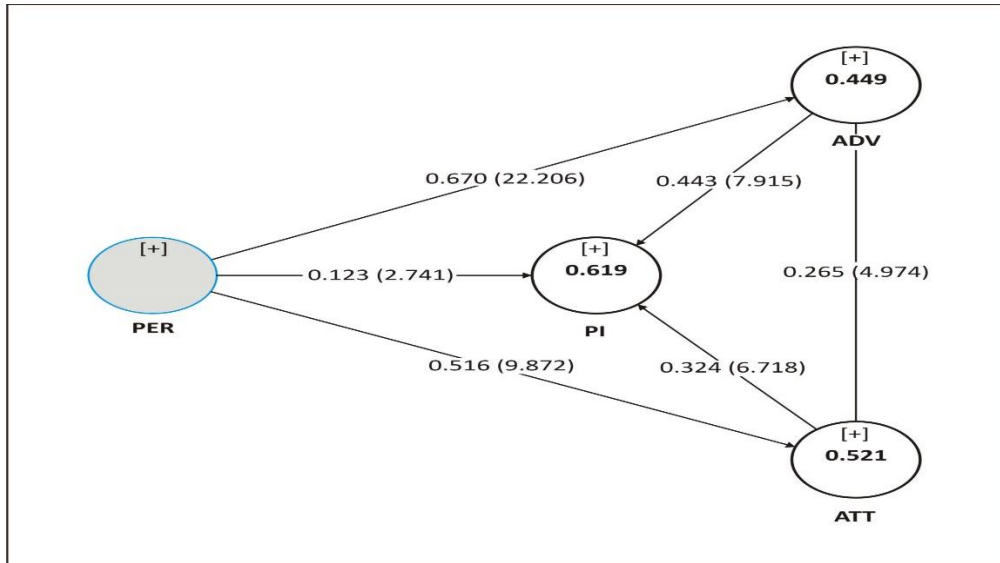


Figure 2: Structural model test results

4.10. Moderation analysis

In this study, we proposed ‘brand familiarity’ as a categorical moderator ‘familiar/unfamiliar’, to test the moderating effect. We argued that brand familiarity would moderate all hypothesized relationships in such a way that the impact of SMS advertising perception would be greater in the presence of familiar brand advertisements. We used the PLS-MGA methods to evaluate the differences in variation in the path coefficient for familiar and unfamiliar brand advertisements (Sarstedt et al., 2011). A significant difference between groups is inferred from p-values equal to or lower than 0.05 and values equal to or greater than 0.95 (Henseler et al., 2009). Table 7 shows the result of the PLS-MGA. The results of PLS-MGA suggest that there are significant differences in the path coefficient between SMS advertising perception and advertising value (H8a), SMS advertising perception and purchase intention (H8b), and SMS advertising perception and attitude toward SMS advertising (H8c). However, there are insignificant path coefficient differences between advertising value and purchase intention (H8d), advertising value and attitude toward SMS advertising (H8e), and attitude toward SMS advertising and purchase intention (H8f).

Table 7: PLS-MGA results

Parameters	Path-coefficient (β)			MGA	Parametric Test	Welch-Satterwait Test	Remark
	Familiar (F)	None- familiar (NF)	Diff	p-Value F vs NF	p-Value F vs NF	p-Value F vs NF	
H8a) PER \rightarrow ADV	0.773	0.433	0.340	0.000*	0.000*	0.000*	Supported
H8b) PER \rightarrow PI	0.227	-0.019	0.246	0.013*	0.009*	0.012*	Supported
H8c) PER \rightarrow ATT	0.665	0.396	0.269	0.014*	0.015*	0.014*	Supported
H8d) ADV \rightarrow PI	0.394	0.487	-0.093	0.436	0.432	0.436	Not Supported
H8e) ADV \rightarrow ATT	0.089	0.311	-0.221	0.079	0.059	0.083	Not Supported
H8f) ATT \rightarrow PI	0.251	0.277	-0.025	0.808	0.817	0.816	Not Supported

Note; * Significant (S), None-significant (NS); PER=SMS advertising perception, ADV=advertising value, ATT=attitude towards SMS advertising, PI=purchase intention

4.11. Neural network (NN) results

In many research fields, artificial neural network (ANN) modeling is a common machine-learning tool that is widely used today. Haykin (2001) defines ANN as "a massively parallel distributed processor consisting of simple processing units that have a natural propensity to store experimental information and make it available for use." ANN attempts to mimic the human brain's functioning. It discovers the latent relationships in the data set through 'training' and shows the outcome of learning in the form of 'testing.' ANN is used to investigate complex relationships because it is free of multivariate data distribution assumptions (Chong, 2013; Liébana-Cabanillas et al., 2017). ANN has a significant advantage over traditional statistical methods (e.g., regression and SEM). Traditional statistical methods can only evaluate linear relationships between variables in a study, whereas non-linear relationships can be evaluated.

There are usually three layers in ANN: input, hidden, and output. The activation function connects each layer. The sigmoid (a hyperbolic tangent) function is commonly used in ANN as an activation function. The sigmoid function is preferred because it squeezes the original data at the higher end and lower end (Chiang et al., 2006). The backpropagation neural network (NN) is a supervised learning network, which in many applications is commonly used in ANN (Chiang et al., 2006). There are several effective examples of ANN models to solve complex market problems such as mobile commerce (Chong, 2013), mobile trade acceptance (Liébana-Cabanillas et al., 2017), mobile banking services (Sharma & Sharma, 2019), mobile payment services (Sharma, et al., 2019), and so on.

4.12. Validation of neural network

SPSS v.26 was used to build an ANN model. This research used a commonly used feed-forward backpropagation multilayer training algorithm with a hyperbolic tangent activation function to train the ANN model (Chiang et al., 2006; Chong, 2013; Liébana-Cabanillas et al., 2017). Overfitting is a concern for ANN. This research used a 10-fold cross-validation technique to avoid this. There is no heuristic available in the network computing node literature (Chong, 2013; Liébana-Cabanillas et al., 2017). Therefore, to validate the findings of the ANN analysis, this study used the widely used accuracy measure, Root Mean Square Error (RMSE), as suggested by many scholars (Chiang et al., 2006; Chong, 2013; Liébana-Cabanillas et al., 2017; Sharma & Sharma, 2019; Sharma et al., 2019; Tan et al., 2014). This study used eighty percent

of data points for training and the remaining twenty percent of data points for testing (Liébana-Cabanillas et al., 2017; Sharma, 2019; Sharma et al., 2017). There is only one model in the ANN study, as per the research model. SMS advertising perception, advertising value, and attitude toward SMS advertising in the ANN model were part of the input layer (neurons), and purchase intention was part of the output layer (see Figure-3). The RMSE represents the error in training and testing. The summary of RMSE analysis is shown in Table 8. The average difference between training and testing RMSE values in the model is small (mean=0.036, sd=0.021). It can therefore be summarized that, as indicated in previous research, the results of the ANN analysis were very reliable (Chong, 2013; Liébana-Cabanillas et al., 2017; Sharma et al., 2019; Sharma et al., 2017; Tan et al., 2014).

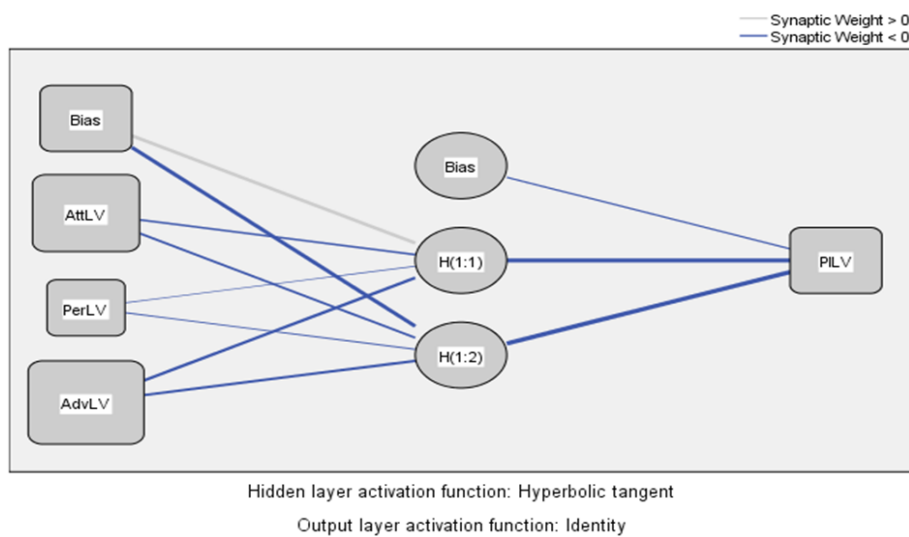


Figure 3: Neural Network Architecture

Table 8: Neural network validation results

Networks	Training	Testing
ANN01	.423	.373
ANN02	.433	.420
ANN03	.450	.431
ANN04	.453	.375
ANN05	.437	.414
ANN06	.453	.424
ANN07	.447	.410
ANN08	.435	.427
ANN09	.435	.372
ANN10	.429	.388
Sum	4.396	4.035
Average	0.440	0.403
S.D	0.010	0.023

4.13. Sensitivity analysis

Sensitivity analysis in a model determines the variations in the dependent variable by virtue of changes in the independent variables associated with it. In the present study, it has been computed by averaging the importance of SMS advertising perception, advertising value and attitude toward SMS advertising (as independent variables) predicting the purchase intention (as dependent variable) (Chong, 2013; Liébana-Cabanillas et al., 2017). The results of the sensitivity analysis are shown in Table 9. In the ANN model, advertising value is the most influential independent variable (IV), with a normalized important ratio of 96.4 percent, for predicting purchase intention (DV). This is followed by attitude toward SMS advertising, with a normalized important ratio of 81.08 percent, and SMS advertising perception, with 27.43 percent of the normalized important ratio, based on the results of the sensitivity analysis. With the help of ANN analysis, we can conclude that SMS advertising value is the most influential variable to predict customers' purchase intention as it has the highest normalized importance ratio when compared to attitude and perception.

Table 9. Importance of constructs

Network	ATT	PER	ADV
ANN01	.322	.182	.496
ANN02	.431	.107	.462
ANN03	.387	.145	.468
ANN04	.403	.105	.492
ANN05	.385	.09	.525
ANN06	.401	.045	.554
ANN07	.475	.219	.306
ANN08	.357	.175	.468
ANN09	.365	.126	.509
ANN10	.423	.129	.448
Average Importance	.3949	.1323	.4728
Normalized Importance	81.08	27.43	96.44

Note; PER=SMS advertising perception, ADV=advertising value, ATT=attitude towards SMS advertising,

5. Discussion

The primary objective of this study was to determine "What is the mechanism by which SMS advertising perception affects purchase intention?" This was achieved using hybrid PLS-SEM-ANN modeling based on a multi-analytical approach. The study investigated the direct effect of SMS advertising perception on advertising value, purchase intention, and attitude toward SMS advertising (H₁-H₃), advertising value on purchase intention and attitude toward SMS advertising (H₄-H₅), and attitude toward SMS advertising on purchase intention (H₆), and finds

support for all the stated direct hypotheses. The results suggest that SMS advertising perception has a significant positive effect on advertising value, purchase intention, and attitude toward SMS advertising, with the highest effect being on advertising value, followed by attitude toward SMS advertising and purchase intention. The result also revealed that SMS advertising perception plays a key role in the development of advertising value, purchase intention, and attitude toward SMS advertising. These findings extend our understanding of the relative effect of SMS advertising perception on advertising value, attitude toward SMS advertising, and purchase intention in the context of SMS advertising. These insights strengthen our understanding of how SMS advertising perception affects purchase intention. A significant association between SMS advertising perception, advertising value, attitude toward SMS advertising, and purchase intention has also been found in prior studies (Lee & Yun, 2015; Nguyen et al., 2019; Salehzadeh & Pool, 2017) and the results of the current study are consistent with those findings. The study results also confirmed the relationship between advertising value, purchase intention, and attitude toward SMS advertising, which indicates that advertising value leads to both purchase intention and attitude toward SMS advertising. This relationship has been validated by previous studies (Lin & Bautista, 2018; Martins et al., 2019; Pintado et al., 2017) and the function of advertising value in the relationship between purchase intention and attitude toward SMS advertising has been discussed. The results of the current study demonstrate that SMS advertising perception, advertising value, and attitude toward SMS advertising play a significant role as predictors of purchase intention.

In its next investigation the study attempts to assess the indirect effect of advertising value and attitude toward SMS advertising on the relationship between SMS advertising perception and purchase intention. The results confirmed the existence of a mediating effect of advertising value and attitude toward SMS advertising on the proposed relationship (h_{7a-c}). The results reveal a strong mediating impact for advertising value and attitude toward SMS advertising that improved the value of purchase intention in the analysis. This suggests that advertising value and attitude toward SMS advertising have an important role in enhancing consumers' purchase intention. Surprisingly, the contrast between the direct effects of SMS advertising perception on purchase intention and the indirect effects through advertising value and attitude toward SMS advertising indicates the indirect effect was higher, suggesting that advertising value and attitude toward SMS advertising are crucial factors. The results of the mediation analysis showed that, as opposed to direct effects, most of the effect of SMS advertising

perception on purchase intention was transmitted via advertising value and attitude toward SMS advertising.

Further, the study attempted to investigate the moderating effect of brand familiarity in the proposed research model. PLS-MGA results suggest that brand familiarity plays a key part in the relationship between SMS advertising perception and advertising value (H_{8a}), SMS advertising perception and purchase intention (H_{8b}), and SMS advertising perception and attitude toward SMS advertising (H_{8c}). From this, it can be inferred that the effect of SMS advertising perception would be greater if the brand is somehow familiar to the consumer. All of the variables predicting the purchase intention were found to be significant, but their precedence was not clear regarding purchase intention. Hence, the study applied ANN modeling to prioritize the purchase intention predictors. The ANN analysis results show that advertising value is the most relevant purchase intention predictor, unlike the PLS-SEM result, which indicates that attitude toward SMS advertising is the most effective purchase intention predictor. This confirms the results of Chan and Chong (2012) and Chong (2013), which demonstrated that it is useful to use neural network analysis over other widely-used statistical methods, as it can also evaluate non-compensatory decision-making processes as either linear or non-linear.

5.1 Theoretical implications

There are many theoretical implications put forth by this study. First is the use of a SOR framework to propose a research model for mobile advertising that articulates the effect of SMS advertising perception on purchase intention. Second, the study identified and tested SMS advertising perception as a type two higher-order (reflective formative) construct. The sub-dimensions of SMS advertising perception include credibility, entertainment, informativeness, irritation, and message relevance. The results support the higher-order specification of the SMS advertising perception construct. This research thus makes a significant contribution to the advertising literature by describing the inter-relationship between SMS advertising perception sub-dimensions. SMS advertising perception had not been comprehensively studied as a higher-order construct in the context of mobile advertising. This study attempts to fill that gap by exploring the interrelationship between SMS advertising perception, advertising value, attitude toward SMS advertising, and purchase intention. By detailing the relationship between these factors, this study makes a major contribution to mobile advertising literature. In

particular, the most important contribution is its work on the process by which the effect of SMS advertising perception is transmitted to purchase intention.

One of the important theoretical contributions of this study is its integrated modeling and investigation of direct and indirect relationships between SMS advertising perception, advertising value, and attitude toward SMS advertising on purchase intention. Other existing studies have attempted to do this separately, but not together. The integrated approach makes the model proposed in the study more inclusive than existing theories, tying theory to practice, and providing theoretical as well as practical implications.

5.2 Practical implications

This research study has several practical implications that can help practitioners to develop their advertisement strategies. According to the result of this study, all five proposed dimensions of SMS advertising perception are significant. However, entertainment and credibility have the highest contribution to the development of SMS advertising perception, followed by informativeness and message relevance. Therefore, if marketers want SMS advertising to be effective, they should create and deliver SMSs that are entertaining yet have some credibility with regards to their contents. Messages that present content in an amusing way to consumers can gain a positive response from the recipient, which will help with future brand recall and fostering the intention to purchase or at least enquire about the brand. Credibility needs to be reflected by the SMS advertising of a brand by exposing accurate, reliable, and trustworthy information about its offerings. Second, the study showed a significant positive relationship between SMS advertising perception and advertising value, and purchase intention and attitude toward SMS advertising. The relationship between SMS advertising perception and advertising value is the strongest, followed by the relationship between attitude toward SMS advertising and purchase intention. This finding means that a positive SMS advertising perception will result in higher advertising value. Practitioners should focus on developing advertising value through positive SMS advertising perception. Previous consumer behavior studies have shown that advertising value depends on unmet needs and expectations. If marketers understand these expectations and communicate with their product advertisements, there is a greater likelihood that advertisement will deliver high advertising value, which in turn leads to a higher purchase intention.

Further, the results of the moderation study suggest that brand familiarity plays an important role in enhancing the effect of SMS advertising perception on advertising value, purchase intention, and attitude toward SMS advertising. This implies that it is more likely that advertisements received from a familiar brand will be seen, read, and trusted. The findings of the ANN analysis have revealed that advertising value is the most important predictor of purchase intention. Essentially, advertising value depends on the message's usefulness and relevance to customers; both of these factors are highly reliant on customer characteristics beyond simply their demographics. This highlights the need for sophisticated content customization of SMS advertising according to various consumer markets.

As a result, this study adds new insights on an under-researched phenomenon. By identifying key mediating factors that help us to understand how advertising value, attitude toward SMS advertising, and purchase intention are influenced by SMS advertising perception, this study bolsters the SOR framework and advances our interpretation of the relationships between these factors. This will ultimately allow both advertisers and advertising agencies to develop strategies to effectively maximize the use of SMS advertising in promoting their brands in the consumer market, thus optimizing the impact of advertising on the purchasing intention of the consumer.

Finally, the findings of this study are equally relevant for all advertisement channels, including mobile advertising. The reasoning is that most advertisements rely on content (text), which is the cornerstone of advertising effectiveness. Moreover, the importance of SMS advertising should not be discounted in the era of advancing communication technologies such as mobile instant messaging (MIM) technologies and social media channels. These platforms are technology dependent, mostly incompatible with each other, and use internet services (Tseng & Teng, 2016). On the other hand, SMS advertising does not have these types of requirements. SMSs can be used as a direct interface to interact with customers without these dependencies and hence is more likely to attain quicker responses from customers.

5.3 Limitations and future research direction

The present study has limitations that need further investigation. For instance, the study focused on cross-section survey analysis results using a form of purposive sampling that limits the generalizability of the findings. Future research may use experimental or longitudinal data with probability sampling to overcome these limitations. Second, the study is confined to the

geographical region of Dubai, UAE, and consumer behavior may vary in different locations. Future studies should focus on other geographical locations to garner more insights on the subject, which will increase the scope of generalization of the findings of this research. Further, the limitations of the quantitative design could be addressed by future research through the potential adoption of a mixed-method approach to gain a deeper understanding of advertising value and attitude toward SMS advertising. One strongly recommended future direction for research is the examination of the scope of the comprehensive model proposed and validated in this study for other advertising platforms such as mobile app advertising, video app advertising, social media advertising, and so on. Even though this study has attempted to use robust and hybrid analytical methodologies for the analysis of the data and inferring results, future studies may utilize more data sets, such as big data, and implement advanced data analytics tools, such as machine learning and artificial intelligence, to attain more in-depth results and conclusions.

6. Conclusion

SMS advertising perception is proposed and validated as a higher order construct in this study. This study also shows the effect of SMS advertising perception on purchase intention using the S-O-R framework. Based on S-O-R framework, this study proposed that advertising perception has a direct effect on advertising value, attitude toward advertising, and purchase intention, and that the effect of advertising perception is then transmitted indirectly to purchase intention through advertising value and attitude toward advertising in a serial and parallel mechanism. All direct and indirect hypotheses are supported by the study's findings. The findings contribute to the body of knowledge in the field of mobile advertising by demonstrating how SMS advertising perception, advertising value, and attitude toward SMS advertising influence purchase intention. This study explains how the effect of SMS advertising perception is transmitted to purchase intention, emphasizing the critical role of advertising value and attitude toward SMS advertising in the process. Furthermore, the role of brand familiarity in improving the effect of SMS advertising perception on advertising value, purchase intention, and attitude toward SMS advertising should not be underestimated, as this study emphasizes.

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Appendix I; Measurement items

Construct	Item		Source
Advertising value	ADV1	I feel that SMS advertising is useful.	Ducoffe (1995), Liu et al. (2012)
	ADV2	I feel that SMS advertising is valuable.	
	ADV3	I feel that SMS advertising is important.	
Attitude toward SMS advertising	ATT1	Overall, I consider SMS advertising as a good thing.	Wang & Sun (2010)
	ATT2	Overall, I like SMS advertising.	
	ATT3	Overall, I regard SMS advertising as an essential thing.	
	ATT4	Overall, reading SMS advertising is important to me.	
	ATT5	Overall, SMS advertising is not interesting to me (R).	
Credibility	CRE1	I feel that SMS advertising is convincing.	Liu et al. (2012),
	CRE2	I feel that SMS advertising is believable.	
	CRE3	I feel that SMS advertising is credible.	
	CRE4	I feel that SMS advertising is truthful.	
Entertainment	ENT1	I feel that SMS advertising is interesting/entertaining.	Ducoffe (1995), Liu et a. (2012),
	ENT2	I feel that SMS advertising is enjoyable.	
	ENT3	I feel that SMS advertising is pleasant.	
Informativeness	INF1	I feel that SMS advertising is a good source of product information.	Ducoffe (1995), Wang & Sun (2010), Liu et al. (2012)
	INF2	I feel that SMS advertising is a good source of timely product information.	
	INF3	I feel that SMS advertising supplies relevant product information.	
Irritation	IRR1	I feel that SMS advertising is irritating.	Liu et. al. (2012), Ducoffe (1995)
	IRR2	I feel that SMS advertising is annoying.	
	IRR3	I feel that SMS advertising is intrusive.	
Message relevance	MR1	I had no interest in the SMS advertisement that I received	Tseng & Teng, 2016
	MR2	The SMS advertisement that I received was worthless to read.	
Purchase intention	PI1	I would consider purchasing products with SMS advertisements.	Martins et al. (2019), Wu et. Al. (2011)
	PI2	I intend to purchase products with SMS advertisements.	
	PI3	I would probably buy products with SMS advertisements.	

Appendix-II; Discriminant Validity- Cross Loading

	ADV	ATT	CRE	ENT	INF	IRR	MER	PIN
ADV1	0.880	0.515	0.381	0.533	0.431	0.283	0.417	0.607
ADV2	0.905	0.547	0.409	0.569	0.414	0.334	0.359	0.644
ADV3	0.894	0.573	0.434	0.583	0.439	0.257	0.343	0.682
ATT1	0.385	0.706	0.400	0.486	0.296	0.224	0.203	0.548
ATT2	0.388	0.721	0.430	0.494	0.353	0.221	0.201	0.447
ATT3	0.469	0.813	0.311	0.655	0.301	0.273	0.275	0.526
ATT4	0.510	0.738	0.271	0.447	0.455	0.275	0.421	0.510
ATT5	0.522	0.751	0.296	0.472	0.439	0.265	0.407	0.503
CRE1	0.382	0.317	0.828	0.344	0.317	0.223	0.264	0.345
CRE2	0.419	0.425	0.887	0.437	0.344	0.293	0.288	0.399
CRE3	0.389	0.405	0.850	0.388	0.309	0.273	0.249	0.374
CRE4	0.364	0.392	0.834	0.392	0.321	0.211	0.211	0.303
ENT1	0.595	0.601	0.447	0.882	0.405	0.352	0.319	0.600
ENT2	0.554	0.572	0.386	0.890	0.350	0.440	0.336	0.505
ENT3	0.500	0.625	0.373	0.850	0.356	0.385	0.273	0.483
INF1	0.416	0.446	0.299	0.381	0.893	0.239	0.274	0.405
INF2	0.426	0.423	0.356	0.361	0.871	0.289	0.307	0.388
INF3	0.440	0.455	0.360	0.393	0.912	0.259	0.297	0.419
IRR1	0.313	0.332	0.294	0.413	0.290	0.926	0.364	0.327
IRR2	0.310	0.316	0.273	0.430	0.300	0.932	0.344	0.350
IRR3	0.270	0.278	0.244	0.389	0.213	0.890	0.223	0.317
MER1	0.377	0.368	0.279	0.310	0.310	0.314	0.919	0.359
MER2	0.389	0.381	0.270	0.342	0.293	0.317	0.920	0.342
PIN1	0.674	0.527	0.393	0.511	0.404	0.286	0.331	0.870
PIN2	0.671	0.566	0.353	0.526	0.406	0.318	0.326	0.882
PIN3	0.522	0.671	0.339	0.534	0.361	0.335	0.330	0.836