

## RISKS OF USING AI TECHNOLOGY IN THE RESEARCH PROCESS OF DOCTORAL STUDENTS IN BUSINESS ADMINISTRATION IN VIET NAM: AN APPLICATION OF THE AHP METHOD

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### Abstract

In the context of rapid digital transformation, the application of artificial intelligence (AI) in scientific research has created numerous opportunities while also posing significant risks for doctoral students in Business Administration. This study aims to examine and categorize the primary risks associated with AI usage, spanning issues related to data, ethics, technology, and user competence. Employing the Analytic Hierarchy Process (AHP) method, the study collected data from 175 doctoral students at major universities in Vietnam to assess the significance of different risk categories. The findings identify four major risk groups: (1) **Data risks** (weight: 0.56), encompassing incomplete data, biased data (Mirsch et al.), and data security concerns; (2) **Ethical risks** (0.26), involving challenges such as transparency, privacy violations, and AI decision-making bias; (3) **Technical risks** (0.12), including software errors and inaccurate AI models; and (4) **Competence risks** (0.06), which pertain to a lack of data analysis skills and difficulties in selecting appropriate AI tools. The study highlights the importance of identifying and managing these risks while proposing strategies to mitigate them and enhance AI proficiency among doctoral researchers.

**Keyword: AI in research, AHP method, AI risks**

### 1. Introduction

In the context of rapid digital innovation and increasingly widely available data, the integration of technology with critical thinking skills in education and research has become urgent (Calma & Davies, 2021). The rapid development of technology, especially artificial intelligence (AI), is significantly changing the research and learning methods of PhD students in Business Administration. Recent studies show that the focus of modern education lies not only in providing specialized knowledge but also in emphasizing the development of critical thinking and problem-solving abilities (García-Chitiva & Correa, 2024).

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This digital transformation has given a great impetus to the academic research process, especially for PhD students, thanks to the support of advanced technologies (De Nito et al., 2023). Among them, AI has emerged as a technology that has the potential to fundamentally change education and research, especially through content generation tools such as ChatGPT. These tools are capable of generating a wide range of content, from text to images and videos (Davenport & Mittal, 2022), and support PhD students in academic tasks such as writing, research, and problem-solving (Vázquez-Cano et al., 2023).

While AI offers many benefits, the process of using AI in research also carries many risks. These risks include over-reliance on AI tools, skewed or inaccurate data outputs, as well as ethical issues in research when using AI-generated content (Michel-Villarreal et al., 2023). This is especially important for PhD students who need to apply technology selectively and prudently to ensure scientific and honest research.

In addition, there is still a lack of in-depth research on potential risks and how to manage risks when applying AI to the entire research process of PhD students in Business Administration. Most current research focuses primarily on learning personalization and administrative management automation (Vázquez-Cano et al., 2023) without providing empirical evidence of the impact of AI on research performance, skill development, or real-world experience of PhD students.

With previous studies on the same topic, there are still research gaps that need to be addressed, including: lack of a comprehensive assessment of both the benefits and risks of AI throughout the research process, lack of quantitative research on the relationship between the use of AI and research results (time to completion of thesis, number of articles, research quality), lack of qualitative research on the experience of using AI and how PhD students handle risks arising in the research process. Filling these gaps will provide the necessary scientific basis to optimize the application of AI, and at the same time build a framework to help PhD students make the most of technology while controlling potential risks, thereby improving research capacity and competitiveness in the academic field.

## **2. Theory background**

### **2.1. Artificial Intelligence**

Artificial Intelligence (AI) is a field of computer science focused on creating intelligent systems capable of performing tasks that typically require human intelligence. AI systems are designed to learn from data, adapt to new situations, and make decisions based on available information (Fowler et al., 2022).

AI has seen remarkable advancements in recent years, driven by increased computing power, the availability of big data, and progress in machine learning algorithms. The development of General Artificial Intelligence (GAI), an advanced type of AI capable of performing various tasks, has opened new possibilities for AI applications in education and research (Davenport & Mittal, 2022).

## **2.2. The potential of AI in research activities**

The remarkable development of technology, particularly Artificial Intelligence (AI), is significantly transforming the research and learning process (Essien et al., 2024). AI has the potential to revolutionize research across various fields, including Business Administration. AI tools can support learning and research in several aspects. Most notably, AI's ability to automate the process of collecting and analyzing large volumes of data helps researchers save time and effort (Hooda et al., 2022).

Machine learning algorithms can be used to identify patterns, trends, and insights from data that traditional analytical methods may overlook. Along with the dynamic development of technology, AI tools have the capability to quickly and efficiently scan a large volume of research materials, identify relevant articles, and summarize key findings. This can help researchers save time and ensure they have comprehensively reviewed the relevant literature (Essien et al., 2024).

AI text generation tools, such as ChatGPT and NotebookLM, can assist students in writing by generating ideas, structuring articles, and even drafting entire paragraphs. Moreover, these tools can be used to check grammar, spelling, and style (Vázquez-Cano et al., 2023).

Last but not least, AI-powered platforms can facilitate research collaboration by connecting researchers with similar interests, sharing data and research results, and enhancing communication (Abed et al., 2016).

## **2.3. Risks in Applying AI to Learning and Research**

Although artificial intelligence (AI) offers many benefits in the research process, PhD students in Business Administration also face significant risks. First, data risk includes bias, inaccuracy, or incomplete data, which can lead to skewed or inaccurate research conclusions. This stems from AI processing unrepresentative data or collecting data from unreliable sources (Davenport & Mittal, 2022). Second, ethical risks related to plagiarism, copyright infringement, or use of content without clear source citations, reduce the integrity of research. The use of AI without strict control can affect the credibility and transparency of academic research (Michel-Villarreal et al., 2023). Third, technical risks include problems related to over-reliance on AI tools, system failures, or data security risks, especially when PhD students use online AI platforms without adequate security measures, leading to the risk of sensitive data leakage (Calma & Davies, 2021). Finally, capability risk is the risk of impairing the ability of PhD students to think critically and creatively when they rely heavily on the results provided by AI without developing independent research skills and deep analysis. This can negatively affect the quality of research and limit the development of research academic principles (Vázquez-Cano et al., 2023). These risks not only pose a major challenge for PhD students in maintaining the quality of their research, but also require careful consideration and control to optimize the application of AI.

## **3. Research Methodology**

### **3.1. Research Design**

This study uses the AHP (Analytic Hierarchy Process) hierarchical analysis method to assess the risks from the use of AI in learning and research of PhD students in Business Administration. The AHP method helps to consider multiple qualitative and quantitative criteria

simultaneously through three main principles: analysis, evaluation and synthesis. However, in the course of conducting the study, there are 4 main types of risks that need to be carefully considered. The research methodology is designed in two phases to identify and measure these risks. Phase 1 focuses on a systematic review of the literature to identify the types of risks associated with the use of AI in learning and research from scientific articles on WoS, Scopus and Google Scholar for the period 2020-2024. After the screening process, we have identified 4 main risk groups and 15 corresponding sub-criteria. Phase 2 uses qualitative methods through expert discussions and quantitative surveys with 175 PhD students in Business Administration at 4 major universities in Ho Chi Minh City. Ho Chi Minh City aims to determine the weighting for risk criteria by the AHP method. The calculation of the pair comparison matrix, weighting, and consistency test ( $CR < 0.1$ ) is performed to ensure reliable and consistent results. The final weight is used to prioritize between criteria, helping PhD students to identify and manage risks effectively when applying AI to their learning and research processes.

### **3.2. Sample Characteristics**

The survey subjects in this study are 175 PhD students studying at major universities in Ho Chi Minh City, majoring in Business Administration. Specifically, the schools include the Industrial University of Ho Chi Minh City, the University of Economics Ho Chi Minh City, the University of Economics and Law of Ho Chi Minh City, and the University of Finance and Marketing.

In terms of gender, 65% of the participants were male, while 35% were female. In terms of age, 30% were in the 28 to 30 years old group, 50% were in the 31 to 40 years old group, and 20% were in the 41 to 55 years old group. By profession, 40% are lecturers, while 60% hold managerial positions. In addition, in terms of monthly income, 40% have an income of 10 to 20 million VND, while 60% have an income of over 20 to 30 million VND.

The research subjects are selected to ensure representativeness, in line with the research objectives in the context of training and development in the field of Business Administration.

### **How risk criteria are measured.3.3**

Risks in the use of AI in research activities include four main criteria and 12 sub-criteria that have been identified in the study, including: Ethical Risk, Competency Risk, Technology Risk, and Legal Risk. These criteria were developed from discussions with experts and reference to scales in previous research. Each main criterion is divided into sub-criteria to specifically measure different aspects of risk when applying AI technology in the research process of a PhD student in Business Administration.

**Ethical risk:** This group of criteria includes three sub-criteria: bias in AI decision-making, transparency, and violation of research information privacy. In particular, bias in AI decisions is the most important sub-criterion, reflecting concerns about AI systems making decisions that are unfair or biased, affecting research results (Johnson et al., 2021). The transparency criterion refers to clarifying decisions made by AI, ensuring they can be interpreted easily. Privacy breaches are a major risk when personal data or sensitive information is not strictly secured during data collection and processing.

Competency risk: This group of criteria consists of three sub-criteria: lack of data analysis skills, difficulty in choosing the right AI tool, and lack of knowledge about AI and machine learning. In particular, lack of data analysis skills is the most important criterion, indicating the need to improve the data processing capacity of PhD students to achieve accurate results (Smith et al., 2019). The difficulty in choosing the right AI tool reflects the challenge of finding the optimal solution among so many technology tools. Lack of knowledge about AI and machine learning is a factor that can limit the ability to apply AI to research and needs to be overcome through complementary training programs (Nguyen & Tran, 2020).

Technology risk: This group of criteria includes three sub-criteria: software or system failures, poor compatibility between AI tools, and over-reliance on AI. Software or system errors are one of the most likely risks when using unstable AI technologies, disrupting research (Davis et al., 2022). Poor compatibility between technology tools makes data integration difficult. Excessive reliance on AI can impair a PhD student's ability to think independently and creatively during research.

Legal risk: This group of criteria includes three sub-criteria: intellectual property compliance, AI tool licensing issues, and data protection violations. Compliance with intellectual property regulations is a factor that needs to be controlled to avoid copying or copyright infringement when using AI (Shahin & Mazloun, 2024). AI tool licensing issues can lead to unauthorized use of software or AI tools of unknown origin. Violation of data protection regulations is a serious legal risk when the privacy and security of research data are not ensured.

#### **Factors to consider in researching the risks of using AI .3.4**

In this study, analyzing the types of risks when applying AI is extremely necessary and significant. Firstly, risk identification and control help PhD students proactively deal with unexpected situations in the process of applying AI technology. Without a full assessment of the potential risks, the use of AI can lead to discrepancies in research results or violations of legal regulations. Second, protect the integrity and ethics of research. Ethics-related risks, such as lack of transparency or invasion of privacy, can seriously affect the credibility of research and violate academic standards. Assessing and controlling these risks is a prerequisite for ensuring transparency and integrity in research (Nguyen & Tran, 2023). Third, strengthen the capacity of PhD students in applying AI effectively and safely. Recognizing and evaluating competency risks, such as lack of analytical skills or limited understanding of technology, helps PhD students realize the need to learn and improve their qualifications to optimize AI tools in research. Fourth, minimizing technological risks helps PhD students proactively handle incidents and improve the reliability of research results. Risks such as software errors or incompatibilities between tools can disrupt the research process or lead to the loss of important data. Finally, ensuring legal compliance and protecting personal rights is key to avoiding legal issues related to intellectual property and protecting personal data. Research by Shahin and Mazloun (2024) indicates that failure to comply with legal regulations can have serious legal and financial consequences for PhD students and research institutions.

Therefore, comprehensive research and assessment of these types of risks not only helps to improve the quality of research but also creates a solid foundation for PhD students in the application of AI technology in a sustainable and safe way.

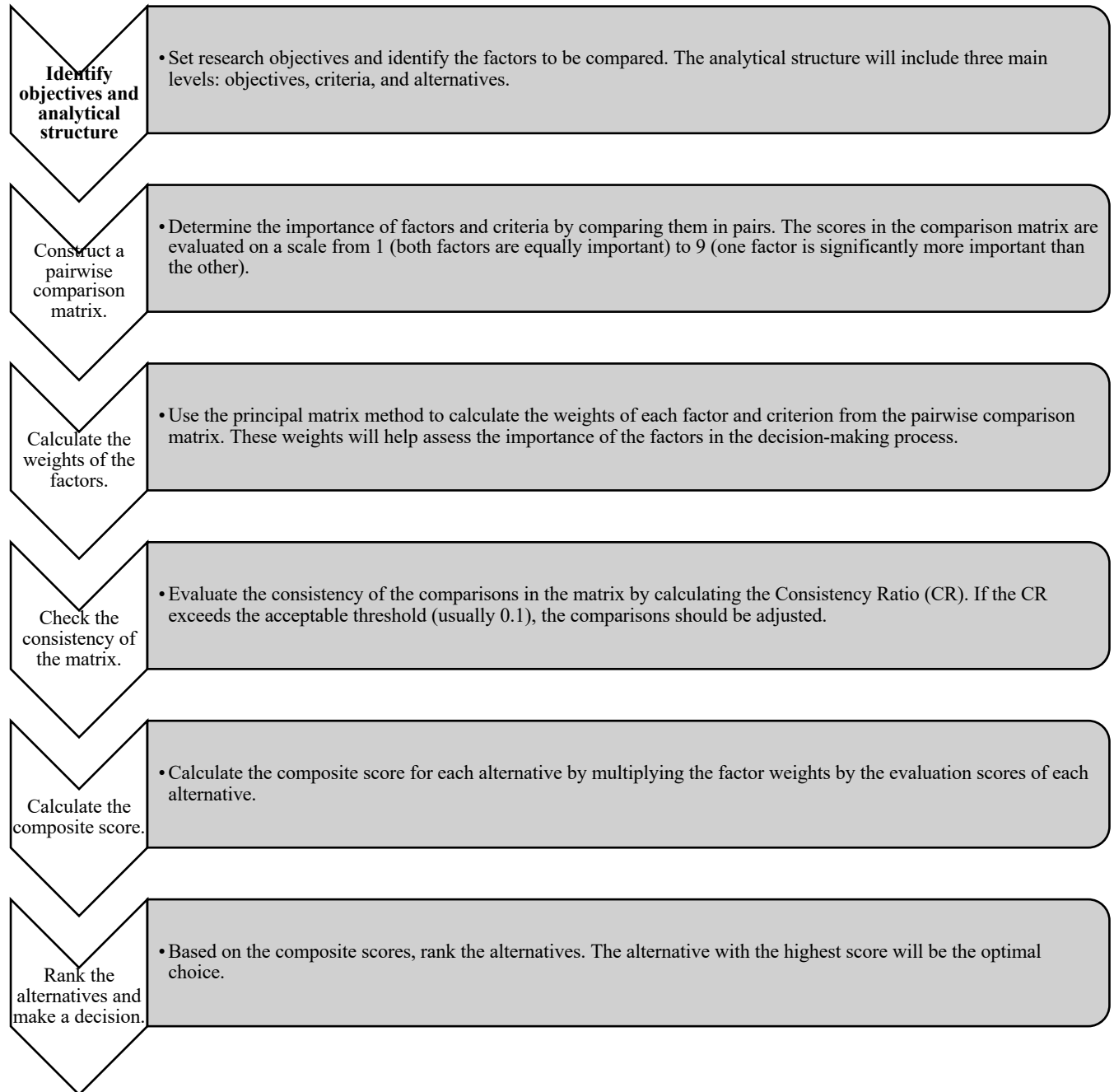
### **Research Gaps.3.5**

Although studies on the risks of applying AI in various fields have achieved significant results, the risks of using AI in the research process of graduate students in Business Administration have not been fully studied. Through the process of reviewing the literature, it can be found that there are several important research gaps: first, there is a lack of a detailed classification framework for the types of risks when applying AI in research. Currently, research mainly focuses on technology risks in areas such as finance and healthcare, but there is no specific theoretical framework for classifying and measuring the types of risks that PhD students may face when using AI. This makes it difficult to determine the extent of the impact of each type of risk, as well as how to manage and mitigate risks in the context of academic research (Nguyen & Tran, 2022). Second, there is a lack of research on risks related to data quality and research results. The application of AI in data collection and analysis can increase the risk of encountering skewed, inaccurate or biased data, seriously affecting research results. However, there are still few studies that analyze these risks in detail and how to control data quality when using AI in Business Administration research (Smith & Johnson, 2021). Third, there are ethical and information security risks when applying AI to research. Ethical issues such as privacy, personal data security, and algorithmic bias are important risks that need further research. Although this is a topic that has been mentioned in other fields, there has not been much specific research on how to manage and ensure transparency and fairness when applying AI in academic research (Brown & Liu, 2020). Fourth, the risk of technology dependence and influence on the critical thinking of PhD students. Another important gap is that AI can reduce the ability of PhD students to think critically and creatively if they rely too much on AI tools to draw conclusions. More research is needed to clarify the long-term effects of the use of AI on independent thinking skills and creativity in research (Halpern, 2014). Fifth, there is a lack of guidelines and risk management frameworks specifically for PhD students in Business Administration. There is currently not much literature or research that provides specific guidance on risk management when using AI in academic research. This creates a large gap in formulating risk mitigation measures that are systematic and tailored to the needs of postgraduate students in this industry.

### **3.6.AHP hierarchical analysis process**

This analysis process must go through six continuous steps and any step in the analysis is indispensable. The steps in the process include:

#### **Figure 1 – The process of implementing the AHP hierarchical analysis method**



#### 4. Research Results

On the basis of analyzing previous studies on the risks of using AI in research, experts have come up with key criteria. There are many proposed criteria, depending on the views and opinions of experts. In this article, the authors only consider 4 criteria in 4 risk groups:

Criterion 1 (RC1): Data reliability risk

Criterion 2 (RC2): Risk of loss of privacy and information security

Criterion 3 (RC3): Technology-dependent risk

Criterion 4 (RC4): Research Ethics Risks

**Table 4. 1 Comparison Matrix and AHP Weights Key Criteria**

Priority	Risk Type	Preferred vector weighting
1	Data risk	0.56
2	Moral Risks	0.26
3	Technical risks	0.12
4	Competency risk	0.06
n	4	
RE	0.9	
$\lambda_{Max}$	4.18	
CI	0.06	
CR	0.07	<0.1

The analysis results show that CR (Consistency Ratio) = 0.07 < 0.1, proving that the pair comparison matrix is highly consistent. Besides,  $\lambda_{max} = 4.18$  and CI (Consistency Index) = 0.06 are both within acceptable limits, confirming that the analysis results are reliable.

**Table 4.2 AHP Detailed Breakdown for Technical Risk and Data Risk Criteria**

Technical risks	Software bugs	Inaccurate AI models	Dependence on external software	Preferred vector
Software bugs	1.00	0.20	0.33	0.11
Inaccurate AI models	5.00	1.00	3.00	0.63
Dependence on external software	3.00	0.33	1.00	0.26
	9.00	1.53	4.33	1.00
Data risk	Incomplete data	Biased data (Mirsch et al.)	Data security issues	Preferred vector
Incomplete data	1.00	0.33	0.20	0.11
Dữ liệu bị sai lệch (Mirsch et al.)	3.00	1.00	0.33	0.26

Data security issues	5.00	3.00	1.00	0.63
	9.00	4.33	1.53	1.00

Regarding technical risks: Priority of sub-criteria: Inaccurate AI model (0.63): This is the highest rated risk, expressing great concern that the AI model does not provide reliable or accurate results, seriously affecting the research results. Dependency on external software (0.26): The use of external software can pose stability and security risks. Software failure (0.11): Software failure is considered less serious than the other two risks, but should still be noted to avoid disruption to the research process. The main risk in this group is the inaccuracy of the AI model, which shows the need to rigorously test the model and data before applying.

Regarding data risk: Priority of sub-criteria: Data security issues (0.63): This is the biggest concern, reflecting the emphasis on protecting research data from security risks or unauthorized access. Bias data (Mirsch et al.) (0.26): The risk of data bias may reduce the accuracy and objectivity of the research results. Incomplete data (0.11): This is a less serious risk, but can still affect the quality of the research model if not dealt with in a timely manner. Data security risks are most highly valued, which requires fellows to take effective data security and management measures.

**Table 4.3 AHP Detailed Analysis for Ethical Risk and Competency Risk Criteria**

<b>Moral Risks</b>	<b>AI Decision Bias</b>	<b>The issue of transparency</b>	<b>Privacy Violations</b>	<b>Preferred vector</b>
AI Decision Bias	1.00	3.00	5.00	0.63
The issue of transparency	0.33	1.00	3.00	0.26
Privacy Violations	0.20	0.33	1.00	0.11
	1.53	4.33	9.00	1.00
<b>Competency risk</b>	<b>Lack of data analysis skills</b>	<b>Lack of knowledge about AI and machine learning</b>	<b>Difficulty in choosing the right AI tool</b>	<b>Preferred vector</b>
Lack of data analysis skills	1.00	5.00	3.00	0.63

Lack of knowledge about AI and machine learning	0.20	1.00	0.33	0.11
Difficulty in choosing the right AI tool	0.33	3.00	1.00	0.26
	1.53	9.00	4.33	1.00

Moral risk: Priority of sub-criteria: AI decision bias (0.63): This is the most serious risk in the ethical risk group, reflecting concerns about AI systems making unfair or biased decisions. The issue of transparency (0.26): The level of transparency of AI is related to how decisions are made and whether they can be clearly explained. Privacy breach (0.11): Despite the lower priority, this is still an issue that needs to be controlled when handling personal data. The biggest ethical risk is bias in AI decision-making, emphasizing the need to monitor and test algorithms to ensure fairness and transparency.

Regarding competency risk: Priority level of sub-criteria: Lack of data analysis skills (0.63): This is the main risk, showing the importance of equipping PhD students with data analysis skills. Difficulty in choosing the right AI tool (0.26): Choosing the right tool is challenging due to the variety of AI tools on the market. Lack of knowledge about AI and machine learning (0.11): This risk is a lower priority, but understanding AI and basic algorithms is still essential.

## 5. Conclusion

The results of the study show that, in the context of PhD students applying AI technology to the research process, the risk of loss of privacy and information security (RC2) is the biggest concern, with the highest weight (0.35). This reflects the concerns of fellows about the possibility of leakage of personal data and sensitive information during the use of AI tools.

This is followed by the risk of data reliability (RC1) with a weight of 0.25, indicating the risk of inaccurate or biased input data, leading to unreliable study results. This risk is particularly acute in quantitative studies, where the accuracy of the data determines the quality of the research results.

Technology-dependent risk (RC3) and research ethics (RC4) were weighted at 0.15 and 0.10, respectively. This shows that, although these risks are less concerned, they still need to be controlled to ensure objectivity and transparency in the research process, and avoid violations of academic ethical standards.

## 6. Limitations and future research directions

### 6.1. Limitations of the study

Although the study has provided an overview and details of the risks of applying AI to the research process, there are still certain limitations: first, the scope of the study mainly focuses on the group of PhD students in Business Administration; Therefore, it is difficult to generalize the results for other disciplines. Secondly, the use of the AHP method is highly dependent on expert

opinions, which can lead to bias due to subjective factors. Third, the new research only focuses on 4 main risk groups, not to mention other potential risks that may arise in the future as AI develops.

## 6.2. Propose future research directions

To overcome the above limitations, future research should consider the following directions: Expand the scope of research to other disciplines such as Data Science, Information Technology, or Health to compare and understand the differences in risks when applying AI. In addition, further studies need to combine the AHP method with other methods such as DEMATEL or TOPSIS to increase the reliability and accuracy of the results. Finally, the following studies need to further investigate potential risk factors in the context of rapid AI development, such as risks related to intellectual property rights or algorithm bias.

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