

Exploring ChatGPT adoption among business and management students through the lens of diffusion of Innovation Theory

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ARTICLE INFO

Keywords:

ChatGPT

Management students

Diffusion of innovation theory

Technology adoption

ABSTRACT

Purpose: this study aims to present an innovative approach (Diffusion of Innovation Theory) to investigate the adoption of ChatGPT by business and management students. The theory emphasizes integrating the variables Viz. relative advantage, compatibility, complexity, trialability, observability, attitude, and intention to adopt ChatGPT in the context of management education.

Method: ology: a non-probability purposive sample of 383 students enrolled in management of Indian public and private institutions was taken to conduct survey to administer questionnaires. Partial Least Square-Structural Equation Modelling was employed to analyze the data using Smart PLS software.

Findings: the findings suggest that students' attitude toward the integration of ChatGPT for educational purposes and knowledge acquisition are overwhelmingly positive. Moreover, relative benefit, compatibility, complexity, trialability, and observability indicate a favorable disposition toward the intention to use ChatGPT among business and management students' community.

Implications: the study asserts significant implications for multiple sectors, including global society, businesses, and academia. The application of the Diffusion of Innovation Theory to the examination of management students' attitude towards ChatGPT provides valuable practical and theoretical insights.

Originality: the originality of the study lies in the innovative approach it takes in investigating the utilization of ChatGPT in management education. Hence, the application of the Diffusion of Innovation theory and the inclusion of context-specific characteristics contribute to the uniqueness of the study.

1. Introduction

The field of education is in the state of pivotal changes, which are now determined by the technological breakthrough. The increasing rate of changes is typical as well. Particularly, the effect of the integration of Artificial Intelligence (AI) and Natural Language Processing (NLP) is considerable as they reshape the ways students learn, communicate, and work with educational resources (Alshater, 2022). In the context of business and management education, such a situation is typical to eliminate centuries-old methods of teaching and facilitate application of the newest technology (Arif et al., 2023). AI is currently applied in

management and business education for considerable practical purposes as well. It offers new experiences for students to enhance their critical thinking and ability to make decisions along with their education. In this regard, it is essential to analyze the factors that contribute to the adoption of the designated AI and NLP model in the context of business and management education (Buraimoh et al., 2023). Moreover, current investigation can be aligned with the theories of the Diffusion of Innovation (Ali et al., 2023; Dwivedi et al., 2023; Zhang & Aslan, 2021).

A recently developed AI tool Viz. ChatGPT is prominent because of its ability to generate human like text. This conversation interaction style is a novel iteration of Artificial Intelligence that can develop to be a

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<https://doi.org/10.1016/j.caeai.2024.100257>

Received 27 March 2024; Received in revised form 14 June 2024; Accepted 15 June 2024

Available online 19 June 2024

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substantial technology that is applicable far and wide. In the year 2022, a conversational interaction style known as Chat Generative Pre-Trained Transformer, was introduced (ChatGPT, 2022; Cotton et al., 2023). The current iteration of that approach is based on conversation training and allows ChatGPT to effectively answer questions such as admit when wrong, question the questions asked, and refuse unwelcome requests. The system is programmed to appear conversational in the response. According to Haman and Školník (2023), the use of ChatGPT tool can be of great help to many tasks, including the research support, text generating, and conducting the literature review. Meanwhile, there is not enough research evidence that the use of ChatGPT, an AI tool, could help in academia. Therefore, this research seeks to trace out the factors affecting the adoption of ChatGPT by the academic professionals. Rogers (2003) argues that Diffusion of Innovation Theory is a comprehensive conceptual framework for understanding the dissemination of the innovations within a given social system. According to the theory, the adoption process of the innovation is influenced by several elements. Features of the innovation itself, the communication channels used to spread, the social system it is introduced to, and the attitudes of the intended adopters. The application of the Diffusion of Innovation Theory to the field of business and management students and subsequent adoption of ChatGPT provides a multi-perspective view of the study. The incorporation of ChatGPT in the syllabuses of business and management schools has the potential to catalyse widespread and profound change. AI-based tools like ChatGPT can reinvigorate the traditional BBA, MBA, and BBS business education, which many universities have focused on developing skills in problem-solving, judgment, and decision-making, as well as oral and written communication. Additionally, as AI is becoming ever more widespread in the global corporate environment, people nowadays need to be able to handle these technologies and gain a comfort level with them. Thus, research on the perception and adoption of ChatGPT by business and management students is not confined to academic research but is instead indicative of their utility in the context of the constantly changing world of work. Thus, in this background, the main purpose of this study is to investigate the variables determining ChatGPT adoption by business and management students using Diffusion of Innovation Theory.

In the context of change in the educational sector, it is crucial to understand the level of ChatGPT awareness among business and management students (Haman & Školník, 2023). First and foremost, investigating this awareness can help one better understand how the AI technologies fare in the academic setting. As recently identified by Strzelecki (2024), oftentimes, education system fails to supply students with the necessary amount of knowledge through an education process, which would help students to do their jobs. Therefore, identifying the said level knowledge with ChatGPT will help to adapt educational techniques to fully embrace the potential provided by the tool. Second, exploring the level of the said awareness will make it possible to explore the tools for enabling better student engagement along with technical literacy within the framework of business and management courses. Finally, researching this question will help to bridge the gap between the upcoming AI technological breakthroughs and the practice in the sector. Therefore, the research question that the proposed study will be designed to answer is as follows.

R1. To what extent are business and management students aware of ChatGPT as a technological innovation?

To investigate the effect of Diffusion of Innovation Theory on ChatGPT adoption by Business and Management students, the analysis of the technology should be defined through perceived characteristics of relative advantage, compatibility, complexity, trialability, and observability. As suggested by Cooper (2023), considering this idea as a research subject will help better understand the dynamics of technology adoption in academic setting of Business and Management. Thus, the research question can be formulated as follows.

R2. How do the perceived characteristics of ChatGPT, as identified by the Diffusion of Innovation Theory (e.g., relative advantage, compatibility, complexity, trialability and observability) contribute to the technology's adoption rates among business and management students?

To bring the suggested tool to its potential as an instructional tool, it is crucial to learn more about the efficient techniques of promoting ChatGPT among business and management students. It will allow achieving all the benefits of the interaction with the ChatGPT to educational institutions and businesses. The personalized technique tackles the specifics and the complexity of the academic and corporate background. Therefore, we propose the following research question.

R3. What strategies can educational institutions and businesses implement to encourage the diffusion of ChatGPT adoption among business and management students?

An appropriate way to investigate the adoption of the ChatGPT among business and management students is through utilizing the Diffusion of Innovation Theory. At its core, the theory, as explained by Rogers (2003), describes how original ideas and innovation become rooted and accepted within wider social networks. It is important to note that the study conducted by Strzelecki (2024), exploring the adoption and use of ChatGPT among college students, perfectly aligns with our research in that it uses the Unified Theory of Acceptance and Use of Technology as a framework. However, it is significant to identify educator's needs, integrating new technologies into the curriculum reality, applying successful pedagogies outcomes, finding a suitable approach to students' participation, and attracting them to the process. In other words, all these issues perfectly comply with the principles of the Diffusion of Innovation Theory. During the recent years, ChatGPT has attracted the attention of researchers and professionals worldwide. Even though studies have been conducted in such areas as science and humanities and especially business and management, there is still little to no vast research within the context of the considered field. However, one can see from the holistic analysis of the sources that the use of DOI theory is an effective method for creating a tough frame of reference for analysing the students' adoption of ChatGPT in terms of major in business and management. It will help researchers to bring an overall understanding of the ways the tool is being accepted, realized, and applied in the educational, business and work environments.

2. Literature review and development of hypotheses

2.1. Diffusion of Innovation Theory

One of the fundamental frameworks in understanding the adoption of Artificial Intelligence in the corporate environment is through Diffusion of Innovation Theory. The theory provides an explanation concerning how innovations are taken up and spread through the social systems, and more specifically, the interaction between organizations and emerging or developed technology (Greenhalgh et al., 2004). Recent studies presented empirical data on this theory (Askarany, 2016; Salazar et al., 2020), examining the organizational and innovation attributes driving acceptability. Murray et al. (2010) suggested that the theory explains the drivers behind the acceptance of new ideas. This contextual claim underpins the late and widescale use of Artificial Intelligence in the organizations.

There is a need to link organizational readiness to strategic goals in the integration of AI (Johnson, Kiser, Washington, & Torres, 2018). Also, crucial decision-making processes are necessary for successful AI deployment, (Bhat, 2022). The Diffusion of Innovation Theory provides a comprehensive framework through which the integration of AI can be understood in organizations. Further, AI and NLP tools have revolutionized the manner of education over recent years (Ali et al., 2023; Dwivedi et al., 2023; Haman & Školník, 2023). The deployment of OpenAI's advanced AI language model, ChatGPT, has the potential to

transform the ways through which students can learn. Utilizing AI technology such as the ChatGPT model has also gained prominence and significantly benefited students in improving critical thinking, decision-making, and communication skills. Moreover, NLP helps students grasp difficult topics and technical vocabularies more easily, leading to a more personalized and adaptive learning system for each student. Nonetheless, more research is required to investigate some relationships between independent and dependent variables that may not have been extensively studied, including the autonomous factors influencing ChatGPT adoption, especially among educators (Haman & Školnik, 2023).

Utilizing the Diffusion of Innovation Theory to examine the use of ChatGPT in business and management education will give a comprehensive understanding of the incorporation of advanced technology into educational system. The insights may be obtained from the theory by Rogers (2003) that describes the challenging process of incorporating technology into education in terms of innovation features, communication channels, and adopters' perceptions. This framework can offer insights into practices that may aid the effective use of ChatGPT and other AI technologies in business and management education.

2.2. Relative advantage and ChatGPT adoption

The Diffusion of Innovation Theory postulates that the extent of improvement associated with a given innovation tremendously impacts its acceptance (Rogers, 2003; Venkatesh et al., 2022). Thus, perceived relative advantage is a critical factor in the adoption of ChatGPT among business and management students (Bhaskar et al., 2021; Li et al., 2020; Tiwari et al., 2023). ChatGPT is expected to outperform existing methods of enhancing critical thinking, decision-making, and learning. Thus, students will be more encouraged if they perceive the new technology as more advantageous and easier to use (Li et al., 2020; Venkatesh et al., 2003). The Diffusion of Innovation Theory also includes relative benefit, which refers to the extent to which ChatGPT performs similarly or better compared to alternatives (Raman et al., 2023). As has been demonstrated, it has economic benefits in education and medicine (Surapaneni, 2023), and practical applications in specialized areas such as plastic surgery (AlJindan et al., 2023). Studies of Islamic banking and educational context have shown the importance of perceived advantage and compatibility in innovation adoption (Abbas, Triani, Rayyani, & Muchran, 2023; Strzelecki, 2024). Since we want to leverage the advantages in a variety of applications, including education, medicine, and banking, we must comprehend and strongly endorse this. With this, we build our research hypothesis as.

H1. The relative advantage has a positive impact on ChatGPT adoption.

2.3. Compatibility and ChatGPT adoption

Rogers (2003) defined compatibility as the extent to which an innovation is consistent with the values, norms, and prior practices of its users. It was further established that compatibility that refers to the degree to which humans believe that a particular new technology should be adopted or utilized relative to their requirements, influences the likelihood of adoption. In this case, business and management students' use of ChatGPT will be significantly impacted by the compatibility of the tool with their learning needs. Those who perceive ChatGPT as compatible to their needs are more likely to use the tool (Dwivedi et al., 2023). Prior studies have shown that there is a direct correlation between compatibility and technology adoption (Venkatesh et al., 2003; Zhang & Aslan, 2021). Rawashdeh et al. (2023) and Sitorus et al. (2019) also agree with the position that compatibility affects technology adoption. According to Gummadidala et al. (2020) there is a need to consider the users' values in AI in criminal management to avoid unethical decisions in AI deployment. The use of innovative methods is

essential to ensure the technology meets the users' value. This implies that ChatGPT's adoption and usage will be critical based on this factor. It indicates that organizations will be more likely to implement and integrate the tool successfully if they align ChatGPT with consumers' preferences, needs, and values. Thus, we propose the following research hypothesis.

H2. Compatibility has a positive impact on ChatGPT adoption.

2.4. Complexity and ChatGPT adoption

One of the prominent barriers to adoption is the complexity of the incorporated technologies, which makes it difficult for users to understand and use it (Kim et al., 2019; Venkatesh et al., 2003). As an AI-powered communication facilitator, ChatGPT is prone to adoption barriers because its complexity can be frustrating. This barrier can be eliminated by making the user interface simple, providing clear instructions, and extensive training (Kim et al., 2019). According to Rogers (2003), complexity is the degree to which an innovation is perceived as relatively difficult to understand and use which is a barrier that hinders the adoption and acceptance within the five main dimensions including relative advantage, complexity, compatibility, trialability, and observability. Wright et al. (2012) and Pérez-Luño and Cambra (2013) also acknowledge the importance of complexity in the acceptance of innovations. Hence, complexity is one of the crucial factors to adopt ChatGPT.

H3. Complexity has a positive impact on ChatGPT adoption.

2.5. Trialability and ChatGPT adoption

Another fundamental concept within Diffusion of Innovation Theory framework, trialability, significantly influences the adoption of innovative technologies such as ChatGPT in business and management education. Studies conducted at the university level by Ali et al. (2023) and Dwivedi et al. (2023) emphasize trialability's positive effect on AI adoption in education. In this respect, it is essential to ensure that students have sufficient ability to experiment with ChatGPT before integrating it into the educational process. Trialability remains low until innovation is adopted, with potential users who have a chance to experience first-hand and eliminate ambiguity related to initial perceptions (Alshamaileh, 2013). This argument is also supported in other research, such as Banerjee, Wei, & Ma, (2012), which stress the importance of trialability as an attribute of the rate of adoption compared to relative advantage, complexity, compatibility, and observability. Finally, Warner et al. (2020) emphasizes the importance of trialability beyond AI and technology, noting that it can lead to an increase in adoption rates. Therefore, trialability positively influences the adoption of ChatGPT by ensuring its users could gain direct experience with it, promoting proper implementation and utilization in various fields. Thus, we propose the following research hypothesis.

H4. Trialability has a positive impact on ChatGPT adoption.

2.6. Observability and ChatGPT adoption

Observability is another fundamental aspect of the Diffusion of Innovation Theory that influences the rate of adoption of ChatGPT. Observability refers to the measure that humans may determine the results of any innovation (Keong, Sa'ar, & Kaliannan, 2023). In addition to making potential adopters' choice clearly, Raman et al. (2023) also argue that innovation becomes more acceptable when its outcomes are clear to external sources. More so, the visibility of the impact of innovations leads to social proof and credibility. For instance, studies about electronic banking technologies lead by Kolodinsky et al. (2004) assert that the high acceptability of the innovation by users relied on the visual displays. Furthermore, the prevalence in the rate of adoption

among innovation adopters, claim that patterns of innovation supporters show an independent increase in the rate of technology acceptance. Therefore, discussing the benefits of innovations leads to increased conversion or usage rate of users of ChatGPT. Thus, we propose the following research hypothesis.

H5. Observability has a positive impact on ChatGPT adoption.

2.7. Students' attitude, behavioral intention, and ChatGPT adoption

ChatGPT's adoption is significantly affected by students' attitudes and behavioral intentions. According to [Tiwari et al. \(2023\)](#), [Ali et al. \(2023\)](#) and other experts, students' attitudes and intentions can be both positive and negative, leading to a higher or lower acceptance percentage. According to [Bhaskar et al. \(2021\)](#), "attempts to introduce the technology on the educational premises will remain successful if the attitudes are positive towards the learning tool or unsuccessful if negative". According to the investigation, analyzing students' attitudes is crucial for implementing new technologies such as ChatGPT. As [Davis, Bagozzi, & Warshaw, \(1992\)](#) stated, attitudes include intrinsic and extrinsic motivation and thus are highly impactful on students' technology usage. Positive attitudes encourage dedicated efforts to obtain knowledge. According to [Bitzenbauer \(2023\)](#), students have a favorable attitude towards ChatGPT, which makes the implementation promising. Moreover, a significant factor influencing attitudes is teacher-student interaction in the process of English learning ([Zhao & Shang, 2022](#)). Further, family and community support often foster positive attitudes ([Ali et al., 2023](#)). Thus, we propose the following research hypothesis.

H6. Students' attitude positively influences behavioral intention towards ChatGPT adoption.

There is a substantial body of research on innovation diffusion theories including Diffusion of Innovations Theory ([Barrett et al., 2020](#); [Damiano et al., 2024](#)). Studies on the use of ChatGPT and other AI technologies in classrooms, especially with business and management students, are noticeably lacking ([Raman et al., 2023](#); [Strzelecki, 2024](#)). While most research has concentrated on the theoretical underpinnings of innovation diffusion and its wide range of applications, there hasn't been much discussion of the difficulties and motivators involved in integrating AI tools in educational settings, particularly in the fields of business and management ([Zollet & Back, 2015](#)). There is still a significant vacuum in our understanding of the factors impacting business and management students' acceptance and use of ChatGPT, despite the fact that several researches have examined students' views and intents towards AI technologies ([Bonsu & Baffour-Koduah, 2023](#); [Raman et al., 2023](#)). Furthermore, although some studies have looked into how AI technologies affect learning outcomes and creativity ([Niloy et al., 2024](#)), little is known about the particular factors that influence ChatGPT uptake in the field of business and management education. To provide useful insights for educators, legislators, and technology developers, there is an urgent need for targeted research that examines the factors that encourage and facilitate ChatGPT adoption in this setting.

3. Research methodology

3.1. Material and methods

The research model of this study ([Fig. 1](#)) incorporates the Diffusion of Innovation (DOI) theory and context-specific characteristics such as relative advantage, compatibility, complexity, trial ability, observability, attitude, and intention to adopt ChatGPT. This study elucidates how management institutions and educators can gain a comprehensive understanding of students' viewpoints when employing ChatGPT for the purpose of management education.

3.2. Sample characteristics

As depicted in [Table 1](#), the sample of this study comprises students enrolled in management courses at both public and private universities situated in Delhi, India. Most of the participants in our sample (43.60%) belong to the younger population, specifically those under the age of 22. This is followed by 35.50% of respondents falling within the age range of 23–27 years. Additionally, 13.86% of participants are between the age of 27 and 32, while 7.04% are above the age of 32. Majority of the participants (56.40%) was identified as male, while a minority (43.60%) was identified as female. Additionally, it was found that 73.37% of the participants in our survey were associated with private colleges, whereas 26.63% were management students attending public institutions. In terms of the educational qualifications of the respondents, the majority were enrolled as undergraduate students (58.76%), followed by those pursuing postgraduate degrees (37.09%), while a small proportion (4.15%) possessed a doctoral degree. A significant amount of the sample exhibited a specialization in general management, accounting for 22 %. This is closely followed by marketing, which represented 19.60% of the sample. The specializations of accounting and finance, human resource management, business analytics, operations and logistics, entrepreneurship, and others accounted for 18%, 9.12%, 13.30%, 6.78%, 7.30%, and 3.90% respectively.

3.3. Instrument development and validation

It is essential to note that selecting and validating the research tools facilitate the attainment of accurate data. The constructs used in this study are based on prior knowledge from similar research that has been developed and validated using the same methodology. The tools for this study are structured according to the independent variables, such as the relative advantage, compatibility, complexity, trialability, and observability. Using surveys or interviews, we can assess the students' perceptions of these variables and their effect on the adoption of ChatGPT. By structuring the tools in this manner, the study can systematically explore the fields aligned with the Diffusion of Innovation Theory. To ensure the constructs' instruments achieve meaningful precision and reliability, the study engaged three experts in the subject matter. The comments offered were significant in developing the constructs. A pre-test was also conducted with 40 active users of ChatGPT, and the results

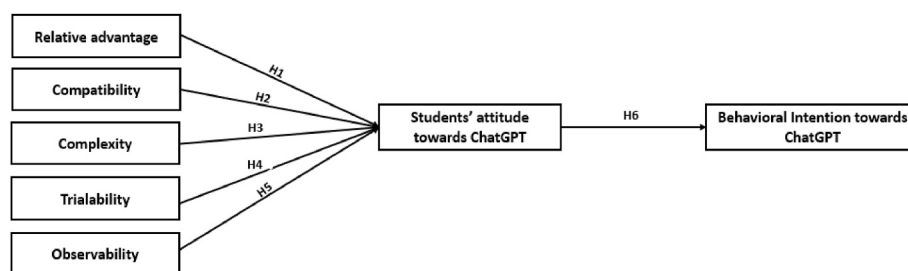


Fig. 1. Research model for the present study.
Source: Authors' own compilation

Table 1
Description of the respondents.

Demographic variables	Frequency	Percentage	Demographic variables	Frequency	Percentage
Age			Specialization		
Under 22	167	43.60%	General Management	84	22.00%
23–27	136	35.50%	Marketing	75	19.60%
27–32	53	13.86%	Accounting & Finance	69	18.00%
Above 32	27	7.04%	Human Resource Management	35	9.12%
Total	383	100%	Business Analytics	51	13.30%
Gender			Operations and Logistics	26	6.78%
Male	216	56.40%	Entrepreneurship	28	7.30%
Female	167	43.60%	Others	15	3.90%
Total	383	100%	Total	383	100%
Type of Institutions			Educational level		
Private	281	73.37%	Bachelor	225	58.76%
Public	102	26.63%	Master	142	37.09%
Total	383	100%	Ph.D	16	4.15%
			Total	383	100%

Source: Primary data

obtained helped in making substantive adjustments and restructuring in the questionnaire. The study thoroughly assessed the internal and external validity of the measuring tools. The survey questionnaire developed for data collection has two main sections. The first part includes demographic data of ChatGPT users such as age, gender, level of education, and area of specialization. The constructed components in the second portion were derived from previous investigations, as outlined in Table 2.

4. Statistical analysis and results

4.1. Common method of variance (CMV)

One potential concern associated with the utilization of survey methodology for data collection is the presence of Common Method Variance (CMV). To address this concern, we utilize two control mechanisms, specifically ex-ante and ex-post. The ex-ante phase involves the implementation of various testing procedures proposed by Podsakoff et al. (2003). These procedures include conducting a pilot test of the questionnaire with a sample of 40 students to assess their comprehension of the statement items. Additionally, the cover letter accompanying the questionnaire should provide an explanation regarding the assurance of anonymity, the request for honest responses, and the absence of right or wrong answers. Based on Kock's (2015) research, the ex-post procedure was conducted by assessing the Variance Inflation Factor (VIF) full collinearity values. The results indicated that the VIF values of all the constructs, ranging from 2.712 to 4.155, did not exceed the acceptable threshold of 5.0 (Bhat & Tariq, 2022; Liang & Shiau, 2018) (refer to Table 5). This observation implies that the presence of multicollinearity did not have a significant impact on the findings of this study. In summary, this research is devoid of the concern of CMV.

4.2. Sampling and data collection

The study employed a non-probability purposive sampling approach to gather data from a distinct target population - individuals belonging to the millennial generation who exhibit a substantial level of acquaintance with ChatGPT and were born between the years of the mid-1990s and the early 2000s. The basis of this excerpt is the acknowledgment that millennials constitute a technologically proficient group characterized by their acute knowledge of evolving technological developments (Aslam, Ahmed Siddiqui, Arif, & Farhat, 2023; Moreno et al., 2017). The decision to incorporate millennials into the AI business is driven by the industry's need to actively involve younger cohorts, who have a greater inclination towards adopting emerging technical innovations (Chattaraman et al., 2019; Szymkowiak et al., 2021). The selected respondents were provided with a video instructional link that

explained the capabilities of ChatGPT, following the technique outlined by Wang and Chen (2019). The training videos, which are accessible on the YouTube platform, were specifically created to offer users a thorough comprehension of the functioning principles of ChatGPT. Following this, participants were requested to fill out a survey after watching the video content.

The target population for this study was the students' community currently enrolled in the Business schools based in North India, precisely in NCR Delhi. For convenience, a survey instrument was built on Google Documents, and the links of the survey were shared on social media. This methodology helped to collect the response from June to July 2023 as the students started their 2nd semester in academic year 2022–2023. Based on the existing research in the disciplines of management and social sciences, scholars generally agree that a sample size of 200–500 participants is commonly regarded as sufficient (Siddiqui, 2013). Furthermore, the selection of an optimal sample size might be impacted by the number of inquiries included in the survey, with a widely acknowledged recommendation being to target 5 to 10 participants per inquiry (Bhat et al., 2022; Henseler et al., 2015). The number of questionnaires effectively collected, upon the completion of the survey, was 383. One of the key considerations to be emphasized, in this regard, is that 35 surveys were excluded from the final analysis since the responses provided by the participants were inadequate. The survey questionnaires, in turn, were scrupulously reviewed with the intent to identify and rectify any incidence of missing data. The questions in the questionnaire were formulated in such a manner that prompted the participants to formulate their response in the form of comments, on a Likert scale that featured five points. Accordingly, a rating of 1–5 was indicative of strong disagreement to strong agreement.

4.3. Structural model results

This research work applied the Partial Least Squares approach to develop a Structural Equation Model using the smart PLS software. Liengaard et al. (2021) pointed out that it is appropriate to use the Partial Least Squares (PLS) approach when establishing predictive research models, focusing on the area of constructing theoretical frameworks. The formulation of theoretical framework represented the first step of the present study in terms of creating the first theoretical framework regarding the factors influencing students' acceptance and usage, as displayed in Fig. 2. Hence, the Partial Least Squares (PLS) approach was suitable for the present investigation (Hair Jr, Howard, & Nitzl, 2020). Moreover, the use of Structural Equation Modeling (SEM) has become highly popular and continues to be used in the field of management and educational research (Bhat, Khan, Al Balushi, Wedajo, & Haseeb, 2024; Bhat & Khan, 2023). The literature on Partial Least Squares-Structural Equation Modeling (PLS-SEM) commonly follows

Table 2

Research instrument.

No.	Type of Variable	Items	References
1	Relative Advantage	ChatGPT contributes to building students' capabilities. I can save time by using ChatGPT. I can save effort by using ChatGPT. ChatGPT helps me to be more effective.	Shahid et al., 2022; Kaur et al., 2020
2	Compatibility	Using ChatGPT is compatible with every aspect of my life. ChatGPT is compatible with my current situation. I spent so much time and effort in ChatGPT. I am afraid of misuse of ChatGPT.	Shahid et al., 2022; Menzli et al., 2022; Kaur et al., 2020
3	Complexity	ChatGPT interface looks easy to understand. ChatGPT is clear and understandable. Using ChatGPT does NOT require technical skills. Using ChatGPT does NOT require a lot of mental effort. Interacting with ChatGPT would NOT confuse me.	Acikgoz et al., 2023; Menzli et al., 2022; Kaur et al., 2020
4	Triability	I learned about ChatGPT before others. I am usually one of the first people to try out ChatGPT. I want to try to use ChatGPT before effective adoption in learning. My university regulates the use of ChatGPT before effective adoption in learning.	Menzli et al., 2022; Schuwer & Janssen, 2018
5	Observability	ChatGPT is visible around my school. It is expected that my friends will show interest in ChatGPT when they see me using it. If I use ChatGPT, then others will know that I am doing so. I am more likely to use ChatGPT because my friends use it.	Al Breiki et al., 2023; Wang et al., 2021
6	Attitude towards ChatGPT	Using ChatGPT would be a positive decision. Using ChatGPT would be a smart decision. I have a positive impression of using ChatGPT for work. I would feel excited to use ChatGPT. I would be happy to use ChatGPT.	Davis, 1989; Shen et al., 2022; Acikgoz et al., 2023
7	Behavioral Intention to use ChatGPT	I would be willing to use ChatGPT. I would be willing to use ChatGPT if I am allowed. I would be willing to let ChatGPT help me to perform different kinds of tasks. I intend to use ChatGPT soon.	Davis et al., 1989; Shen et al., 2022; Acikgoz et al., 2023

Source: Developed by authors based on literature

two-step methods in studies incorporating data analysis. The purpose of the first stage of the PLS-SEM approach is to determine the inter-item reliability, internal consistency, and convergent and discriminant validity of the measurement model. The next step is to continue with the final step, in which the second stage is used to test the hypotheses and assess the structural model's predictive power. Therefore, the internal consistency of each variable was analyzed through Composite

Reliability (CR), with results shown in Table 3. For each statement determining the variables, construct validity was also being measured practically in the early stages of the research. Cronbach alpha coefficient results, which served the purpose of this research, are reflected in Table 3 (Shaked et al., 2020; Khan, Bhat, & Sangmi, 2023). The statistical software packages SPSS 24 and SMART PLS 3 were employed for data analysis.

4.4. Measurement model

In the first phase of the study, the approach to the measurement of the model was performed through the setting of the threshold level at 0.70% and assessing the inter-item reliability through the factor loadings (Hair Jr et al., 2020). The second phase of the study is an exploration into the convergent validity through Average Variance Extracted (AVE) with the threshold level of 0.50 (Hair Jr et al., 2020). In this study the third step was the one dealing with the determination of internal consistency reliability through a score of composite reliability evaluation and a 0.70 or more is the threshold level proposed by Hair Jr et al. (2020). The values for the coefficient of determination are presented in Table 3. The values that were shown in this table indicate that there is a correlation coefficient that is shown for CR more than 0.70, indicating reliability. The table presented herewith gauges the convergent validity, representing the extent to which this theoretical model corresponds to the actual construct. As revealed from the data presented herein, the overall presented construct has strong convergent validity.

4.5. Discriminant validity

The assessment of discriminant validity was conducted using the Fornell-Larcker criterion (1981) and the HTMT (heterotrait-monotrait ratio of the correction). Fornell and Larcker (1981) posited that the square root of Average Variance Extracted (AVE) ought to surpass the correlation between the two constituent elements within the model. The latent variables in this study demonstrated discriminant validity, so fulfilling the criteria. Table 4 presents the results indicating that the Average Variance Extracted (AVE) values for the construct surpass the squared inter-construct correlations and the Cronbach's alpha values. This finding suggests that the measurement scale employed in the study possesses legitimacy. The measurement scale demonstrates a significant level of validity, as evidenced by a robust Cronbach's alpha coefficient. Furthermore, it is advisable that in cases where the HTMT ratio of the correction value exceeds 0.85 or 0.90, the issue of discriminant validity is likely to arise. Table 4 illustrates that all the values of HTMT conform to the recommended threshold of 0.85, as proposed by Fornell and Larcker (1981) and Kline (2005). The observed result indicates that discriminant validity has been successfully established. Table 5

The study's hypotheses were tested using a Structural Equation Modeling (SEM) technique based on Partial Least Squares (PLS). A bootstrapping procedure with 3000 iterations was used to assess the statistical significance of the weights assigned to the subconstructs and path coefficients (Ali et al., 2017). The PLS approach does not produce comprehensive indicators of overall fit quality. Tenenhaus et al. (2005) conducted an evaluation to determine the adequacy of the model fit. The goodness-of-fit (GoF) index was introduced as a diagnostic tool. The geometric mean of the typical communality and the typical R^2 is used to calculate the GoF (Goodness of Fit) for endogenous constructs. Hoffmann and Birnbrich (2012) published the following threshold values for evaluating the goodness-of-fit (GoF) analysis results: GoFmedium = 0.25, GoFLarge = 0.36, and GoFsmall = 0.1. According to the data in Table 3, the model used in this investigation has a goodness-of-fit (GoF) score of 0.768, indicating a robust fit. Following the examination of the measurement model and goodness-of-fit, the relationships determined from the structural model's recommended relationships were reviewed. It can be observed that the standard deviation is low. The data is collected from business and management students only which could be

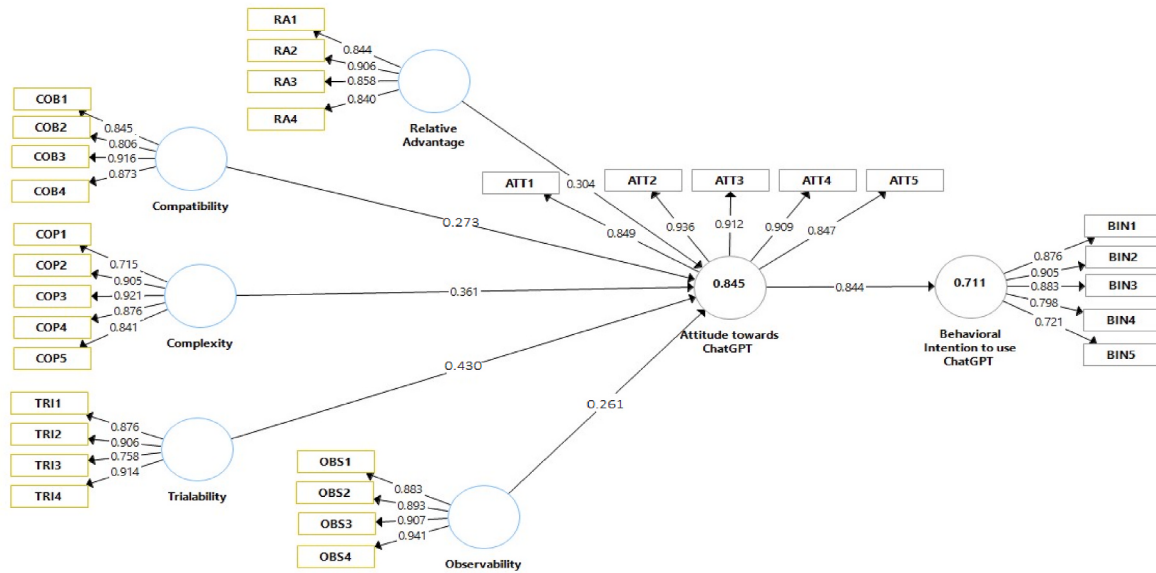


Fig. 2. Results of structural model analysis.
Source: SmartPLS output

Table 3
Summary of the results of the assessments.

Construct	Items	Factor loading	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)	R ²
Relative Advantage	RA1	0.844	0.886	0.901	0.921	0.744	
	RA2	0.906					
	RA3	0.858					
	RA4	0.840					
Compatibility	COB1	0.845	0.884	0.896	0.92	0.741	
	COB2	0.806					
	COB3	0.916					
	COB4	0.873					
Complexity	COP1	0.715	0.906	0.921	0.931	0.73	
	COP2	0.905					
	COP3	0.921					
	COP4	0.876					
	COP5	0.841					
Trialability	TRI1	0.876	0.887	0.903	0.923	0.75	
	TRI2	0.906					
	TRI3	0.758					
	TRI4	0.914					
Observability	OBS1	0.883	0.927	0.929	0.948	0.821	
	OBS2	0.893					
	OBS3	0.907					
	OBS4	0.941					
Attitude towards ChatGPT	ATT1	0.849	0.935	0.938	0.951	0.795	0.845
	ATT2	0.936					
	ATT3	0.912					
	ATT4	0.909					
	ATT5	0.847					
Behavioral Intention to use ChatGPT	BIN1	0.876	0.895	0.918	0.922	0.705	0.711
	BIN2	0.905					
	BIN3	0.883					
	BIN4	0.798					
	BIN5	0.721					
Average scores						0.755	0.782
AVE*R ²						0.590	
√AVE*R ² (GoF)						0.768	

Source: SmartPLS output

the reasons for the homogeneity and results. The revised R² values in Fig. 2 indicate the extent to which the predictor variable(s) effectively explain the linked construct. As shown in Table 3, the two associated constructs, attitude toward ChatGPT (R² = 0.845) and desire to adopt ChatGPT (R² = 0.711), both match the needed condition. Chin et al. (2008) grouped endogenous latent variables into three model validity categories based on their R² values: significant (0.67), moderate (0.33),

and weak (0.19). The findings of our study indicate that sentiments regarding ChatGPT and plans to use it are moderate, with R² values of 0.845 and 0.711, respectively. Furthermore, the study assessed the predictive validity of the model by analyzing the predictive relevance (Q²) and effect size (F²) of the constructs employed for prediction (Peng & Lai, 2012). The effects of all five exogenous components are considerable, as indicated by Table 5 data. Chin et al. (2008) also used the

Table 4

Discriminant validity.

(Fornell–Larcker criterion)							
	Attitude towards ChatGPT	Behavioral Intention to use ChatGPT	Compatibility	Complexity	Observability	Relative Advantage	Trialability
Attitude towards ChatGPT	0.892						
Behavioral Intention to use ChatGPT	0.844	0.839					
Compatibility	0.752	0.677	0.861				
Complexity	0.871	0.751	0.723	0.855			
Observability	0.710	0.627	0.528	0.661	0.906		
Relative Advantage	0.881	0.73	0.772	0.857	0.786	0.863	
Trialability	0.784	0.618	0.726	0.747	0.566	0.754	0.866

(HTMT0.85 criterion)							
Attitude towards ChatGPT							
Behavioral Intention to use ChatGPT	0.898						
Compatibility	0.817	0.748					
Complexity	0.822	0.818	0.811				
Observability	0.764	0.666	0.572	0.712			
Relative Advantage	0.835	0.769	0.852	0.844	0.863		
Trialability	0.805	0.661	0.804	0.829	0.624	0.846	

Source: SmartPLS output

Table 5Blindfolding process: F^2 , Q^2 and VIF values.

Constructs	Collinearity statistics (VIF)	F^2	Q^2
Attitude towards ChatGPT	–	2.466	0.610
Behavioral Intention to use ChatGPT	1	–	0.449
Compatibility	2.936	0.015	
Complexity	3.172	0.201	
Observability	2.719	0.019	
Relative Advantage	4.155	0.083	
Trialability	2.809	0.07	

Source: SmartPLS output

predicted sample reuse (Q^2) approach in their analysis. Positive Q^2 values, as shown in Table 5, imply that the model has adequate predictive relevance, as proved by Peng and Lai (2012). Finally, the study used standardized path analysis to evaluate the hypothesized correlations between the independent and dependent variables. Table 6 and Fig. 2 show that all the hypotheses, H1–H6, had positive route coefficients and achieved statistical significance at the $p = 0.001$ level.

5. Discussion

The utilization of ChatGPT has attracted considerable interest within the field of management studies. The learner recognizes that utilizing ChatGPT offers a time-saving and efficient approach to enhancing their problem-solving skills (Celebi et al., 2023). According to Dwivedi et al. (2023) and Tiwari et al. (2023), this enhances the effectiveness of learning. Consequently, our research findings demonstrate a significant positive relationship between the relative advantage of students'

attitude towards ChatGPT and its impact, so providing support for Hypothesis 1 ($\beta = 0.304$, $P = 0.000$). Management students regard ChatGPT as being compatible with their daily use, since it assists them in resolving the current challenges they encounter. This finding is consistent with the results of the studies conducted by Yilmaz et al. (2023a), Abbas, Triani, Rayyani, & Muchran, (2023) and Strzelecki (2024). Nevertheless, the perpetual state of compatibility might lead to adverse consequences, as students may become too reliant on the AI tool, resulting in a reluctance to allocate their time towards other constructive endeavors. The compatibility of ChatGPT may inadvertently contribute to the exploitation of the system, as it encourages students to allocate a significant amount of their time towards its utilization. This finding provides support for our second hypothesis, which posits that compatibility with ChatGPT is associated with a favorable change in attitude towards ChatGPT ($\beta = 0.273$, $P = 0.000$). This finding is in line with Dwivedi et al. (2023).

The ChatGPT, an AI system developed by Open AI, is widely regarded as having a user-friendly interface that appears to be easily comprehensible to individuals aspiring to become managers. It is believed that the system possesses a high degree of clarity and comprehensibility, hence rendering the tool accessible to users without necessitating any technical expertise Yilmaz et al. (2023b). Management students perceive ChatGPT as a cognitive-light tool, as its usage does not demand significant mental exertion, and engaging with the system does not lead to confusion. This finding provides support for our third hypothesis, which posits that the level of difficulty in utilizing ChatGPT is positively associated with the attitude towards ChatGPT among students studying management ($\beta = 0.361$, $P = 0.000$). This finding can be corroborated with the study of Kim et al. (2019). The participants in our research have demonstrated an initial endeavor to utilize ChatGPT ahead of their peers. They believe that they are among the early adopters of ChatGPT. The individuals conveyed their desire to experiment with technology

Table 6

Results for path relationship.

H	Path Relationship	β	(STDEV)	T Value	P Values	2.50%	97.50%
H1	Relative Advantage - > Attitude towards ChatGPT	0.304	0.025	12.16	0.000	0.549	0.718
H2	Compatibility - > Attitude towards ChatGPT	0.273	0.038	7.184	0.000	0.813	0.645
H3	Complexity - > Attitude towards ChatGPT	0.361	0.085	4.247	0.000	0.622	0.708
H4	Trialability - > Attitude towards ChatGPT	0.43	0.131	3.282	0.000	0.622	0.507
H5	Observability - > Attitude towards ChatGPT	0.261	0.038	6.868	0.000	0.426	0.614
H6	Attitude towards ChatGPT - > Behavioral Intention to use ChatGPT	0.844	0.054	15.53	0.000	0.708	0.921

Source: SmartPLS output

prior to its successful integration into the educational process. The individuals hold a favorable perspective regarding the institution and educational setting's role in overseeing the utilization of ChatGPT prior to its successful integration into the learning process. This finding provides empirical evidence in favor of our fourth hypothesis, which posits that the degree of trialability in utilizing ChatGPT is positively associated with the attitude towards ChatGPT among students studying management ($\beta = 0.430$, $P = 0.000$). This finding is akin to [Ali et al. \(2023\)](#).

The rising popularity of ChatGPT has been noted, making it a prominent topic of discussion among students. There is evidence of students using ChatGPT and displaying a notable level of interest in this tool, as observed within its user base [Yilmaz et al. \(2023c\)](#). Individuals hold the belief that their usage of artificial intelligence technology will be recognized by others, who will display a strong interest in observing its utilization. Moreover, there is a higher likelihood that students studying management may adopt a certain tool or platform if their peers or classmates inside their educational institution are already utilizing it. This finding provides support for hypothesis 5, which posits that the level of observability of ChatGPT is associated with a favorable change in attitude towards ChatGPT ($\beta = 0.261$, $P = 0.000$). This finding can be found similar to the study conducted by [Raman et al. \(2023\)](#).

The survey participants together exhibit a notable and statistically significant inclination towards a positive outlook. Utilizing ChatGPT constitutes a favorable and intelligent choice. Management students hold a favorable perception of the integration of chat based GPT system in the educational setting. The users show excitement and happiness when using the application for their academic and other educational references. Besides, the participants, who are the management students in this study, showed a positive attitude towards the application and were excited about using ChatGPT. The user has high confidence when using ChatGPT in all that pertains to learning and education. This finding can be believed to be positive towards education technology (edtech) companies because a commitment to innovation is believed to provide an excellent outcome for the same for their end-users. With respect to the result on the behavioral intention to use ChatGPT, they were positively excited about using ChatGPT application for their study. This belief upholds that students are excited about ChatGPT application to use ([Foroughi et al., 2023](#); [Kabra et al., 2023](#)). This finding provides support for our sixth hypothesis, which posits that management students have a good intention to use ChatGPT ($\beta = 0.844$, $P = 0.000$). This finding is consistent with [Tiwari et al. \(2023\)](#) and [Ali et al. \(2023\)](#).

In general, the study documented a prevailing favorable disposition among students towards the integration of ChatGPT as a tool for educational purposes and knowledge acquisition. The constructs of relative benefit, compatibility, complexity, trial ability, and observability exhibit a favorable disposition towards the intention to utilize ChatGPT within the context of management education.

R1: To what extent are business and management students aware of ChatGPT as a technological innovation?

Business and management students are acutely aware of ChatGPT, drawn to its multifaceted advantages. This AI-driven tool not only provides a competitive edge over traditional methods but also seamlessly integrates into existing educational frameworks, ensuring compatibility and user-friendliness. Its capability of allowing one to try and see the results further makes it trendy hence becoming part of the core system in the higher education sector for students, research, and other academic staff. The research revealed that the students' perceived relative advantages, compatibility, complexity, and trialability are directly related to their favorability towards ChatGPT and its use in general. Student eagerness as early adopters implies the importance of caution to avoid total dependence on technology. Peer recommendations and observability also led to a predisposition for ChatGPT integration, implying a positive path to utilizing the technology to provide the students with better learning opportunities ([Yilmaz et al., 2023b](#)).

R2: How do the perceived characteristics of ChatGPT, as described by

the Diffusion of Innovation Theory (e.g., relative advantage, compatibility, complexity, trialability, and observability), impact its adoption among business and management students?

Overall, the aspects of the perceived characteristics of ChatGPT under the Diffusion of Innovation Theory significantly affect the likelihood of its adoption. Firstly, the relative advantage of ChatGPT manifests in its ability to save time and solve problems. This evidently improves learning outcomes through better effectiveness, thus leading to a more positive attitude toward innovation. The compatibility of ChatGPT in terms of daily use is understandable, and it is easy to adopt ChatGPT within one's learning process; however, the usage can shift to misuse, and students should be wary of that. ChatGPT is presented in a user-friendly way: the cognitive ease of use positively affects students' attitude. The trialability of the innovation, also demonstrated by students who frequently check ChatGPT "for fun" – makes students more willing to adopt it. Finally, the concept's visibility – due to the writing in student peer networks clearly influences the decision of other students to also adopt it. Ultimately, the evidence presented suggests a general readiness to adopt ChatGPT by business and management students as an innovation to improve their education.

R3: What strategies can educational institutions and businesses implement to facilitate the diffusion of ChatGPT adoption among business and management students?

Multiple approaches can be offered to facilitate ChatGPT adoption concerning both business and academic students majoring in business and management. First, universities and schools might present focused educational campaigns that include high leverage facets of ChatGPT as proven in their attitude and problem-solving practices. Despite the favorable alignment that should be enabled in daily lives, no leniency should be allotted to enable overreliance and secure holistic exploitation. The second aspect to address is trialability, which institutes should facilitate by enabling students to work with ChatGPT functionality in a controlled environment. Additionally, to enhance the implementation, companies might boost the visibility via influencers who might persuade student populations or foster a nurturing ChatGPT approach within a specific university or school. Lastly, ChatGPT can reduce the complexity perception by establishing easy-to-navigate interfaces and comprehensive supporting resources. This will foster dedicated morale and utilization intent to execute aspiring goals and visions. Generally, the detrimental characteristics can be effectively eliminated through the strategic selection of relevant initiatives to maximize the adoption of ChatGPT in business and management students.

6. Implications

The implications of the current research are considerable for multiple stakeholders, including corporations, global society, and academia. Thus, the application of Diffusion of Innovation Theory for the assessment of management students' attitudes to adopt ChatGPT offers a series of practical and theoretical insights. In practical terms, authors point to the way educators can guide the effort of the use of ChatGPT implementation in educational settings. It presupposes that educators need to emphasize the opportunity cost of relying on the tool versus regular teaching and learning strategies. The study identified the need for appropriateness, thereby requiring the compatibility of ChatGPT with existing educational approaches and one's job aspirations.

ChatGPT, like any other text-to-text derived model, can be a wealth of information and ability but its usage should be geared to promote creativity, and not automatism. Educators can play a key role in using ChatGPT, who can navigate by showing how to solve it, with utmost awareness of the limitations that come with this technology, and ignorance of developing their own analytical solutions ([Cotton et al., 2023](#); [Qureshi, 2023](#)). Students can be prodded towards asking questions, verifying the answers, and critically evaluating the input, if they are to leverage ChatGPT as a tool to augment their problem-solving capabilities, instead of treating it as an aid for their cognitive abilities ([Fraiwan](#)

& Khasawneh, 2023; Zheng, 2023).

The need for reducing complexity and increasing the knowledge of how ChatGPT may be used is expected to be achieved through simplifying its operation and advocating the initial stage of introduction. As a result, the appropriate impact is crucial to emphasize. Therefore, the authors suggest the importance of impact and actual evidence to be emphasized as well. An in-depth, methodological assessment of how a new technology, ChatGPT, is adopted makes a substantive contribution to our current theory of how technology is adopted in an educational context. By applying the principles of traditional diffusion, the complexities of the implementation process are revealed. Using this comprehensive approach, researchers are better able to assess students' progress through the various stages of uptake and thus uncover which factors are most determinative. Therefore, this research, by assessing students' use of ChatGPT, offers a critical contribution to the field of media and technology use in education. Such research can inform policymakers about ensuring the responsible use of new instructional tools without impacting the effectiveness of their implementation. Additionally, this research contributes to the extant Diffusion of Innovation Theory by offering a theory-driven analysis of how management students interact with a new technology.

7. Conclusion and future directions

The results and implications of this quantitative study provide students' attitudes toward the adoption of ChatGPT, an advanced AI technology. It offers comprehensive insights into its use and perceived benefits. On one hand, students consider ChatGPT an adequate time-saving and efficient tool to improve problem-solving skills, initially validated by the significant positive relationship with perceived advantages and adopting it. It is compatible with daily use among students; thus, using it occasionally would discourage over-reliance that might lead to over-operationalization. The easy-to-use interface and cognitive-light nature of ChatGPT fosters a good reception among students in that the attributes are reflected in the students' attitudes toward ChatGPT. On the other hand, students portrayed early adopter behavior by expressing trialability as signing up for the first time and showing some institutional support. It seems observable enough considering the recent popularity among students. Generally, the students' attitude shows a high likelihood of adopting ChatGPT, and in a collective attitude, they all show an optimistic, excited, and confident opinion with positivity regarding the future rewards of ChatGPT. This shows the perceived benefit of ChatGPT regarding relative advantage, compatibility, trialability, observability, and the future reward; all points to a positive future of integration of ChatGPT in management education. ChatGPT output is also not without errors and limitations. Facilitators and stakeholders feared that using erroneous data would generate output that may not be suitable or applicable to both learning and present job scenarios. Worse, it could be programmed to produce wrong citations, which would serve to threaten research and publications. Accessing ChatGPT output would lead to the stagnation of creativity and threats to human curiosity.

Another limitation of this study is, due to its limited sample size and narrow focus on Delhi, India's capital. It focused on students' intents for using ChatGPT in education, proposing a novel concept while providing insights in a limited timeframe. Because ChatGPT is a new instrument, its investigation is incomplete, implying the need for further studies with larger samples and including various stakeholders' perspectives. The research instrument utilized may not sufficiently capture various aspects of ChatGPT usage among business and management students, potentially limiting the depth of responses. Furthermore, the statistical findings may lack generalizability outside specific setting of business and management students, limiting their relevance to other student populations or businesses. In addition, sampling bias may result from selecting student groups based on their participation in certain courses related to the research issue, thus rendering the findings little

unrepresentative of the larger students' population.

Ethics

The study involved human participants for data collection. The participants were assured of the confidentiality of their responses and informed consent was obtained from all the participants. The present study was approved by ethical committee bearing ID: UTAS-Muscat/RCC/BS/2022/02.

Open data

Data supporting findings of the study can be provided on request through email to the corresponding author of this article. However, the dataset would be anonymized for privacy concerns of the study participants.

CRediT authorship contribution statement

Alaa Amin Abdalla: Writing – original draft, Supervision, Investigation, Funding acquisition, Data curation. **Mohd Abass Bhat:** Writing – original draft, Software, Conceptualization. **Chandan Kumar Tiwari:** Writing – original draft, Resources, Project administration, Investigation, Conceptualization. **Shagufta Tariq Khan:** Writing – review & editing, Supervision, Conceptualization. **Abel Dula Wedajo:** Resources, Methodology, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgment

We, the authors of this research article, are highly grateful to Abu Dhabi University, Abu Dhabi, UAE, for providing financial support to conduct this research.

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