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Alexa! Examine privacy perception and acceptance of voice-based artificial intelligence among digital natives

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Abstract

Technological advancements, globalization, and digitalization have initiated various innovations across the globe transforming consumer needs and their ways to interact with brands and technology. Voice-based Artificial Intelligence, for the past few years, has been widely accepted and used by consumers worldwide for routine and special purposes. Nowadays, its presence can be felt across the majority of sectors like Healthcare, Education & Training, Entertainment, Automobile, and Retail. With its exciting unique features and convenience, there is no denial of voice being the future. Consumers have the power to decide the fate and success of an innovation. Thus, it is essential for organizations, innovators, and marketers who wish to increase technology adoption rates and reduce the barriers to acceptance of voice-based artificial intelligence among digital natives to evaluate the influence of numerous variables. This study aims to identify the motivators and inhibitors of the adoption of voice assistants among digital natives along with understanding their privacy perceptions about voice-based artificial intelligence. To examine the acceptance of voice-based artificial intelligence and its usage by youngsters, the researchers have proposed a comprehensive model to examine the relationship between various variables affecting consumer behaviourial intention. The study will be a significant addition to the previous literature as very limited studies have tried to understand the acceptance of voice assistants taking digital natives as consumers.

Subject Classification: *68T01, 68P27.*

Keywords: *Voice-based artificial intelligence, Voice assistants, Consumer adoption, Technology adoption, Digital natives, Privacy perception.*

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1. Introduction

Technological advancements, globalization, and digitalization have initiated various innovations across the globe transforming consumer needs and their ways to interact with brands and technology. The journey which started decades ago has evolved drastically, with artificial intelligence causing rigorous changes in human-computer interactions

In the digital era, Voice-based Artificial Intelligence has become ubiquitous in the lives of youngsters, especially Generation Z and Generation Alpha while facing unprecedented growth worldwide. Voice Assistants like Amazon Alexa, Apple Siri, Google Assistant, and Microsoft Cortana are rapidly expanding their consumer base by providing unique features leading to convenience and managing routine tasks efficiently like information search, voice commerce, listening to music and podcasts, news, and weather updates and controlling smart home devices (Koon et al., 2020). However, digital natives come under early adopters of such smart technologies.

Artificial Intelligence and Smart Technologies have been continuously influencing basic human functioning leading to great organizational and social changes (Sommer, 2015). The rise of the internet, globalization, artificial intelligence, and smart technologies like voice assistants have transformed the professional and private lives of users and eventually the quality of human life worldwide (Roblek et al., 2019). Also, along with COVID-19 affecting the human lives drastically, people should start acting pro-actively (Kumar & Ayedee, 2021) like exploring the voice as future. With voice-based artificial intelligence becoming all-pervasive, exploring its impact on human life, especially digital natives become necessary. Smart artificial intelligent technologies have become an indispensable part of digital natives' lifestyle. This cannot be named addiction even, it is an inseparable part of their lives (Turner, 2015). They use it literally everywhere, be in classrooms (Mahsud et al., 2020) or at homes.

Digital natives (Generation Z) are the consumers which have never survived without the internet and have access to technology since their birth. Children see their parents using and adopting voice assistants for even asking for directions or cooking recipes. This enhances the interest of youngsters into this amazing technology. Children haven't even learned proper words, search poems and videos on YouTube using voice search. Youngsters use voice-based artificial intelligence for entertainment and multitasking.

Youngsters mostly adopt to Voice-based Artificial Intelligence to save time and perform multiple tasks simultaneously. Though children are excited about the ways such technologies can alter their routine tasks and everyday lives, they are concerned about ethical dilemmas like privacy concerns and reduced time with family and friends (Roblek et al., 2019). Digital natives are known for their comfort with smart technologies and artificial intelligent devices like smartphones, smartwatches, voice assistants, and virtual/augmented reality (Twenge, 2017). Innovation has been transforming the consumer market across the globe and even making consumers smart by providing better and more efficient solutions to the challenges they face across different sectors. To provide such solutions, organizations work tirelessly day and night to analyze gaps and develop innovations in a rapidly changing modern digital era. The success of such innovations as voice-based artificial intelligence requires proper adoption and penetration of that technology by the consumers. Also, COVID-19 has forced the brands to choose new and innovative paths to explore the opportunities and gain consumer trust (Bhatia et al., 2022).

It is apparent that digital natives use artificial intelligent devices regularly and their human-like characteristics like voice in voice assistants transform the way consumers perceive and react toward them. The personification of voice assistants is quite common owing to their voice, irrespective of the fact that it has no other physical human-like characteristics. This helps humans to develop a bond with technology. Although this human-computer deeper connection offer numerous opportunities for marketers and brands to interact with users, developing trust, especially with digital natives is quite challenging but essential (Pitardi & Marriott, 2021). Various studies have been conducted to understand the consumer perception and penetration process of voice assistants. This study focuses on determinants of acceptance of voice-based artificial intelligence by Generation Z (born between mid 1990s to 2009) (Turner, 2015) and Generation Alpha (born between 2010 to 2024) and their privacy perception.

With the wave of digitalization and tech-savvy youngsters, understanding the determinants which influence the acceptance of voice-based artificial intelligence is necessary. While most of the studies examine the economical and technological factors influencing the adoption of voice assistants (Makkonen et al., 2016), this study examines the factors motivating and inhibiting acceptance of voice assistants especially among Millennials and Generation Z in a developing country like India.

Objectives of the Study

1. To examine the factors motivating and inhibiting the acceptance of voice-based artificial intelligence by digital natives.
2. To examine the privacy perception of voice-based artificial intelligence among digital natives.
3. To develop a comprehensive model to influence the acceptance and adoption of voice-based artificial intelligence by digital natives.

Research Methodology

In this study, the research methodology is based on previous literature related to voice-based artificial intelligence. In order to retrieve sufficient and high-quality research papers regarding privacy perception and acceptance of voice assistants, an initial literature quest was followed by narrowing to the theme. The researchers carried out a comprehensive search of web-based databases like ProQuest, Google Scholar, and Research Gate to identify relevant academic literature using the Snowball technique described by (Wohlin, 2014). A myriad of terminology like "voice assistants", "technology acceptance", "digital natives", "voice-based artificial intelligence adoption" etc., were used as keywords to gather relevant literature required for conceptual development. Also, the backward and forward snowball techniques were used to identify the research papers mentioned in the references section and new papers that cite the paper being examined respectively.

Literature Review

Voice assistants are artificial intelligent devices that either can be incorporated into smartphones, smartwatches, and other smart technologies or built-in as stand-alone speakers like Alexa Echo and Apple HomePod which provide daily, technical, administrative, managerial, and social assistance to consumers (Hoy, 2018). Voice-based Artificial intelligence makes routine tasks like listening to music, setting alarms, web browsing, checking weather updates and, purchasing and placing orders efficient and convenient. With rapid advancements and developments in technology, voice assistants are not only capable of understanding the human commands but interpreting and completing required actions while responding in synthesized voices and asking follow-up questions if required.

With higher compatibility and penetration of smart technology, users are being inquisitive about such technologies and digital natives tend to readily experiment with them. The latest development of voice-based artificial intelligence has transformed the human-computer interaction dynamics with users relying on their voice assistants for even transactional tasks.

Digital Natives

Digital Native is the term coined by Marc Prensky in 2001 to describe the generation of users of digital technologies since their birth, being surrounded by computers, videogames, smartphones, and other smart technology. They seek comfort in technology and artificial intelligence. They are exposed to digital methods of communication like smartphones and video calls and use various digital tools for educational purposes as well like smartboards, YouTube videos, and smart classrooms (Prensky, 2001). Technology is an integral part of their lives and they believe that they can't even spend a day without using technology. Though the term was coined to address the gap between digital students and traditional teaching pedagogy, now digital natives are categorized as a separate consumer segment by the marketers.

Digital Natives present as one of the most lucrative segments for marketers and product developers of tech-savvy products. To cater to the digital needs of the users of this segment, marketers must understand their perceptions about a specific product or idea. Thus, understanding the determinants of technology acceptance by digital natives is essential, especially when we are talking about voice-based artificial intelligence due to its unique features which previous technologies lacked like Natural Language Processing (NLP). Marketers are now formulating strategies to capture the market share by shifting to digital modes of promotion like social media marketing, influencer marketing, voice marketing, and virtual reality/augmented reality (Halton, 2021).

Privacy Concerns

Human-Computer Interaction (HCI) is a complex phenomenon where users are often afraid of their privacy. Digital Natives though spend their lives around technology, are also concerned for their privacy and inhibit to adopt a certain technology if find it not safe. Privacy concerns negatively moderate the relationship between functional attributes and the behaviourial intention of digital natives to accept voice-based artificial

intelligence (Dogra & Kaushal, 2021). Rapid advancements in technology and dynamic global market accompanied by the internet, artificial intelligence, and information sharing procedures, though developed with an aim to provide a better customer experience often lead to greater customer risks and negative perception about privacy by the users (Mathur, 2018).

Privacy concerns are often linked to users' concern, uneasiness, and apprehension about the unauthorized collection, storage, usage, and control of customers' personal information (Malhotra et al., 2004) leading to Perceived Privacy Risk from the users' side which is associated with emotional fears which negatively hamper the decision-making process, especially during consumer purchase decisions or technology acceptance. Customers tend to reuse to make purchases or adopt innovation in case of high privacy concerns. (Loewenstein et al., 2001). Privacy perceptions have been examined by numerous authors. However, with recent developments in voice-based artificial intelligence, authors have been keen to understand the privacy concerns and perceived privacy risks toward voice assistants (Hoy, 2018; McLean et al., 2021). Authors have highlighted the negative effect of privacy concerns in the technology acceptance process as a negative antecedent (Hasan et al., 2021) or even as a moderator (McLean & Osei-Frimpong, 2019), even in the case of Alexa, Siri, or other voice assistants.

Consumers be it digital natives or digital immigrants look for both organizational and governmental policies and regulations before making any purchase decision or safeguarding their privacy. For this, brands should work tirelessly to enhance consumers' privacy perceptions positively (Lwin et al., 2007). Therefore, firms should work on building trust in consumers' eyes towards their products. Trust and Privacy share a negative correlation relationship leading to opposite outcomes. Trust promotes behaviourial intention towards usage while privacy concerns hinder the purchase or acceptance decisions (Akbar et al., 2020; Wirtz & Lwin, 2009). Therefore, marketers should strategically develop measures to enhance trust and reduce privacy concerns for catalyzing the adoption of voice-based artificial intelligence.

Conceptual Development

Performance Expectancy

Performance Expectancy in the UTAUT model is defined as the degree of consumer expectation by which an individual perceives that using a particular technology will help them to accomplish tasks efficiently,

effectively, and with good performance (Venkatesh et al., 2003). For this study, it can also be described as the degree to which digital natives perceive that using voice-based artificial intelligence will enable them to achieve improved performance in their private and professional spheres.

Effort Expectancy

Effort Expectancy (EE) is defined as the degree of consumer's level of ease or ease of expectation to use related with the adoption of technology (Venkatesh et al., 2003) while measuring the easiness level associated with the use and adoption of any technology. It helps to measure how effortlessly the user can accept and use the technology. In this research, Effort Expectancy is how effortlessly digital natives can use voice assistants for their day-to-day tasks. Effort Expectancy has a direct link and significant positive influence on digital natives' behaviourial intention to use voice-based artificial intelligence. This is because the adoption of voice assistants by digital natives for various daily purposes and learning is likely to be influenced by how easy or difficult and complex it is to search for information or make calls and listen to music through Voice Assistants like Alexa and Siri.

Hedonic Motivation

Hedonic Motivation (HM) is defined as the degree of the consumer's level of perceived enjoyment related with the adoption of technology (Venkatesh et al., 2003; Venkatesh & Bala, 2008).

The construct from the UTUAT model helps to measure the level of enjoyment resulting from the use of technology aside from any performance or effort consequences arising from the technology use. In this study, Hedonic Motivation can be described as the degree of enjoyment and fun digital natives perceive from using voice assistants to perform their day-to-day tasks or from their interactions with Voice-based Artificial Intelligence. When the user perceives that a particular technology is enjoyable or fun, then they will have positive feelings towards that technology and even tend to accept/purchase relatively quickly (Rajan, 2020).

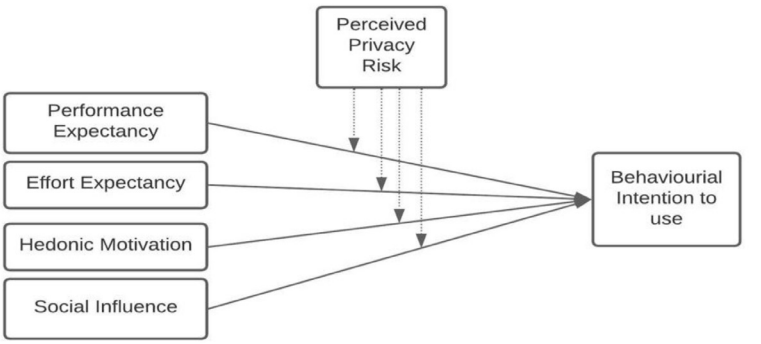
Social Influence

Social Influence (SI) is defined as the degree of consumer's decision to adopt and accept technology influenced by other's opinions and the individual's perception about what his/her important referents think about their course of action during a specific situation (Venkatesh et al.,

2003). Before taking any significant decision, individuals tend to seek the opinions of their significant others like friends, family, colleagues, and other close ones. Through this, individuals tend to seek a balance between their self and social interests. In this study, Social Influence can be described as their belief that their friends and family members think that they should use voice assistants to perform their day-to-day tasks or from their interactions with Voice-based Artificial Intelligence. (Al Shamsi et al., 2022; McLean & Osei-Frimpong, 2019; Pitardi & Marriott, 2021).

Perceived Privacy Risk

Perceived Privacy Risk is the measure of risk perceptions of individuals associated with adopting a particular technology. Users are exposed to new innovations and artificial-intelligent technologies with rapid advancements in technology around the globe. This enhances the risks associated with those technologies like Privacy Risk. Artificial Intelligent Technologies store a large amount of consumer data to provide an enriched customer experience which should be only collected after due customer permission. However, this may pose risk perceptions in the consumers' eyes which can resist the customers to adopt the technology (McLean & Osei-Frimpong, 2019; Rauschnabel et al., 2018). Thus, Perceived Privacy Risk can moderate the relationship between Performance Expectancy, Effort Expectancy, Hedonic Motivation, Social Influence, and Behaviourial Intention to use. In this study, Perceived Privacy Risk can be described as perceptions of digital natives about their privacy. It is their belief that using voice assistants to perform their day-to-day tasks or from their interactions with Voice-based Artificial Intelligence will not hamper their security. When the users have negative perceptions about their privacy,



Conceptual Model

they will have negative feelings toward that technology and will restrain from using that technology.

Discussion and Conclusion

The research work identified the important factors that significantly affect the behaviourial intention of digital natives to accept voice-based artificial intelligence. With voice assistants growing in popularity, a proper understanding of the determinants of technology acceptance becomes inevitable in the pool of literature. The extended constructs add validity to the proposed model in this area. Digital natives have spent their lives in the era of ubiquitous technology, and are prone to use digital methods of communication, learning, and basically living. For such a generation who is always looking for new innovations and methods to perform tasks effortlessly, who believes in smart work than hard work, voice-based artificial intelligence is a boon. Voice assistants help them call their friends while driving with just a voice command, set alarms, play music while being in a different room, and listen to audiobooks while getting ready for school, college, and even offices. Generation Z and Millennials often like to try novel innovative products, this makes them a crucial consumer segment for voice assistants. The proposed model is based on previous literature, it bridges the gap in the past literature. The authors highlight the importance of reducing privacy risks associated with the use of technology by the users. Information collected and used by the firms through voice-based artificial intelligence should be authentically used in essential measures to enhance customer experience. Customers should feel secure when interacting with Alexa, Siri, or any other voice assistant.

Implications of Research

Theoretical Implications

Voice-based artificial intelligence has seen unprecedented growth and exponential rise across the globe in past few years. First, by combining the UTAUT model with Perceived privacy risk, the study extends the traditional UTAUT model to provide a holistic understanding of the relationship among different factors influencing the adoption of voice-based artificial intelligence by digital natives. The study enriches the

previous literature by providing a new direction to the area of the research focusing on digital natives: Generation Z and Millennials. Past studies were majorly focused on how voice assistants can make the lives easier for elderly people, however, in developing nations like India where youngsters form a major part of the population, it is essential to understand their perceptions as well about recent developments.

Managerial Implications

Product designers should essentially look into enhancing features, user interface, and design to attract non-users of the technology.

Also, marketers should be more transparent while collecting the personal information of the consumers, as it will reduce privacy concerns. Consumers would be in a win-win situation as their security will be safeguarded and not hampered, and the information shared will gain them a better experience.

In a nutshell, the study provides insights into the potential reasons for the users to adopt voice-based artificial intelligence like completing tasks, listening to music, setting alarms, and making purchases. Developers should try to add new benefits to the list making it more lucrative for customers to switch to this technology. Also, voice commerce should be made more secure as users will not be easily involved in human-computer interactions involving transactions if its reliability is in doubt. Marketers should focus on positioning strategies of voice assistants and reach customers for their satisfaction levels. The researchers also believe that companies like Amazon, Apple, Google, and Microsoft should provide their services to other brands and make efforts to incorporate voice assistants in other sectors. The Internet has made life digital, and there is no way back. With the right decisions and grabbing opportunities, brands can make consumer interactions reach a new level. Lastly, the study focuses on digital natives who like to try new things and are keen on fast, funky, and attractive user interfaces. Therefore, developers should get more designs, colors, faster processors, and hi-tech technology to attract and retain this dynamic yet potential segment.

Limitations of the Study and Future Scope of Research

Despite some interesting and valuable advancements provided by this research work, there exists certain limitations and scope for further studies. First, the study proposed a conceptual model for technology

acceptance like voice-based artificial intelligence. However, there was no empirical investigation carried out to validate the constructs and model. So, future researchers may collect empirical evidence to support the findings. Second, the research is focused on digital natives and therefore this study represents only young consumers. With previous research continuously supporting the usage of voice assistants across all age groups worldwide, it would be interesting for future researchers to examine the role of trust and privacy perceptions towards voice-based artificial intelligence across different age groups and even geographical settings. Thirdly, a future study examining the actual usage of voice assistants will provide more enlightening insights into this area of research. Also, lastly while studying the actual usage, the researcher may study the order of preference of the tasks by digital natives or other users of the technology. Lastly, antecedents of perceived risks can be studied to understand the holistic technology adoption towards voice-based artificial intelligence.

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