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Psychological determinants of consumer's usage, satisfaction, and word-of-mouth recommendations toward smart voice assistants

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Abstract. AI-based voice assistant (VA) technologies are facing an unprecedented growth. VA are available as a standalone device like Amazon Echo dot or Google home and also as an extension such as Google maps and OK Google. Extant research has mostly focused on the device specific characteristics to explain the adoption of VA. In this research, we take a different approach and examine the psychological determinants of VA adoption. We look at how factors such as playfulness, escapism, anthropomorphism, and visual appeal of VA influence the attitudes (hedonic and utilitarian) of consumers. Moreover, we also examine the effects of psychological characteristics of VA on usage intentions and satisfaction, which lead to a favorable word-of-mouth (WOM) behavior that is critical for adoption of a technology. Using a structural equation modeling approach, our results suggest that psychological factors have a significant positive influence on both attitudes. Hedonic attitude further influences satisfaction and utilitarian attitude positively impacts usage and satisfaction, which have a positive association with WOM. Our research offers useful insights to marketers to increase the VA adoption and makes contributions to the literature.

Keywords: Smart voice assistant, psychological factors, word-of-mouth.

1 Introduction

Rapid technological advancements have given rise to various innovative products which fulfils the need of the modern era consumer. Every decade sees a change in how humans interact with the technology. The journey has computers has followed evolution from

desktop to world wide web, to mobile phones, to touch screen and now smart phones and smart devices to block chain technology (Hughes, Dwivedi, Misra, Rana, Raghavan, & Akella, 2019). The penetration level of these smart products differ according to the adoption and diffusion rate of these technologies in developing and developed economies across the globe. After the COVID-19 pandemic the dependence of human race on AI (Artificial Intelligence) based products and services have increased many fold due to social distancing norms, sanitization issues and growth in work from home culture. The role of AI has significantly increased in the field of management (Dwivedi, et al., 2019) and marketing in the recent times although it is widely used in other sciences for more than half a century (Jarek, & Mazurek, 2019). The large amount of data present online through smart phone devices or big data systems makes AI an important part of marketing research conducted by various online shopping or service providers portal. According to Oxford Dictionary, AI is “the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages” (“Definition of artificial intelligence in English by Oxford Dictionaries”, 2019). With the development in the field of artificial intelligence new technologies are being offered to the consumers in the form of voice, text and image recognition, autonomous vehicles and robots. The practical application of voice recognition is available in smart phones (e.g. Google Assistant). The current research focuses on smart Voice-interaction technologies such as smart speakers like Google Home and Alexa. The word “Smart” refers to “self-monitoring analysis and reporting technology.”

Extant research in technology adoption mostly focuses on the usefulness and ease of use factors that are specific to device characteristics (Alalwan, Dwivedi, & Rana, 2017). In a recent research, Dwivedi et al. (2019) propose that attitudinal disposition toward technology is vital in influencing the behavioral tendencies to adopt technology. Psychological factors that appeal to hedonic experience (e.g., visual appeal or playfulness) significantly influence the adoption of emerging technologies like virtual reality and augmented reality ((Demirkan & Spohrer, 2014). However, research on impact of such factors in context of smart voice assistant is in nascent stage (Hugehs et al., 2019). We try to address this research gap in present study. We look at the antecedents to the attitudes (hedonic and utilitarian) to examine the adoption and usage behavior. The purpose of this research is to investigate the impact of psychological factors such as anthropomorphism, playfulness, visual appeal, and escapism on usage and satisfaction with smart voice assistants. Furthermore, we also look at the word of mouth (WOM) recommendation, because a positive WOM increases the changes of technology diffusion (Dwivedi et al, 2019).

2 Literature Review

2.1 Smart consumers

Consumers are co creating and experiencing the latest smart technologies in services context like hospitality and tourism (Neuhofer, Buhalis, & Ladkin, 2015) and retail (Pantano & Naccarato, 2010). The term ‘Smart’ represents the social, economic and technological advancements driven by rapid innovations in information and communication and connected technologies (Demirkan & Spohrer, 2014). Smart technology is defined as ‘value-creating connected and synchronised smart objects or

devices that interact with one another, sense the environment, and guide and control their functions autonomously' (Roy, Balaji, Sadeque, Nguyen, & Melewar, 2017). The active users who voluntarily extend efforts to directly help others in the smart service scape are referred to as 'smart consumers'. The extant literature have been developed to understand the variables of consumer experience co-creation. However, the literature is still at an initial stage in understanding the conceptual relationships of 'smart consumer' experience co-creation. Although there has been a lot of research concerning brand equity and customer experience (Kumar, Dash, & Malhotra, 2018), none has been able to connect it to the smart services context and specifically to smart consumers.

2.2 Smart technologies

Infusion of smartness into different contexts has been a recent trend, with some prominent examples including smart tourism (Neuhofer, Buhalis, & Ladkin,, 2015), smart retailing (Roy et al., 2017), smart cities (Letaifa, 2015). The extant marketing literature defines the smart technology environment as the platform where several smart devices are consistently working for consumers to live with greater comfort (Cook & Das, 2004). But in fact at the heart of the smart environment is not the devices, but the users, referred to as smart consumers (Cook, Augusto, & Jakkula, 2009; Mavrommati & Dar- zentas, 2006). Chen et al. (2018) define smart consumers as those consumers who voluntarily engage and are competent to participate in experience sharing. User experience sharing behaviour may be defined as 'customers initiation effort made for the direct benefit of others in their service network' (Chen et al., 2018).

2.3 Smart Voice Assistant and psychological factors

Smart voice assistants play an important role in understanding consumer the consumer faces several trust issues in its adoption (Foehr, & Germelmann, 2020). Smart voice assistants work on the philosophy of capability, context, dependence, multidimensionality, separability, and applicability (Alter, 2019). A voice assistant may be termed as smart voice assistant if it can: Capture information, Transmit information, Store information, Retrieve information, Manipulate information, Display information (Alter, 2019). Chatbots provides engaging and interactive customer service (Chung, Ko, Joung, & Kim, 2018). Smart voice interaction technologies (SVIT) are also termed as voice user interfaces (Kendall, Chaudhuri, & Bhalla, 2020). Consumers use SVIT for three kinds of interaction: looking up, learning and leisure (Kendall, Chaudhuri, & Bhalla, 2020).

Research has shown that today, consumers are not only willing to accept SVITs but also build various types of relationships with the devices. At the same time, prominent SVITs like smart speakers (e.g., Amazon Echo, Google Home) have sparked privacy and data security concerns of consumers, suggesting that the adoption of such smart technologies require considerable levels of consumer trust. Although research shows a considerable understanding of factors influencing smart technology adoption and the relationship types that result from consumer–smart technology interaction, implications on how consumers initially develop and afterwards maintain trust in these smart technologies is scarce.

Despite the recent research interest in SVITs in the fields of human-computer–interaction, consumer behaviour, and marketing (e.g., Ehret and Wirtz 2017; Verhoef et al.

2017; De Keyser et al. 2018), the definition for smart technology with voice - interaction functions is not very clear. Researchers are having different opinions for it. From the literature three categories of definitions can be identified. First, there are definitions that conceptualize SVITs mainly with reference to their underlying software components or computational infrastructure, for example, natural language processing, artificial intelligence (AI), or cloud computing (e.g., Luger and Sellen 2016; Cho 2018; De Keyser et al. 2018; Lopatovska and Williams 2018; Myers et al. 2018). Second, researchers conceptualize SVITs by discovering their possible range of abilities (e.g., online shopping or controlling other smart devices; Cowan et al. 2017; Li and Lee 2017; Manikonda, Deotale, and Kambhampati 2017; Porcheron et al. 2017; Chen and Wang 2018; Knotte et al. 2018; Santos et al. 2018). Third, another category of definitions conceptualizes SVITs by relating the concept with consumer technologies available in the market, such as Amazon's Alexa or Apple's Siri (Moorthy and Vu 2014; Kiseleva et al. 2016; Vyturina et al. 2017; Lopatovska et al. 2018).

To respond to their users' vocal requests, SVITs are equipped with highly sensitive always-on microphones that scan their spatial environment for predefined activation terms (e.g., "Alexa", "Hey, Google"). This always-on feature of SVITs has raised serious privacy and data security concerns. It has thus been argued by researchers that SVITs constitute an element within a larger economic order of what has been termed "surveillance capitalism". Anthropomorphism is another psychological mechanism explaining the adoption and diffusion of smart speakers can be found in the voice based interaction mode between consumers and SVITs (Bort 2016). Consumers tend to anthropomorphize objects and products, meaning that they ascribe uniquely human like attributes, cognitive patterns, intentions, motivations, and emotions to non-human entities, such as technology. Consumers have been found to exhibit a tendency to anthropomorphize objects particularly if they are alone (i.e., if they desire social interaction) and have a need for affection toward their environment. With regard to SVITs, this latter motivation is of particular importance, it is closely connected with consumers' desire to explain, predict and eventually master a technology within its environment. This means that SVIT users who are not aware or bothered about the privacy concerns while interacting with them are more likely to anthropomorphize the technology.

In response to consumer tendencies to humanize SVITs, marketers of smart technologies implemented tactics in their persuasion repertoire that facilitate the anthropomorphism of products (Aggarwal & McGill 2011). Researchers argue that this is also the case for SVITs such as smart speakers. First, the voice-based mode of consumer-technology interaction facilitates consumer tendencies to anthropomorphize the technology, given that this mode of interaction is usually reserved for human-to-human exchange (Nass & Brave 2005). Second, the naming of the voice -interaction software with which users of smart speakers interact, often suggests human like associations, like "Alexa" or "Siri". While Amazon's software developers justify their choice of the term "Alexa" as a "wake word" (note the anthropomorphic suggestion implicitly included here) because of its rarity as a first name and its special combination of soft vowels and the letter x (Bort 2016), the fact that the software was given a female first name particularly activates anthropomorphism. These anthropomorphic associations are emphasized in advertising of the Alexa. In video commercials, the smart speakers are not marketed on the basis of their technical specifications. Instead, the idea of SVIT as a helpful humanoid is conveyed. "Alexa" is thus portrayed as more than essentially a collection of software codes, constituting a "happy helper" within the private parts of consumers' day-to-day lives (Phan

2018).

In humanizing technology, consumers not only consider anthropomorphic cues but regard technologies as social actors with which they form interpersonal relationships. Consumer culture theory has recently shown increased interest in the characteristics and dynamics of these interpersonal consumer–smart technology relationships. Although Schweitzer et al.’s work (2019) provides a good overview of the different types of relationships between consumers and SVIT, it disregards contextual influences on consumer–smart technology relationships (as proposed in Verhoef et al. 2017 and Woodall et al. 2018) and does not explain how trust in smart technologies and relationships may develop.

3 Conceptual Model

Recent research suggests that attitude is a critical antecedent to technology usage and adoption behavior (Dwivedi et al., 2019). In our research we include two aspects of attitude – hedonic and utilitarian (Spangenberg, Eric, Voss, & Crowley, 1997) to examine the influence of both attitudes on usage and satisfaction with technology (see Figure 1). In this study, we explore the device characteristics and psychological benefits of using voice assisted devices that form the attitude which leads to usage and satisfaction with the technology (Alalwan, Dwivedi, & Rana, 2017). Moreover, word-of-mouth recommendations are vital for information diffusion and technology adoption (Mishra, Maheswarappa, Maity, & Samu, 2018). We also analyze the impact of usage behavior and satisfaction on WOM intentions that may help us to understand the further adoption of voice assistants.

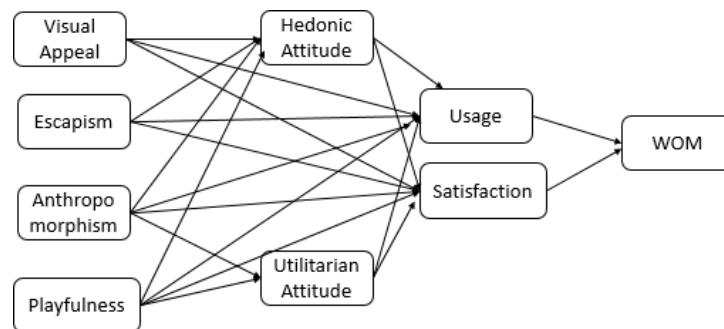


Fig. 1. Conceptual Model

We propose the following hypotheses based on the conceptual model-

H1: Visual appeal is positively related with (a) Hedonic Attitude, (b) Usage, and (c) Satisfaction.

H2: Escapism is positively related with (a) Hedonic Attitude, (b) Usage, and (c) Satisfaction

H3: Anthropomorphism is positively related with (a) Hedonic Attitude, (b) Utilitarian Attitude, (c) Usage, and (d) Satisfaction

H4: Playfulness is positively related with (a) Hedonic Attitude, (b) Utilitarian Attitude, (c) Usage, and (d) Satisfaction

H5: Hedonic attitude is positively related with (a) Usage and (b) Satisfaction.

H6: Utilitarian attitude is positively related with (a) Usage and (b) Satisfaction.

H7: Usage behavior is positively related to word-of-mouth intentions.

H8: Satisfaction is positively related to word-of-mouth intentions.

4 Research Methodology

The questionnaire was designed using standard items from the past literature. The data was collected online. Two video that reflect the meaning of smart voice assistant were inserted in the google form. The data was analyzed using PLS SEM technique. A total of 120 valid responses have been used in the analysis (65% males, average age 25.5 years). We used income and employment status as control variables in this study.

5 Data Analysis

5.1 Measurement model

We tested for reliability and validity indices as recommended in extant research. All the outer loadings are above 0.8, AVE is above 0.5, and Composite reliability is more than 0.7 (Hair Jr, Hult, Ringle, & Sarstedt, 2016). All VIF values are less than 5, and HTMT values (discriminant validity) are less than 0.9 (Hair et al., 2016). Thus, we conclude that the measurement model is valid and reliable.

5.2 Structural Model

The structural model was evaluated using bias corrected bootstrapping resampling procedure at 5000 sub samples. The results are given in Table 1. First hypothesis had three sub parts. Impact of visual appeal on hedonic attitude (H1a, $\beta = 0.01$, $p = 0.97$) was found to be insignificant where as other two hypotheses (H1b, H1c) which suggested impact of visual appeal on Usage ($\beta = 0.18$, $p = 0.08$) and satisfaction ($\beta = 0.3$, $p = 0.02$) were found to be significant. Escapism significantly impacted hedonic attitude (H2a, $\beta = 0.18$, $p = 0.03$) and satisfaction (H2b, $\beta = 0.22$, $p = 0.02$) but had no impact on usage ($\beta = 0.1$, $p = 0.16$). Hedonic and utilitarian attitude was significantly impacted by Anthromorphism (H3a, $\beta = 0.29$, $p = 0.049$; H4a, $\beta = 0.37$, $p = 0.003$) and playfulness (H3b, $\beta = 0.37$, $p = 0.003$, H4c, $\beta = 0.53$, $p < .001$). Impact of Anthromorphism was not significant on usage (H3c, $\beta = -0.07$, $p = 0.57$) but impact of playfulness was found to be significant on usage (H4c, $\beta = 0.53$, $p < .001$). H3d and H5a were insignificant whereas H4b, H4d, H5b, H6a, H6b, H7 and H8 were supported (see Table 1).

6 Discussion and Implications

Prior research suggests that smart voice interaction technology (SVIT) is more used by the smart phone users in comparison to smart speaker users (Foehr, & Germelmann, 2020). The

number of individuals who have tried voice assistants on smart phones is 146.6 million compared to more than 50 million for smart speakers (Voice assistant consumer adoption report, 2018). Consumers view voice assistants on smart phones as utilities first, for example, the convenience of voice interactions for searching or asking for directions has replaced the touch interaction with the smartphones.

The findings suggest that psychological acceptance and gratifications derived from SVITs are critical antecedents to the hedonic and utilitarian attitude toward technology usage. Users find SVITs playful, they enjoy the experience, and use SVIT as an escape mechanism. Users perceive these devices having certain element of human and interact accordingly. The results reveal that hedonic attitude may not lead to usage but influence satisfaction, whereas utilitarian attitude lead to usage and satisfaction. Users are more likely to recommend SVIT when they are satisfied with the device.

Our study reaffirms the findings of Dwivedi et al. (2019) about the importance of attitude in technology usage behavior. The novel contribution of this study is to cement the role of psychological aspects in technology usage. We integrate elements from sociology and psychology research to arrive at antecedents to attitudinal parameters. The design and human like appeal of SVIT can improve the chances of adoption. Hence, we suggest marketers to stress these two aspects in their communication to users for increasing the usage and satisfaction. Voice assistants provide elements of playfulness and a new fantasy world where users talk to them as humans. We believe that firms should try to make the interactions with SVIT more human like to make consumers engages and satisfied.

7 Limitations

Our study has certain limitations. We accept that the sample size is low, but since the data collection is still in process, we are hopeful to have a relatively larger sample size in few weeks that should add to robustness and generalizability of results. We did not specifically look at the language aspect of voice assistants. In India, users use a variety of languages, which SVIT may not be able to interpret at times leading to dissatisfaction. Further research can examine the role of interactions using multiple languages. Another interesting extension could be the impact of gender of voice assistant and how it affects the users' attitudes and behavior.

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Table 1. Hypothesis Results

Hypo.	Relationship	Path coefficient	<i>p</i> value	Supported
H1a	Visual Appeal -> Hedonic Attitude	0.01	0.97	No
H1b	Visual Appeal -> Usage	0.18	0.08	Yes
H1c	Visual Appeal -> Satisfaction	0.3	0.02	Yes
H2a	Escapism -> Hedonic Attitude	0.18	0.03	Yes
H2b	Escapism -> Usage	0.10	0.16	No
H2c	Escapism -> Satisfaction	0.22	0.02	Yes
H3a	Anthropomorphism-> Hedonic Attitude	0.29	0.049	Yes
H3b	Anthropomorphism -> Utilitarian Attitude	0.37	0.003	Yes
H3c	Anthropomorphism -> Usage	-0.07	0.57	No
H3d	Anthropomorphism -> Satisfaction	0.01	0.96	No
H4a	Playfulness -> Hedonic Attitude	0.27	0.05	Yes
H4b	Playfulness -> Utilitarian Attitude	0.25	0.03	Yes
H4c	Playfulness -> Usage	0.53	<.001	Yes
H4d	Playfulness -> Satisfaction	0.36	0.002	Yes
H5a	Hedonic Attitude -> Usage	-0.22	0.12	No
H5b	Hedonic Attitude -> Satisfaction	0.33	0.01	Yes
H6a	Utilitarian Attitude -> Usage	0.34	0.02	Yes
H6b	Utilitarian Attitude -> Satisfaction	0.21	0.08	Yes
H7	Usage -> WOM	0.24	0.03	Yes
H8	Satisfaction -> WOM	0.56	<.001	Yes