Adoption Intention of Generative AI Chatbots among Students: Development of an Extended Value-Based Adoption Framework

Aatm Prakash Rai[1], Puneet Kumar Gupta[2] , Jagannath Patil[3]

[1]Research Scholar, ICFAI Business School, The ICFAI University, Dehradun, India.

[2]Assistant Professor, ICFAI Business School, The ICFAI University, Dehradun, India.

[3] Former Specially Appointed Professor, NIAD QE, Japan & Adviser, NAAC, Bengaluru.

Abstract— The demand for innovation such as Generative Artificial Intelligence (Gen-AI) Chatbots are increasing exponentially for self-learning in higher educational institutions (HEIs) worldwide. The previous researchers had suggested that Gen-AI chatbots could be utilized to achieve academic excellence in HEIs. The main objective of this research is to develop a conceptual framework for understanding adoption of Gen-AI chatbots among students of Higher Education in Uttarakhand. This was accomplished through a systematic literature review of the publications retrieved from the two well-known databases, Scopus and Web of Science (WoS). A step-by-step process is followed to retrieve the published literature on Gen-AI Chatbots adoption in higher education. The results proposed extending Value-based adoption model by incorporating attitude as an additional mediating construct and adding social influence, personal innovativeness, self-efficacy and removing and replacing perceived fee with perceived cost as predictors of mediating constructs towards adoption intention of Gen AI Chatbots among students in HEIs.

Keywords: Generative AI, Chatbots, Adoption Intention, Higher Education

1. Introduction

New inventions and technologies have been emerging more in current decades. Some of these disruptive innovations have found widespread consumer adoption, but most have failed to get the attention they deserve and have gone off the market. To clarify what factors determine the acceptance and diffusion of new technology and innovation, it is important to consider social expectations and demand factors, which lead to the introduction of new technology. Finally, this insight is guiding technology developers to reduce the risk of adoption failures. One fundamental question in the field of Information Systems (IS) is to understand why people accept, use, and adopt technology or innovation. Artificial Intelligence (AI) technology is at the very outset of its global acceptance, adoption and a transformational technology, to say the least; one that provides India a unique window to shape its 'brand of AI leadership'. India, for example, plans to build an inclusive lead in technology space by utilizing AI for economic prosperity, social good, inclusivity and positioning it as "Garage" for the other developing nations (Kumar et al., 2018). NITI Aayog has decided to concentrate on 5 critical areas of India which are expected to benefit the most from AI in solving the social problems. These include prominent segments such as health, agriculture, education, Smart Cities and Infrastructure and smart mobility and transportation (Kumar et al., 2018).India has the '7th place' in "India is ranked as Per AI Readiness" while based on a report by Salesforce 'Overall AI Readiness Score 2023' [1]. 41% want to use "open-source generative models", 37% want to integrate "cloud API generative models", and only 22% are excited about developing their own "generative models". It also raises the need for the AI talent pool to be able to construct generative models and emphasizes the importance of generative AI models, like 'Gen AI chatbots', for the labor force in all industries. It will be liberating for universities to be able to produce an AI talent pool to the corporate world at this stage. Generative AI chatbots like ChatGPT and Copilot have now been widely adopted in information systems for improving the effectiveness of teaching and learning [2]. With the emergence of Gen AI tools like machine learning and natural language processing, the learning experience has gotten a lot better. Gen AI Chatbots can be a great time saver, increase efficiencies and provide accurate feedback, and that benefits teachers and students.

2. LITERATURE REVIEW

'Generative Artificial Intelligence' (Gen-AI) tools for instance Chatbots are currently broadly incorporated with IS for efficient teaching and learning (Johri, Katz, Qadir, & Hingle, 2023). Also, (Smolansky, 2023) investigated the impact of Gen-AI on students' evaluations in higher education sector and inferred that the students and teachers have hybrid responses related to their academic integrity and the acceptance and adoption of assessment methods. The learning capabilities have been enriched with the arrival of Gen AI tools such as machine learning, large language models and natural language

processing'. Chatbots are likely to strengthen productivity, bail out teachers' time, and grant accurate feedback, profiting both teachers and their students. As per (Chang, 2022) , Chatbots are grouped as computer programs that are capable of initiating human-like conversations to accelerate discovering, developing and distributing knowledge. The authors (Pérez, 2020) recognized chatbots as a software application dependent on 'Natural Language Processing(NLP)' and 'machine learning (ML)' algorithms and are considered competent in executing and responding to user queries by means of textual conversations, audio interactions or avatars. Chatbot utilizes AI to replicate human-like dialogues and commonly merge chats or other related applications, attaining user-friendly connectivity. ELIZA, the first chatbot, launched in 1996 by Joseph Weizenbaum. Since then, the adoption of chatbots has flourished across all industries, mainly customer servicing and engagement (Fryer, 2019). As per a latest report of 'Fortune Business Insights', the 'Global market size' of chatbots was anticipated at USD396.2 million during year 2019 and it is projected to catch a compound 'annual growth rate(CAGR)' of 22.5% to USD1953.3 million by end of year 2027 . Likewise, Gen AI chatbots for education purposes are projected to stretch a market size of $5.3 billion by year 2032, with a 'cumulative annual growth rate (CAGR) of 40.5% in between year 2023-2032 (Paliychuk, 2023). These data realize substantial importance due to the encouraging trend of revealing customized learning experiences to students (Ahlam, 2023). In preliminary phase, the main intention of chatbots was to assist the simulation of human-like interaction by computer-simulated interactions. Presently, tools like Chatbots are being broadly employed in many sectors, like e-commerce, retailing, tourism and hospitality, education, banking and financial services, insurance sector , healthcare, automotive, etc (Shetty, 2024). IBM's (Church, 2023) categorized chatbots into five different types namely, 'button or menu-based chatbots', rules-based chatbots' , AI-powered chatbots', 'voice chatbots', and 'generative AI chatbots'. ChatGPT, well known 'Gen AI chatbot', has more than 100 million users worldwide. Surprisingly, it just took 5 days since its launch in November 2022, to have 1 million users. Remarkably, Instagram achieved that number in 2.5 months. This exaggerated pursuit in chatbots intention to adopt can be credited to the prominence of smartphones and 'high-speed internet connectivity'. 'Generative Artificial Intelligence', like ChatGPT, functions exceptionally compared to normal AI models. In fondness to discover patterns and generating predictions, it returns new responses, all-embracing textual , voice, and video formats. With its lineage in 'deep neural network' designs, and more accelerated by "transformer designs", "Large Language Models (LLMs)" combine abundant criteria's, ensuing in various 'natural language processing' tasks (openai, 2023). 'Gen AI chatbots' like ChatGPT launched by OpenAI, can produce consistent, contextually appropriate responses based on preceding conversations and chat history, supporting a collaborative platform for human-like conversation (Jo, 2024). The interactional ability of ChatGPT can adjust the academic panorama, by revamping the avenue through which students absorb, associate, and assume in context of educational content (Fauzi, 2023). OpenAI's ChatGPT is a 'Gen AI chatbot' which is empowered to convert large volumes of language data, fast-tracking prompt user results. OpenAI's ChatGPT is an open-source platform (Alshammari, 2024).

3.   RESEARCH PROBLEM

The rapid rise of Gen AI chatbots has impacted various industries, including education. In higher education, both faculty and students use these chatbots. However, factors influencing their acceptance and use for educational purposes are underexplored. Particularly in India, research on student adoption of Gen AI chatbots is lacking. This study aims to examine the key factors affecting students' intention to use these chatbots and to propose an improved model.

4.   RESEARCH METHODOLOGY

This technique involves several stages to review the published research work on the adoption of Gen AI Chatbots in the education sector [13] [14] [15]. Initially, keywords were selected to choose research studies. The initial process included identifying and selecting databases for reputable published research articles, with Scopus and Web of Science (WoS) databases chosen for their extensive coverage of scholarly research work. The Scopus and WoS databases enable trend analysis, citation tracking, and collaboration between constructs and authors within specific research domains. These databases offer advanced search options to identify appropriate research work based on keywords, authors, and publication dates while maintaining research prestige and visibility.

To ensure comprehensive research, keywords were carefully selected and searched on 17th September 2024. The keyword search performed on the databases used the following terms: (("theor*" OR "Model") AND ("Chatbot*" OR "ChatGPT" OR "GenAI*" OR "Generative AI*") AND ("Adoption" OR "Acceptance") AND ("Higher Education*" OR "HEIs" OR "Universit*")). This search yielded 198 records from Scopus and 142 results from WoS between 2013 and 2024. The results were further filtered by title and papers written in the English language only. Figure 1 shows "The preferred

Reporting Items for Systematic Review and Meta-Analysis (PRISMA)". Table 1 showcases the frequency of operationalization of various technology adoption theories and models in Gen AI chatbots adoption in higher education literature also showcases the number of studies performed on students and teachers.

Table 1: Bibliometric Analysis of the extracted literature from Scopus and WoS

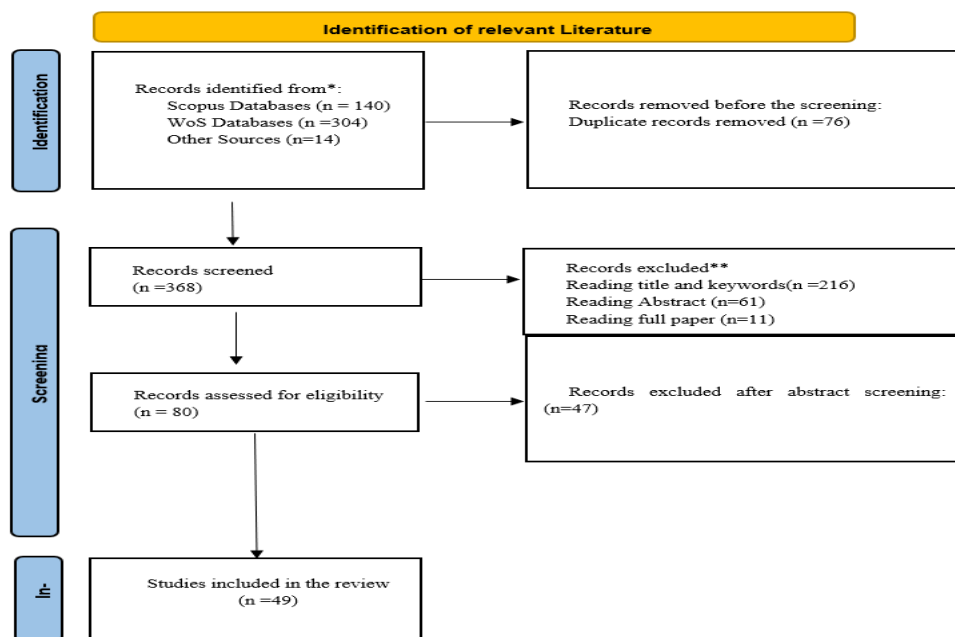| Models	Occurrences	Stakeholder's	No. of Articles
UTAUT	9	Teachers	3
UTAUT2	11	Students	46
TAM	15	Review	0
VAM	3	Grand Total	49
Others	6		
Total	49		

Figure 1 PRISMA diagram

4.1 Gap Analysis

A review of 49 studies examining the adoption of generative AI chatbots in higher education revealed that the Technology Acceptance Model (TAM) was the most frequently applied framework (n = 15), followed by the extended Unified Theory of Acceptance and Use of Technology (UTAUT2) (n = 11). The original UTAUT model was employed in nine empirical investigations, while the Value-Based Adoption Model (VAM) was utilized in only three studies. However, the literature suggests promising potential for the VAM model, as it demonstrated a stronger predictive ability for behavioral intention (adjusted $R^2 = 0.679$) compared to the UTAUT model (adjusted $R^2 = 0.619$) (Sohn & Kwon, 2020)

4.2 Conceptual Framework

4.2.1 Independent Variables

After doing thorough literature review, the following constructs were adapted from various papers:

4.2.1.1 Perceived Usefulness (PU): "The degree to which students believe that chatbot technology benefits them by improving their learning performance" (Strzelecki, Cicha, Rizun, & Rutecka, 2024).

4.2.1.2 Perceived Enjoyment (PE): "The extent to which students perceive that using chatbots offers interesting and delightful learning experiences" (Strzelecki A. , 2023).

4.2.1.3 Perceived Technicality (PT): "The degree to which chatbot is perceived as being technically excellent in the process of providing services" (Ragheb et.al, 2022).

4.2.1.4 Social Influence (SI): "The degree to which an individual perceived that important others believe that he or she should use the chatbot" (Kim et.al, 2021).

4.2.1.5 Personal Innovativeness(PI): "The personality trait that reflects the tendency of certain individuals to try out and adopt the latest advancements in IT" (Strzelecki A. , 2023).

4.2.1.6 Self-Efficacy(SE): "It is a person's belief in their ability to succeed in a particular situation or accomplish a task" (Almahri, 2020).

4.2.1.7 Perceived Cost (PC): " It encompasses both monetary costs (such as subscription fees) and non-monetary costs (such as time, effort, and cognitive load) that users associate with adopting and integrating chatbots into their academics" (Budhathoki, Zirar, Njoya, & Timsina, 2024).

4.2.2 Mediating Constructs

The following are the adopted mediating constructs in our proposed model:

4.2.2.1 Attitude (A)- "It reflects a user's overall evaluation of a chatbot based on its perceived benefits and ease of use" (Al-Abdullatif, 2023).

4.2.2.2 Perceived Value (PV)- "Users' overall perception of chatbot based on the considerations of its benefits and sacrifices needed to acquire and/or use it." (Saroia, 2018).

4.2.3 Dependent Variable

4.2.3.1 Adoption Intention

Adoption intention is defined as an individual's readiness or intention to usage of a new technology and has long been considered to be the most proximal predictor of actual usage by technology adoption model. It is a measure of the propensity of the user to mentally accept an innovation after considering two separate but related pieces of information from already existing knowledge that will lead to the spontaneous use of the innovation, controlled by additional variables such as presence of alternatives or risk. Regarding higher education, adoption intention towards generative AI chatbots represents how willing students are to embrace such applications in their learning process, which is an important variable that defines the impact of implementation processes (Davis, 1986; Venkatesh et al., 2012; Strzelecki, 2023).

4.2.4 Proposed Model

Based on the review of literature and identified gaps, we propose the extension of Value-based adoption model (Figure 2)
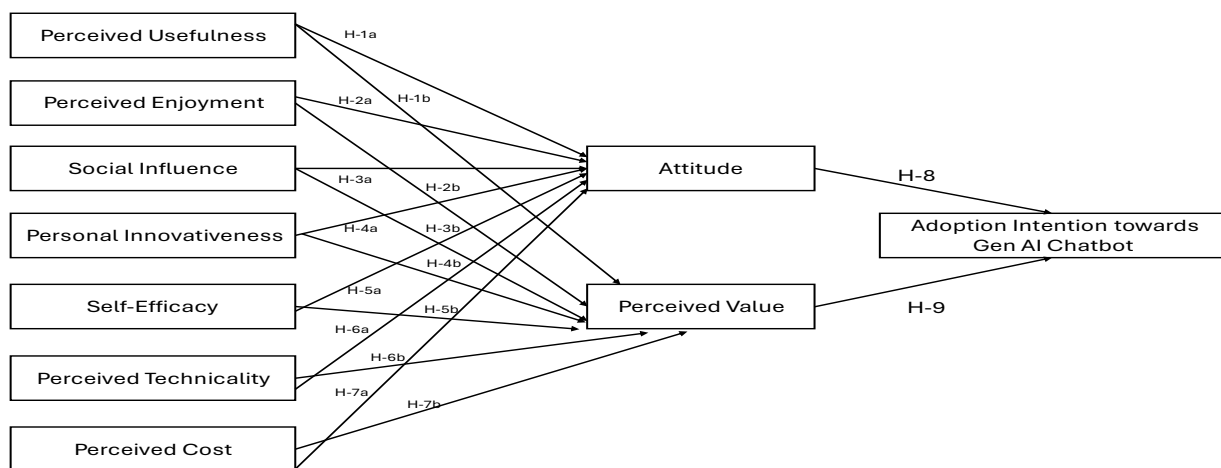

Figure 2: Proposed Model

"Attitude" and "Perceived Value" are mediating constructs and "Intention to use Gen AI Chatbot" is considered a dependent construct while the independent variables are, seven constructs, incorporating one "Perceived usefulness" derived from the original TAM model (Davis, 1986) and three constructs namely, "Personal Innovativeness", "Social Influence" and "Self-Efficacy" are adapted from UTAUT3 (Farooq, 2017). Two constructs are adapted from the VAM model (Kim & Chan, 2007); namely, "Perceived Enjoyment" and "Perceived Technicality". We propose replacing "Perceived fee" with "Perceived cost" because of the user's different types of monetary and non-monetary costs.

5   CONCLUSION

This study offers a conceptual framework for Gen-AI chatbot adoption using an extended VAM model. It contributes to both theoretical understanding and practical application in educational policy and technology deployment. By identifying and analyzing influential adoption factors, this study can support improved student engagement and digital readiness in HEIs.

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