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Acceptance of Voice Assistants using Technology Acceptance Model (TAM)

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Abstract

Voice search is becoming increasingly popular with customers as a way to simplify their lives. More individuals than ever are drawn to the technology that seems to give such independence due to the fear of being enslaved by computers. Every year after the holidays, more homes start using voice search. The basic concept is that the user speaks their request into the voice-activated gadget, which streams it through the cloud, transforming it into text. In reality, it is altering the search algorithm. As a result of the opening of Pandora's Box, businesses like Amazon, Apple, and Microsoft are adapting to fulfill the rising demand for voice-enabled gadgets. Voice assistants have created numerous possibilities for capitalizing on the speech bot trend and using this technology in novel and intriguing ways. This study focuses on the use and level of acceptance of voice assistants among various age groups in daily life.

Keywords: Voice assistants, Hands-free technology, Hedonic Motivation, social influence

Introduction

In this ever-evolving digital world where speed, efficiency, and convenience are constantly optimized, Voice Computing symbolizes an innovative development in human-machine interaction. There has been an increased awareness and a higher level of comfort validated specifically by millennial consumers. Consumers use voice assistants while multitasking and can be alone or in a group.

Voice assistants are software agents that interpret human speech and respond through synthesized voices. The software constantly listens for a keyword to wake it up. Once it hears that keyword, it

records the user's voice and sends it to a specialized server, which processes and interprets it as a command. Depending on the command, the server will supply the voice assistant with appropriate information to be read back to the user, play the media requested by the user, or complete tasks with various connected services and devices.

Speech recognition involves using software to recognize words and translate them into digital text for further actions. Voice recognition comprises recognizing a speaker's voice by analyzing voice characteristics against an existing sample voice for authentication.
Voice assistant users can ask questions, control home automation devices, playback media and manage other basic tasks like email, to-do lists, and calendars with verbal commands.

Flashback of Voice Assistants

The first speech recognition system, named Audrey, was created by Bell Laboratories in 1952. Instead, Audrey was rudiment technology-wise, understanding only ten digits -spoken by particular people. At the Seattle World's Fair in 1962, IBM introduced Shoebox, which could perform mathematical functions and recognize 16 spoken words. In the 1970s, scientists from Carnegie Mellon University in Pittsburgh, Pennsylvania, along with the support of the United States Department of Defense and its Defense Advanced Research Projects Agency — created Harpy, which could recognize 1,011 words. Then came Julie, the doll from the Worlds of Wonder toy company in 1987, and it could recognize a child's voice and respond to it.

Apple started building speech recognition features into its Macintosh computers with PlainTalk app in 1993. In 1997 came Dragon NaturallySpeaking, which was the first continuous dictation product. It could comprehend about 100 words per minute and turn them into text. Samsung launched Bixby, IBM introduced Watson, Microsoft launched Cortana on Windows 10 and Windows phones, and Nuance has Nina.

Apple Inc. launched the first mass-accessible voice command system as they released the virtual assistant named Siri in 2011. Siri joined the world of intelligent speakers with the HomePod in February 2018. Google Assistant on the Android platform works on Apple's iOS but has limited functionality. Then the smart speakers came along, and "Alexa" and "Hey Google" became a part of everyday banter.

Google Home

Google Home speakers facilitate its users to give voice commands for interacting with services through Google's personal assistant software called Google Assistant. Many integrated services permit the users to listen to music, control video playing or receive news updates entirely by voice. Google Home devices have assimilated support for home automation, allowing users to control smart home appliances with their voice. Alexa is Amazon's cloud-based voice service on the Echo, Echo Dot, and Alexa companion devices like the Fire tablet and Fire TV. Alexa skills are apps that enable voice-activated capabilities for connected smart devices and online services. Alexa is a voice assistant that was created and developed by Amazon. It was named after the ancient library of Alexandria. It was created in 2014. Alexa is a touch-free device that has a speaker. Users usually use it to play music, read the news and set alarms. Alexa is competent enough to connect with a phone, show directions, and estimate traffic times. Alexa delivers a set of inbuilt capabilities, referred to as skills. Alexa's facilities include answering questions, providing weather forecasts, playing music, and querying Wikipedia.

Review of Literature

Speech recognition defines converting speech into digital data by translating acoustic signals to a set of words, while voice recognition aims to identify the person speaking (Patel, Maind, Bramhecha, Mahale, Sanghavi, 2013). Speech recognition works using algorithms through acoustic and language modeling. Acoustic modeling represents the relationship between linguistic units of speech and audio signals; language modeling matches sounds with word sequences to help distinguish between similar words" (Syntony, n.d.).Voice recognition is a technique in computing technology by which specialized software and systems are created to identify, distinguish and authenticate the voice of an individual speaker (Techopedia, 2018).

A first study discussing automatic speech recognition shows the approach of artificial intelligence is operated in answering machines of customer care and call centers (Morgan, 2012). Another study that discusses acoustic modeling in speech recognition claims customer satisfaction is achieved by promoting enhanced and improved customer handling (Hinton, 2012).

A study discussing speech recognition and AI declares that these technologies are not capable enough to compete with the accuracy of human listeners due to the lack of reliable software; thus,

developing flawless and highly efficient speech recognition techniques remains a challenging task (Choudhary, Kshirsagar, 2012). The potential possibilities that voice control withholds are unlimited, making the assistants' manufacturers vital actors, holding big data and acting as gatekeepers to this information. In 2016 it was estimated that USD 2 billion worth of sales were driven by digital assistants (Toesland,2016).

Research Methodology

Based on the systematic literature review, a research model was developed to determine the users' acceptance of voice assistants like ok google, Siri, Alexa, etc. A survey was conducted to evaluate how anthropomorphism attracts people to use and get satisfied with them. The survey measured the respondent's acceptance of new technology and their psychological feeling towards the new technology acceptance. Further, the technology's social influence made the user use this new technology. The survey questions concerned the respondent's perception of the voice assistant to measure their intention, satisfaction, social influence, hedonic motive, etc.

a) Survey: The user perception was measured by a distribution questionnaire and by surveying the perceived utility and intention towards the voice assistant. The survey consisted of two parts of questions. The first part was demographic, control variables such as age, gender, education qualification, income, device preference, tenure, frequency, purpose, and language.The second part of the survey questions focused on users' perception of quality/usefulness, perceived Ease of use, hedonic Motivation, and social influence towards the satisfaction and acceptance of the voice assistants technology. All the measurement items were asked on a seven-point Likert scale.

b) Sample: The survey was created on Google Forms and distributed online. The respondents were asked whether they have/had experiences with voice assistants who only can attempt the survey. There were 224 responses received, and 200 responses were considered for this study; most were received from India. The respondents were a mixture of various age groups, geographical areas, and different fields of work culture.

c) Research Objectives of the study are:

- To identify the factors influencing the user's intention to use the voice assistant.
- To measure the user's technology acceptance of voice assistant.

- To identify the most effective usage of voice assistants by the users.

d) Research hypothesis

For this research, the following hypotheses are developed:

H_1: The quality of Voice assistants significantly impacts users' intention to use voice assistants.

H_2: Perceived usefulness of voice assistants significantly impacts users' intention to use voice assistants.

H_3: Voice assistant's Ease of usage significantly impacts users' intention to use voice assistants.

H_4: Social influence significantly impacts users' intention to use voice assistants.

H_5: Hedonic Motivation significantly impacts users' intention to use voice assistants.

Results and Discussion

Data collected were converted, and spss was used to prove the hypothesis. The following table shows the demographic profile of the respondents.

Table 1: Demographic Profile of the Respondents

Particulars	Options	Percentage
Gender	Male	48
	Female	51
Age	Less than 12	16
	Teenagers (13-18)	17
	19-25	15
	26-40	35
	41-50	12
	above 50	5
Nationality	India	72
	Other	28
Purpose	Play youtube videos, songs, etc	35
	Searching purposes like restaurants, places, etc	15
	News and General knowledge	10
	Medical and beauty tips	5
	place an order and buy items	14
	Set and get reminders as personal assistance	12
	Miscellaneous	9

Frequency	Every Day	55
	Weekly	20
	Monthly	25
Voice Assistants	Alexa	40
	Siri	25
	Ok Google	30
	Others	5

The above table explains the demographic profiles of the respondents; it is understood that most of the respondents are female (51%) and are in the age group of 26 to 40 years, and 72% are from India. The purpose of voice assistants was primarily used to play youtube videos and songs by users, especially children and aged people. The age group of 26 to 40 years uses voice assistants for new reading and placing orders; few also use them as personal assistants. Further, most of them are using Alexa and Google. The following table shows the regression weights of the independent variables on the dependent variable. The regression analysis was conducted to test the hypothesis framed for the current research and to measure the user's intention to use the voice assistants.

Table 2: Regression Weight

Hypothesis	Independent Variable	β	Sig (p)	Result
H_1	Perceived Quality	0.056	0.040	Accepted
H_2	Perceived usefulness	0.066	0.041	Accepted
H_3	Ease of Use	0.175	0.012	Accepted
H_4	Social Influence	0.042	0.035	Accepted
H_5	Hedonic Motivation	0.019	0.026	Accepted

Dependent Variable: Intention to Use Voice assistants.

The various influencers to use voice assistants are discussed as follows:

Perceived Quality and Intention to Use Voice assistants

The perceived quality of the voice assistants has a significance value (p) of 0.040, which is less than 0.05. It denotes that the perceived quality of these voice assistants significantly influences the intention to use this technology. Hence H1 is accepted.

Perceived usefulness and Intention to Use Voice assistants

The perceived usefulness of the voice assistants has a significance value (p) of 0.012, less than 0.05. These voice assistants are helpful for users in their daily life to accomplish their activities quickly, increase their productivity, and achieve things very quickly. Thus, the user's perceived usefulness significantly influences the intention to use this technology. Hence H2 is accepted.

Perceived Ease of use and Intention to Use Voice assistants

The perceived usefulness of the voice assistants has a significance value (p) of 0.041, less than 0.05. These voice assistants are very easy to use by the users irrespective of age group and do not need technological knowledge. It is easy to understand and use, and people feel skillful using this new technology. Thus, perceived Ease of use significantly influences the intention to use this technology. Hence H3 is accepted.

Social influence and Intention to Use Voice assistants

Social influence towards the usage of voice assistants has a significance value (p) of 0.035, less than 0.05. In this technology era, people think they should use voice assistants to prove they are updated with technology. Hence, most of them started using this kind of new technology. Thus, social influence significantly influences the intention to use this technology. Hence H4 is accepted.

Hedonic Motivation and Intention to Use Voice assistants

Social influence towards the usage of voice assistants has a significance value (p) of 0.026, less than 0.05. In this tense and busy world, people feel that voice assistant are fun-filled, enjoyable, entertaining, touch-free, and quickly respond to their demands. Hence, most feel relaxed using this new technology, especially children under 15. Thus, hedonic Motivation significantly influences the intention to use this technology. Hence H5 is accepted.

Conclusion:

Voice Assistants refer to mediums (with or without screens) that can be accessed through voice commands and inputs. They help users perform various tasks not limited to researching products and services, purchases, providing information, query handling, or integrating with other connected objects to perform tasks. These computer-generated applications also learn user preferences over time and gradually personalize interactions suited to the user.

The most common purposes for which voice bots are being utilized are researching products and creating shopping lists, checking order status, Playing music, checking directions, booking an appointment for a car service, booking a cab, Learning about banking/ insurance products, checking

account balance, paying credit card bills, transferring funds. The service providers should not only offer text-based touchpoints to their customers but also consider the provision of speech-based services. Consequently, questions relevant to the deployment of chatbots (Schuetzler et al., 2021) must be re-evaluated for VAs. For example, providers should consider offering VA applications for their customers' intelligent speakers when providing product information and recommendations. They should also implement speech-based interaction touch points on their websites to increase customers' efficiency and enjoyment.

Regarding perceived efficiency, cognitive effort, enjoyment, and satisfaction, speech-based interaction modalities are superior to text-based. Organizations should also consider using conversational bots as a communications channel for marketers pushing marketing messages. It is essential to bear in mind in this context that messages need to be personalized. As the use of voice assistants proliferates, it will become increasingly crucial for voice to have a persona and become more life-like. An added element of fun and engagement will be necessary to boost the consumer experience and satisfaction. Brands that provide a good experience with their conversational assistants will drive higher customer engagement.

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