Abstract

The role of ChatGPT in teaching managerial decision-making in higher education lessons from an experiment

The advancement of artificial intelligence (AI) has significantly impacted higher education, influencing both learning and teaching processes. This study examined the effectiveness of applying the ChatGPT language model in higher education through a decision-making experiment, comparing the methods and outcomes employed by students and the students' approaches. The research aimed to evaluate students' satisfaction and the efficiency of AI support in decision-making. The findings revealed that the methods and decisions employed by ChatGPT often aligned with students' approaches, although notable differences were observed in some cases. Participants positively assessed ChatGPT's objectivity and rationality although its inability to account for special contexts emerged as a limitation. The results highlight the opportunities and challenges of AI-supported decision-making and emphasise the need for further research to ensure the effective integration of this technology.

Keywords: artificial intelligence, ChatGPT, higher education, decision-making

In recent years, the rapid development of artificial intelligence (AI) has presented new opportunities across various domains, including higher education and decision-making. ChatGPT, a GPT-based language model developed by OpenAI, is a notable example of this technology. Built on natural language processing (NLP), ChatGPT is increasingly used to address diverse challenges. Its capabilities include processing large volumes of textual data and quickly summarising complex information, making it a valuable tool in decision-making. The evolution of AI and ChatGPT has significantly impacted higher education, offering universities new possibilities that influence learning, teaching, and research.

This study examined the effectiveness of integrating ChatGPT into decision-making processes within the context of teaching decision-making in higher education. Using a group of students' experiences, the research explored the differences between the decision-making methods chosen by students and ChatGPT and the resulting decisions made by humans and AI. Additionally, it assessed students' satisfaction with ChatGPT's decision-making methods and outcomes. The findings aim to serve as a foundation for further

research on effective collaboration with language models, maximising their benefits while mitigating potential risks.

In the following sections, the use of ChatGPT in higher education is first reviewed based on the literature, focusing on its benefits and challenges for educators and students, as well as its pedagogical applications and limitations. Subsequently, an exploration is made into how ChatGPT and similar language models can support decision-making, discussing their advantages and risks in this domain.

ChatGPT in higher education

The advent of generative artificial intelligence, particularly models such as ChatGPT, has sparked transformative discourse in higher education, raising diverse perspectives on its implications. This literature review highlights recent research exploring the benefits and risks of ChatGPT's integration into higher education, focusing on teaching, learning, student engagement, and institutional practices.

Among its advantages, several studies emphasise ChatGPT's potential to enhance learning experiences in higher education. Aristovnik (2024) explains that ChatGPT facilitates personalised learning by adapting to individual student needs, thereby promoting engagement and a deeper understanding of course materials. This capability enables a tailored educational approach where students interact with AI to clarify concepts and receive immediate feedback, simulating a more interactive learning environment.

Similarly, Li (2024) noted that integrating ChatGPT into teaching practices can significantly complement traditional pedagogical methods. ChatGPT functions as a supplementary educational tool that enhances critical thinking and analytical skills by providing students with access to a vast repository of information and resources. This support is particularly valuable in complex subjects requiring immediate clarification.

According to Shahzad et al. (2024), ChatGPT is also a valuable educational resource. They can utilise ChatGPT to streamline administrative tasks such as grading and feedback, allowing them to focus more on the strategic aspects of teaching. The efficiency gained through automation can improve the quality of education by enabling educators to dedicate more time to developing engaging and effective course materials. Furthermore, a systematic review

by Dikilitaş et al. (2024) highlights that educators can leverage ChatGPT for professional development. The model assists in designing course content, developing assessments, and exploring innovative teaching strategies, thereby enhancing the overall teaching effectiveness.

Jensen (2024) suggests that ChatGPT can bridge information gaps among students with diverse backgrounds. By providing equal access to information and resources, AI can help reduce disparities in educational opportunities. This "knowledge democratisation" fosters an inclusive learning environment where all students can engage with educational content, regardless of their prior experiences or academic backgrounds.

Despite its numerous benefits, several studies underscore the significant risks associated with ChatGPT's use in higher education. Abulaiti et al. (2024) identified trust as a critical factor in the acceptance and adoption of ChatGPT in educational contexts. Reliance on AI for educational purposes can provoke scepticism among both students and instructors regarding the accuracy and reliability of AI-generated content. Since trust is essential for effective interaction with AI tools, perceived unreliability may hinder the integration of ChatGPT in educational environments.

One of the primary concerns related to ChatGPT's integration is its potential impact on academic integrity. As Nebieridze and Jojua (2024) emphasise, the ease of access to AI-generated content raises issues of plagiarism and the authenticity of student work. Students may be tempted to use AI to generate essays or complete assignments, undermining the core values of "academic trust." Instructors face the challenge of developing frameworks and policies to effectively address these ethical dilemmas while leveraging the benefits of AI.

 Song et al. (2024) offers a nuanced view of students' experiences with ChatGPT. While some students reported positive interactions, others expressed concerns about the quality and relevance of AI-generated responses. This variability in perception underscores the need for further research to understand the factors influencing mixed experiences, such as familiarity with the technology, learning styles, and disciplinary differences.

Additionally, Dikilitaş et al. (2024) revealed that while some students welcome the integration of AI tools, others approach it with apprehension, fearing that AI might replace critical thinking and problem-solving skills. This dichotomy indicates a pressing need for educational institutions to address these concerns through targeted training and awareness campaigns.

The integration of ChatGPT into higher education thus entails both advantages and challenges. On the one hand, it offers enhanced learning experiences and support for educators and bridges informational gaps, potentially transforming the educational landscape. On the other hand, issues related to trust, ethical considerations, and diverse student experiences require careful attention. Future research should focus on establishing best practices for introducing AI tools such as ChatGPT in higher education, ensuring they enhance rather than undermine academic integrity and the overall educational experience. Continuous dialogue among stakeholders—students, educators, and policymakers—is essential for effectively managing AI integration in higher education.

ChatGPT in decision-making

The rapid advancement of generative artificial intelligence, particularly ChatGPT, has spurred extensive research on its impact on decision-making across various sectors, including business, education, and engineering. This literature review synthesises recent studies that focus on the benefits and risks associated with integrating ChatGPT into decision-making processes, highlighting its transformative potential while addressing the challenges it poses.

One of ChatGPT's key advantages in decision-making lies in its ability to process large volumes of data and generate actionable insights. According to Chuma et al. (2024), ChatGPT facilitates data-driven decision-making by providing real-time analysis of extensive datasets. Its capability to quickly identify patterns and trends enables organisations to apply strategies effectively and respond rapidly to market dynamics, thereby enhancing competitiveness. Additionally, Jiang et al. (2024) emphasise that integrating ChatGPT with data visualisation tools further enhances its utility, particularly in higher education, allowing decision-makers to better interpret complex data and make informed decisions regarding resource allocation and curriculum development.

The integration of ChatGPT with decision management systems, such as Pega's Adaptive Decision manager (ADM), illustrates another dimension of its utility in business environments. Kumar (2024) discusses how combining ChatGPT with ADM can facilitate more nuanced decision-making processes. By simulating human interactions, ChatGPT helps decision-makers pose contextual questions and suggest personalised solutions based on

algorithmic analyses. This synergy improves flexibility and responsiveness in business operations, making decision-making more adaptable to changing circumstances.

ChatGPT also contributes to improving logical analysis within decision-making frameworks. Aljaž (2024) explores ChatGPT's application in the Theory of Constraints (TOC) thinking process, highlighting its role in identifying bottlenecks and proposing logical solutions. Its ability to process complex logical frameworks and generate clear, actionable insights makes ChatGPT a valuable tool for managers engaged in strategic planning. ChatGPT enhances the decision-maker's ability to adapt quickly to evolving business conditions by providing immediate feedback and information.

In the context of business information systems, Diantoro et al. (2024) examined how ChatGPT can support strategic decision-making in medium-sized enterprises. Their study finds that such enterprises can leverage ChatGPT to understand market trends and operational efficiency without requiring extensive data analysis teams. ChatGPT enables smaller organisations to access advanced analytical capabilities, by democratising decision-making tools, levelling the playing field with larger competitors.

Despite these advantages, numerous studies highlight the risks associated with the use of ChatGPT in decision-making. Reliance on ChatGPT raises concerns about overdependence on AI systems, potentially reducing human oversight in critical decision-making processes. Nivetha and Prasanth (2024) argue that while ChatGPT provides valuable insights, it cannot replace human judgement, particularly in complex decision scenarios involving ethical considerations. They cautioned that excessive reliance on AI could undermine critical thinking and moral reasoning, especially in decisions with significant social or ethical implications.

An exploratory study by Xu et al. (2024) raised questions about the quality and reliability of ChatGPT's outputs, particularly in subjective decision-making contexts, such as engineering design. While the tool may generate creative solutions, its effectiveness diminishes when subjective preferences or ethical dilemmas arise. The study warns that AI-generated recommendations may reflect biases inherent in training data, necessitating thorough validation by human decision-makers to ensure alignment with organisational values and ethical norms.

Integrating ChatGPT into existing decision-making frameworks can also present challenges, particularly in aligning AI capabilities with organisational

goals and processes. Kumar (2024) notes that while ChatGPT facilitates decision-making through its interactive capabilities, organisations must consider how to effectively incorporate this technology into their existing systems. This requires comprehensive training and adaptation of existing decision-making protocols to fully exploit the benefits of AI tools.

In conclusion, the integration of ChatGPT into decision-making processes offers significant benefits, including enhanced data analysis, adaptive decision-making, and improved logical reasoning. However, it also poses critical risks, such as ethical concerns, AI dependency, and integration challenges. Future research should focus on developing frameworks that balance ChatGPT's strengths with the need for human oversight in decision-making. Addressing these challenges will enable organisations to harness the full potential of ChatGPT to improve decision-making outcomes while safeguarding against the inherent risks of AI technologies.

Decision-making experiment—research design

The single group, i.e., self-controlled experiment, was conducted by the first author of this study within the framework of the *Managerial Decision-Making* course at *Collegium Humanum Warsaw Management University*, involving correspondence students from the *Management MA programme*. The student's task was to present and analyse an individual decision-making process based on the following criteria: (1) Clearly define the decision-making situation/problem. (2) Describe the decision-making process using an arbitrarily chosen method or tool. (3) Analyse your decision-making process: highlight the advantages and risks and how the latter can be managed. (4) Consult ChatGPT regarding the decision. (5) Compare your and ChatGPT's decision-making process and results and evaluate the differences. The decision-making methods students could apply during the experiment are presented in Table 1.

Table 1. Decision-making methods used in the experiment

I. Decision tables	II. Decision charts
1. Pros and cons	4. Decision tree analysis
2. Paired ranking	5. Flow diagram
3. Grid analysis	6. Cause-and-effect diagram

Annexe 1 includes a brief description of these decision-making methods. These methods allow managers to make decisions systematically, ensuring that choices are well-informed, logical, and aligned with organisational objectives. A common feature of these two categories of methods is the calculation and maximisation of subjective expected utility. The need to ensure objectivity drove the selection of methods in the experiment.

The effectiveness of incorporating ChatGPT into individual decision-making was examined using the above decision-making methods. The *research questions* were as follows: (Q1) How do the *decision-making methods* chosen by students and ChatGPT differ for a given problem? (Q2) How do the *decisions* made by students and ChatGPT differ? (Q3) How satisfied are students with ChatGPT's *decision-making method and outcomes*?

The following *hypotheses* were formulated for the study: (H1) The decision-making methods chosen by students and ChatGPT differ for a given problem, depending on the nature of the decision-making situation. (H2) The decisions made by students and ChatGPT are not identical and depend on the alignment of their chosen methods. (H3) Students' satisfaction with ChatGPT's involvement varies based on the alignment of decision outcomes.

The research methodology involved *quantitative statistical analysis* for H1 and H2, focusing on the correlations between demographic characteristics, decision-making methods, and outcomes. For H3, a *qualitative content analysis* of opinions regarding satisfaction was performed.

Statistical analysis of the results

The study involved 24 participants, two-thirds of whom were women and one-third were men. Regarding age distribution, the majority were under 40 years old (58.4%), with the 31–40 age group being the most represented (41.7%, 10 participants), followed by the 41–50 age group (29.2%, 7 participants). Regarding occupation, 9 participants (37.5%) held managerial positions, one-quarter were employees, and the remainder identified as entrepreneurs or other professions. The characteristics of the sample are illustrated in figure 1.

Participants were free to select their decision-making problem, context, and the method used to solve it. Three-quarters of the group chose workplace-related decision-making situations, while the remainder opted for personal scenarios. The majority of participants (70.8%, 17 individuals) chose

the *Pros and cons* method to solve their problems, followed by 16.7% (4 participants) using *Grid analysis*, 8.3% (2 participants) choosing *Paired ranking*, and 4.2% (1 participant) applying the *Cause-and-effect diagram*.

Figure 1. Characteristics of the sample by gender, age, and occupation
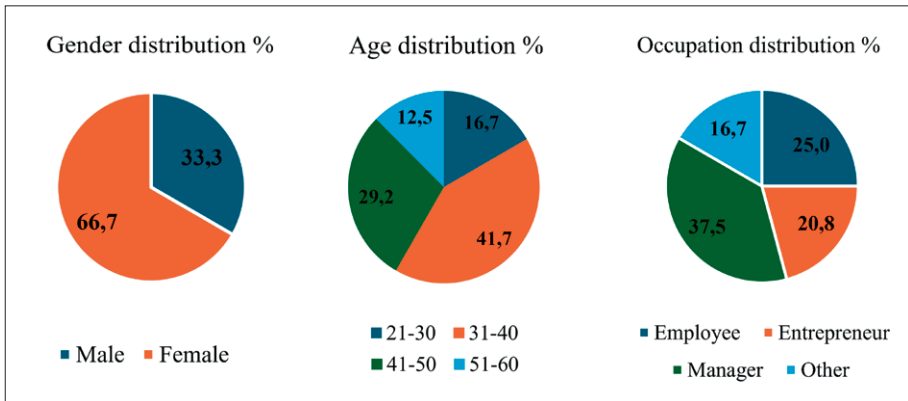
When consulting ChatGPT for decision-making, it was observed that the chatbot frequently used the *Pros and cons* method, similar to the students, in 45.8% of cases. The second most common method was *Grid analysis* (20.8%), followed by the *Cause-and-effect diagram* (16.7%). Additionally, ChatGPT employed two unique methods—decision tree analysis and flow diagram—*Decision tree analysis* and *Flow diagram*—each in one case. The comparison between the students' and ChatGPT's selected methods is shown in figure 2.

The first part of hypothesis H1—that the decision-making methods chosen by students and ChatGPT are not identical—was confirmed, albeit not significantly: in 54,2% of cases (13 instances), the chatbot used a different method than the students. However, the second part of H1, suggesting that the choice of methods correlates with the nature of the decision-making situation, was not statistically supported. No significant relationship was found between the decision context and the type of method selected (Pearson's chi-square test: $\rho = 0.502$ for ChatGPT and $\rho = 0.797$ for students).

**Figure 2.** Comparison of the decision-making methods chosen by students and ChatGPT
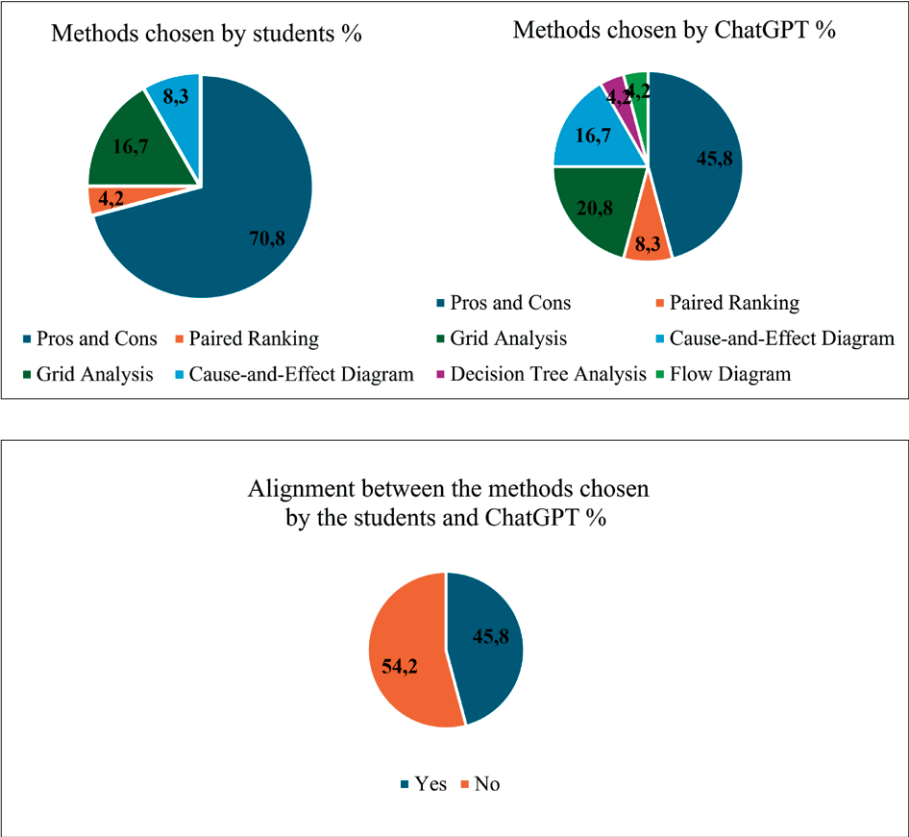
Regarding the alignment of outcomes between students and ChatGPT, it was found that in nearly three-quarters of cases (70.8%), both arrived at the same decision. This partially confirmed hypothesis H2, as 29.2% of cases showed divergent results. However, the claim that outcome alignment depends on the alignment of methods was not supported statistically (cross-tabulation analysis: ρ = 0.851). Figure 3 illustrates the alignment of the decisions made by the students and ChatGPT.

Figure 3. Alignment of decisions made by students and ChatGPT
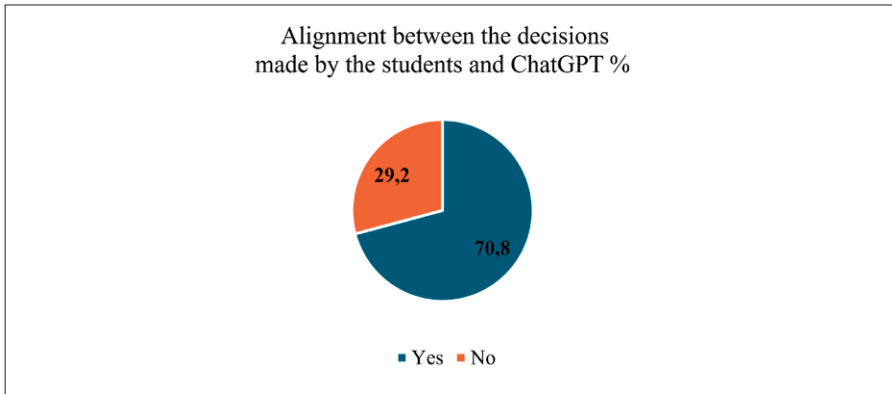
A total of 75.0% of students were satisfied with the outcomes generated by ChatGPT, particularly those whose decisions aligned with the chatbot. Only 4 students rejected ChatGPT's suggestions and remained confident in their own decisions. Hypothesis H3, which posited that the alignment of decisions strongly influences satisfaction with ChatGPT, was strongly and statistically confirmed (ρ = 0.000). Figure 4 illustrates students' satisfaction with ChatGPT's responses.

Figure 4. Students' satisfaction with the ChatGPT responses
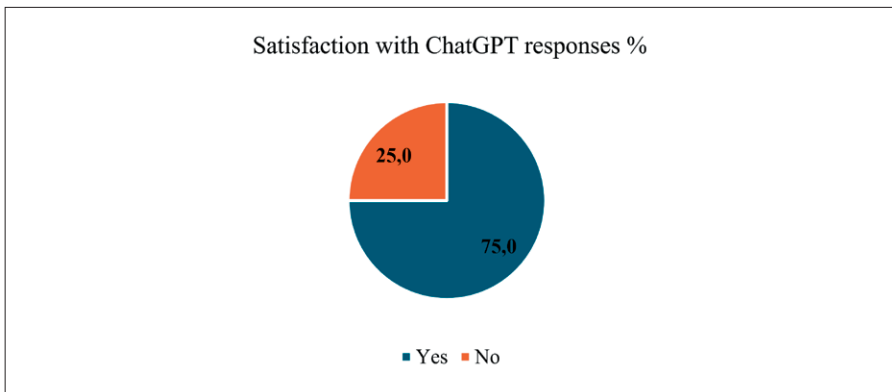
The statistical analysis partially validated the hypotheses. For H1, while the claim that students and ChatGPT chose different decision-making methods was supported, no significant correlation was found between decision

contexts and method selection. For H2, the divergence in outcomes was confirmed, but it was independent of method alignment. H3 was unequivocally validated, as the alignment of decisions between students and ChatGPT strongly determined satisfaction with ChatGPT's responses.

Content analysis of opinions

The content analysis of opinions explored users' experiences with the use of AI, specifically ChatGPT, in decision-making processes. Several key themes and trends emerged, summarising ChatGPT's role and impact in these processes. The key themes include: (1) objectivity and rationality, (2) the importance of precision and question formulation, (3) limitations of AI and disregard for special contexts, (4) suggestions and alternatives, (5) comparisons between AI and user preferences, and (6) the effectiveness of AI in complex decision-making.

A recurring observation was that the responses provided by ChatGPT were often more rational and objective than the users' own decisions. Users noted that while they attempted to exclude emotional factors from their decision-making, AI-generated responses considered less emotion-driven elements, aiding in more objective decision-making. One user highlighted, "I received a well-structured response from the AI, including considerations that pointed towards a much more rational direction."

Several users emphasised that the quality of ChatGPT's responses greatly depended on how precisely and thoroughly the questions were developed. If the questions were insufficiently specific, the AI could not provide completely accurate or detailed responses, which could affect the decision-making process. One user commented, "If I had phrased my question in more detail, I would have received an even more comprehensive answer."

Another important point raised by several students was that ChatGPT did not always account for local or specific economic, political, and cultural factors that could be critical in certain decisions. One participant remarked, "In my opinion, the risk analysis did not consider economic, human, and political factors specific to a country."

Typically, AI does not provide a definitive answer but instead outlines multiple options or alternatives from which the user must select the most appropriate one. This characteristic was seen as particularly beneficial for

decision-makers, as it allowed for the consideration of multiple perspectives. One user noted, "ChatGPT does not provide a clear-cut answer but rather offers possibilities and suggestions."

The document frequently referenced comparisons between user decisions and those suggested by ChatGPT. Analyses showed that, in many cases, users' own decisions and AI-recommended solutions were similar. One participant stated, "The AI's decision does not differ from mine; I positively evaluate the AI's decision because it supports the correct direction."

In several instances, AI offered more detailed and comprehensive analyses, particularly when choosing among multiple alternatives or addressing complex situations. One user observed, "My original decision-making process was simple and quick, but the AI's proposed method allowed for a more detailed and thorough analysis."

The advantages of incorporating ChatGPT into decision-making processes based on opinions, are summarised in the word cloud shown in Figure 5.

**Figure 5.** Advantages of integrating ChatGPT into decision-making
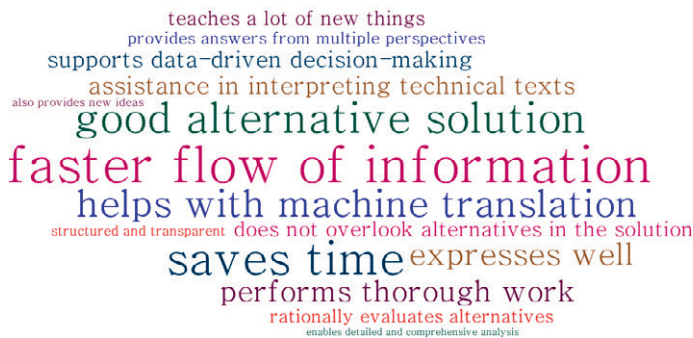
The risks associated with incorporating ChatGPT into decision-making processes, based on opinions, are summarised in the word cloud shown in Figure 6.

The analysis indicates that ChatGPT can be a valuable tool for supporting decision-making, particularly in situations requiring the rapid collection and synthesis of information. However, its limitations are also evident, especially regarding the neglect of local or specific circumstances and the importance of precise question formulation. Nonetheless, most participants positively

evaluated ChatGPT's responses and felt that the AI's assistance added value to their decision-making processes.

Figure 6. Risks of integrating ChatGPT into decision-making
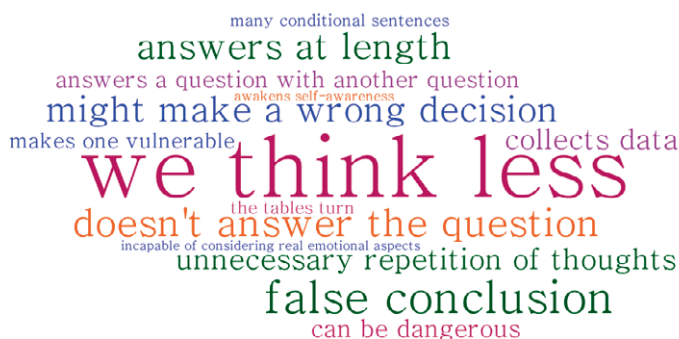
Conclusions and recommendations

This study examined the effectiveness of applying ChatGPT in higher education, with a particular focus on its role in managerial decision-making processes. Conducted at the Collegium Humanum Warsaw Management University, the experiment involved students comparing their decision-making methods with responses generated by ChatGPT. The objective was to understand the differences between human and AI-based decision-making methods and outcomes and to assess students' satisfaction with ChatGPT's decisions.

Although the experiment was conducted on a limited sample, and the findings cannot be generalised, they provide a foundation for broader research. However, the following conclusions can be drawn: (1) The decision-making methods used by ChatGPT and the students were not always identical; however, in many cases, the outcomes were similar. This indicates that while ChatGPT uses different methods, they often lead to reliable results. (2) Most students were satisfied with ChatGPT's decisions, particularly when they aligned with their own. This suggests that AI-generated decisions can be relevant and valuable in decision-making. (3) ChatGPT's decisions were objective and rational, yet they sometimes overlooked specific local factors (e.g., economic and political conditions). This limitation highlights the importance

of considering local contexts in decision-making. (4) ChatGPT typically did not provide definitive answers but offered multiple alternatives, aiding decision-makers in analysing and choosing among options.

Further research is recommended to better understand how ChatGPT can be more effectively integrated into higher education and decision-making processes. Educators and students should receive more detailed training on the application of AI, with particular emphasis on the precision of prompting. It is essential to consider AI's limitations, including its neglect of local contexts and cultural factors, as well as ethical concerns that may hinder critical thinking and moral reasoning.

References

Abulaiti, M. (2024). Higher education in the era of AI. In: G. Morris, & S. Kozuch (Eds.), *Developments and future trends in transnational higher education leadership* (pp. 244–265). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-2857-6.ch014

Aljaž, T. (2024). Leveraging ChatGPT for enhanced logical analysis in the theory of constraints thinking process. *Organizacija*, 57(2), 202–214. https://doi.org/10.2478/orga-2024-0014

Aristovnik, A. (2024). Exploring the global impact of ChatGPT in higher education from the students' perspective. *International Conference on Business, Economics, Law, Language & Psychology*, 2024, 335–336. https://doi.org/10.20319/icssh.2024.335336

Diantoro, K., Munthe, E. S., Herwanto, A., Mubarak, R., & Istianingsih, N. (2024). The role of ChatGPT in business information systems to support strategic decision making in medium-scale enterprises. *Jurnal Minfo Polgan*, 13(1), 382–389 https://doi.org/10.33395/jmp.v13i1.13673

Dikilitaş, K., Furenes Klippen, M. I., & Keles, S. (2024). A systematic rapid review of empirical research on students' use of ChatGPT in higher education. *Nordic Journal of Systematic Reviews in Education*, 2(1), 103–125. https://doi.org/10.23865/njsre.v2.6227

Chuma, E. L., Alves, A. M., & Oliveira, G. G. (2024). Evolution of generative AI for business decision-making: A case of ChatGPT. *Management Science and Business Decisions*, 4(1), 5–14. https://doi.org/10.52812/msbd.87

Jensen, L. X., Buhl, A., Sharma, A., & Bearman, M. (2024). Generative AI and higher education: A review of claims from the first months of ChatGPT. *The International Journal of Higher Education*, Springer, *88*(6), 1–17. https://doi.org/10.1007/s10734-024-01265-3

Jiang, T. Y., Liu, E., Baig, T., & Li, Q. (2024). Enhancing decision-making in higher education: Exploring the integration of ChatGPT and data visualization tools in data analysis. *New Directions for Higher Education*, Wiley. Vol. Fall 2024, Issue 207, 15–29. https://doi.org/10.1002/he.20510

Kumar, P. T. (2024). Leveraging conversational AI for enhanced decisioning: Integrating ChatGPT with Pega's Adaptive Decision Manager. *Journal of Software*, *19*(2), 42–51, https://doi.org/10.17706/jsw.19.2.42-51

Li, M. (2024). The impact of ChatGPT on teaching and learning in higher education: challenges, opportunities, and future scope. In M. Khosrow-Pour, D. B. A. (Ed.), *Encyclopaedia of information science and technology, Sixth edition* (pp. 1–20). https://doi.org/10.4018/978-1-6684-7366-5.ch079

Nebieridze, M., & Jojua, N. (2024). Towards the use of artificial intelligence (ChatGPT) in higher education: Students' perspective. *Journal of Education in Black Sea Region*, *9*(2), 1–15. https://doi.org/10.31578/jebs.v9i2.313

Nivetha, P., & Prasanth, S. (2024). Transforming management decision-making: The role of ChatGPT. *Shanlax International Journal of Management*, *11*(4), 29–33. https://doi.org/10.34293/management.v11i4.7486

Shahzad, M. F., Xu, S., & Javed, I. (2024). ChatGPT awareness, acceptance, and adoption in higher education: the role of trust as a cornerstone. *International Journal of Educational Technology in Higher Education*, *21*(46). https://doi.org/10.1186/s41239-024-00478-x

Song, X., Zhang, J., Yan, P., Hahn, J., Krüger, U., Mohamed, H., & Wang, G. (2024). Integrating AI in college education: Positive yet mixed experiences with ChatGPT. *Meta-Radiology*, *57*(4), 1–4. https://doi.org/10.1016/j.metrad.2024.100113

Xu, W., Kotecha, M. C., & McAdams, D. A. (2024). How good is ChatGPT? An exploratory study on ChatGPT's performance in engineering design tasks and subjective decision-making. *Proceedings of the Design Society*, *4*, 2307–2316. https://doi.org/10.1017/pds.2024.233

Annex 1.

Table. Brief description of the decision-making methods used in the experiment

Decision-making method	Description	Purpose	Example
I. Decision tables Decision tables organise and analyse decision-making scenarios in a tabular format. They consist of conditions (criteria or variables) and their corresponding actions or outcomes.		To handle complex, rule-based decisions by systematically evaluating all combinations of criteria.	Choosing a supplier based on price, quality, and delivery time.
1. Pros and cons	*This method involves creating a list of advantages (pros) and disadvantages (cons) for each option. The lists are compared to determine the best choice.*	*To weigh the options qualitatively and make straightforward comparisons.*	*Deciding whether to outsource a project by evaluating cost savings (pro) versus quality control risks (con).*
2. Paired ranking	*Options are compared in pairs, with preferences recorded for each comparison. Scores are totaled to rank the options.*	*To prioritise options based on subjective judgments or preferences.*	*Choosing the best candidate for a managerial role by comparing their qualifications pairwise.*
3. Grid analysis	*Also known as a decision matrix, grid analysis scores options against criteria that are weighted by importance. The scores are totaled to identify the best choice.*	*To make objective, data-driven decisions that account for multiple criteria.*	*Selecting a marketing strategy based on cost, reach, and effectiveness.*

Decision-making method	Description	Purpose	Example
II. Decision charts	Decision charts visually represent choices, alternatives, and outcomes, often in a flowchart-like structure. They clarify the steps and consequences of decisions.	To simplify complex decision-making by mapping out potential paths.	Deciding whether to launch a new product based on market research results.
4. Decision tree analysis	*A decision tree is a graphical tool that models decisions, potential outcomes, probabilities, and costs. Branches represent choices, and their consequences are mapped out.*	*To evaluate decisions involving uncertainty and multiple steps.*	*Assess whether to invest in a new technology based on projected returns and associated risks.*
5. Flow diagram	*Flow diagrams depict the sequence of decisions and their potential outcomes using symbols and arrows. They illustrate the process from start to finish.*	*To understand the decision-making process step by step and ensure that no aspect is overlooked.*	*Developing a process for resolving customer complaints*
6. Cause-and-effect diagram	*Also called a fishbone or Ishikawa diagram, it identifies the root causes of a problem by organising potential causes into categories.*	*To diagnose issues and focus on addressing root causes rather than symptoms.*	*Investigating the reasons for the declining product quality.*