Difficulties and Challenges in Implementing Artificial Intelligence in Different Fields

[1]Dr. Parthasaradhy. T, [2]Mrs. K. Dhanavathi, [3]Ms. G. Shanthini,
[1]Professor, Department of Management studies, Sri Venkateshwaraa College of Engineering and Technology, Ariyur, Puducherry, India
[2]Assistant Professor, Department of Management studies, Sri Venkateshwaraa College of Engineering and Technology, Ariyur, Puducherry, India
[3]Assistant Professor, Department of Management studies, Sri Venkateshwaraa College of Engineering and Technology, Ariyur, Puducherry, India
[1]drtps16@gmail.com. [2]dhana391@svcet.ac.in. [3]gshanthini2001@svcet.ac.in.

Abstract: *By facilitating automation, improving decision-making and spurring innovation, artificial intelligence is revolutionizing in different fields. However, there are a number of obstacles and constraints associated with the application of artificial intelligence technology in a variety of fields, including education, engineering and technology, healthcare, business economics, social science and humanities and arts and design. This study examines the various obstacles to integrating artificial intelligence, such as organizational opposition, worker displacement, ethical concerns, legal gaps, data availability and quality challenges, and technology limits. The study finds both domain-specific and general obstacles to successful artificial intelligence adoption through a comparative investigation of various fields. It also talks about how interdisciplinary cooperation, infrastructural development, policy frameworks can help gets over these challenges. The report ends with suggestions for interested parties to support the more ethical and sustainable application of artificial intelligence in a variety of domains.*

Keywords: *Artificial Intelligence, Technology Adoption, Empirical Research, Multidisciplinary Domains, Difficulties and Challenges.*

1. INTRODUCTION

Artificial Intelligence (AI) has become a pivotal force in numerous sectors, revolutionizing traditional processes and driving innovation (Rane et al., 2024c), There is no doubt that the emergence of artificial intelligence and the resulting digital transformation have brought fundamental changes in employment and future skills (Petridou & Lao, 2024), artificial intelligence has emerged as an excellent tool across multiple industries and holds great promise for the government, society, and economy(Alhosani & Alhashmi, 2024), artificial intelligence is everywhere and its development, deployment and use is moving forward rapidly and contributing to the global economy, AI should not be seen as introducing new technology because it is already in use and will certainly be used in the future (Alhosani & Alhashmi, 2024)

In the twenty-first century, artificial intelligence has quickly emerged as a key component of technological development, impacting a variety of industries such as public administration, healthcare, education, finance, manufacturing, and agriculture. AI has enormous potential to boost productivity, accuracy, and creativity across industries thanks to its capacity to analyse enormous volumes of data, spot trends, and make wise decisions.

The effective application of AI technology is still a difficult task, though, in spite of the encouraging prospects. When trying to incorporate AI into their current workflows and systems, many institutions and organizations run across serious obstacles. Numerous reasons, such as poor data quality, a lack of technical infrastructure, high implementation costs, a shortage of qualified people, and worries about ethics, transparency, and data privacy, might contribute to these difficulties.

The nature and degree of these challenges vary in other domains, for instance, the engineering and technological sector may experience problems with system integration and personnel displacement, whereas the healthcare sector struggles

with stringent regulatory norms and ethical considerations. In a similar vein, educational establishments would find it difficult to provide fair access and adapt AI to various learning settings.

The purpose of this study paper is to examine the main obstacles and problems encountered when using AI in different fields. The study aims to give a better understanding of the reasons that prevent effective AI deployment by looking at both common and sector specific barriers. In order to overcome these obstacles and guarantee the appropriate deployment of AI, the study also emphasizes the significance of interdisciplinary cooperation, strong policy frameworks, and long-term strategic planning.

2. Review of Literature

Often companies invest heavily in AI development but encounter problems such as failure to achieve market readiness of the prototype or the systems struggling to deliver expected benefits. The challenges of AI implementation go beyond technical aspects and are in fact very diverse (Kerschbaum & Dachs, 2024). The challenge is not only in applying AI to processes but also in overcoming barriers such as lack of infrastructure and the quality of available data (Espina-Romero et al., 2024). AI faces significant barriers that need to be overcome before its widespread safe and successful use is achieved in healthcare (Ahmed et al., 2023). There are a number of legal issues and human rights challenges related to AI, One of the biggest risks with the proposal to hold developers responsible is a chilling effect on AI development (Rodrigues, 2020). AI tools and analysis techniques were effective in addressing challenges related to risk assessment, cost prediction, and decision-making, Initial AI tools for project management heavily depend on individuals to accurately input data, timely update tools, and make necessary corrections (Hashfi & Raharjo, 2023).

Major obstacles were identified, including a lack of knowledge of cognitive technologies, poor data quality and trouble integrating cognitive initiatives with current systems and procedures, and problems (Sharma et al., 2021). The acceptance of AI in various domains hinges on several critical factors, challenges, and strategic interventions. (Rane et al., 2024c). Dealing with AI technologies and their associated requirements and opportunities has become a necessity not only for IT specialists but for other professions as well, such as technical or commercial professions (Petridou & Lao, 2024). AI has been the subject of heated discussion among policymakers for over a decade (Alhosani & Alhashmi, 2024)

3. Statement of the Problem

Many sectors still confront major challenges in effectively deploying AI technologies, despite the increased interest and investment in different fields. Although AI has enormous potential to improve operations, decision-making, and spur innovation, a number of obstacles frequently prevent its widespread implementation. Technical constraints, poor data quality, inadequate infrastructure, moral and legal dilemmas, employee opposition, and weak regulatory frameworks are a few of them.

Furthermore, there is no one-size-fits-all solution to these problems because their intricacy differs among industries. The quick development of AI in some domains surpasses organizational and policy preparedness, while in others, advancement is hampered by a lack of resources and qualified workers. Because of this, many firms find it difficult to successfully and long-term integrate AI.

In order to offer insights that can direct more thoughtful, strategic, and responsible adoption of AI technologies, this research aims to uncover and analyze the fundamental issues and problems that obstruct AI deployment across a variety of areas.

4. Research Gap

Many studies have examined the potential uses and advantages of AI across different fields, there is still a dearth of information in the literature about the real-world difficulties and challenges that come with putting AI into practice. The majority of current research frequently ignores the practical challenges that businesses have during the adoption process in favour of concentrating on the technical prowess of AI systems or their potential influence on industrial performance.

The studies that are now available are often limited to specific businesses, such as healthcare or business economics, and do not offer a comparative viewpoint across a wide range of fields. This fragmented approach does not capture the broader trends, commonalities, and unique constraints that impact AI adoption in many contexts, insufficient research has been conducted on the interplay of ethical, legal, and technological issues to ascertain the success or failure of AI integration. In order to bridge these gaps and offer useful information to scholars, corporate leaders, and policymakers who want to promote the more responsible and effective use of AI technology, this study aims to give a comprehensive, cross-sectorial overview of the challenges in deploying AI.

5. Objectives of the Study

1. To classify and identify the main difficulties and challenges encountered while implementing AI across different fields, including business economics, healthcare, education, engineering and technology, humanities and social science and engineering and technology.
2. To make strategic suggestions and potential recommendations for the problems found in order to facilitate more efficient AI in various domains.

6. Methodology

Research Design

A quantitative descriptive research design is used in this study to investigate the obstacles and problems encountered while applying AI in a variety of academic and professional domains. The design is to directly collect empirical data from academics, educators, and professionals in six designated fields.

Target Population and Sample

Professionals, educators, researchers, and practitioners who either use or are familiar with AI applications in their respective professions make up the demographic of interest. A total of 150 respondents make up the sample, with 25 participants selected from each of the following six fields: business and economics, education, engineering and technology, medical and health sciences, social sciences and humanities, and arts and design. This tiered strategy guarantees equitable representation in the various fields where artificial intelligence is being used.

Sampling Techniques

Convenience sampling and snowball sampling methods were combined to reach participants: Convenience Sampling: Institutional email lists, professional networks, and educational forums were used to find participants who were readily available and eager to take part. Snowball Sampling: The first respondents were asked to recommend peers or colleagues who are also using AI in their fields. This method made it easier to contact responders in hard-to-reach or specialist areas, especially in specialized fields like design and the arts.

Data Collection Instrument

The main instrument for gathering data was a structured questionnaire. In order to detect and measure the perceived problems, technological obstacles, ethical issues, institutional limitations, talent shortages, and user acceptance issues related to AI adoption, the questionnaire includes both closed-ended and likert-scale items. To make sure the items were clear and pertinent; the instrument was verified by expert review and a pilot test with ten participants from various areas.

Data Collection Procedure

An online survey platform was used to gather data during a 4-week period. Prior to their involvement, respondents provided their informed consent after being briefed on the study's objectives. Participants' confidentiality and anonymity were guaranteed.

Tool for Analysis

The percentage analysis approach was used to assess the gathered data, along with some graphical representation for a clear visual depiction.

7. Analysis

Table 1: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Education

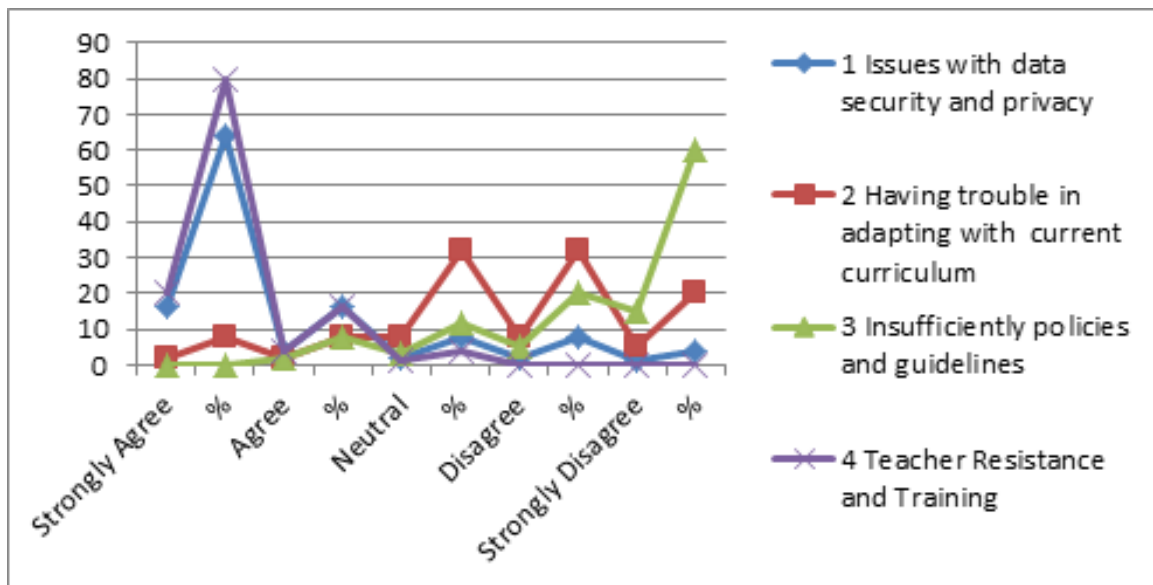| Difficulties and Challenges in Implementing Artificial Intelligence In the Field of Education											
S. No.	Statements	Strongly Agree	%	Agree	%	Neutral	%	Disagree	%	Strongly Disagree	%
1	Issues with data security and privacy	16	64.00	4	16.00	2	8.00	2	8.00	1	4.00
2	Having trouble in adapting with current curriculum	2	8.00	2	8.00	8	32.00	8	32.00	5	20.00
3	Insufficiently policies and guidelines	0	0.00	2	8.00	3	12.00	5	20.00	15	60.00
4	Teacher Resistance and Training	20	80.00	4	16.00	1	4.00	0	0.00	0	0.00

Figure 1: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Education

The data analysis identifies a number of significant obstacles to integrating AI in the classroom. The most prevalent problem, as expressed by 80% of those who "Strongly Agree," is teacher resistance and lack of proper training, underlining the need for professional growth and change management measures. Furthermore, 64% of respondents strongly agreed that there were serious problems with data security and privacy, demonstrating a general concern about safeguarding sensitive data.

However, 60% of respondents strongly disagreed that inadequate policies and guidelines were a significant barrier. This implies that this component is now undervalued or that current policies are seen sufficient. There is variation in how institutions are handling integration problems, as evidenced by the varied answer regarding the difficulty of integrating AI into the current curriculum, with a significant portion remaining neutral or disagreeing.

Table 2: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Engineering and Technology

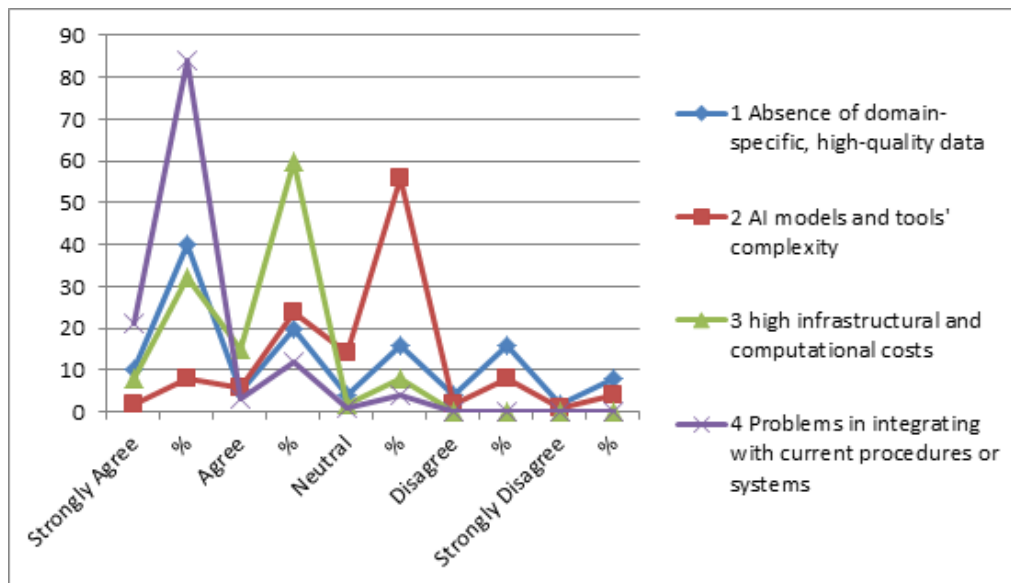|	Difficulties and Challenges in Implementing Artificial Intelligence In the Field of Engineering and Technology									
S. No.	**Statements**	**Strongly Agree**	**%**	**Agree**	**%**	**Neutral**	**%**	**Disagree**	**%**	**Strongly Disagree**	**%**
1	Absence of domain-specific, high-quality data	10	40.00	5	20.00	4	16.00	4	16.00	2	8.00
2	AI models and tools' complexity	2	8.00	6	24.00	14	56.00	2	8.00	1	4.00
3	high infrastructural and computational costs	8	32.00	15	60.00	2	8.00	0	0.00	0	0.00
4	Problems in integrating with current procedures or systems	21	84.00	3	12.00	1	4.00	0	0.00	0	0.00

Figure 2: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Engineering and Technology

The report identifies a number of significant obstacles to integrating artificial intelligence in the engineering and technology sectors. 84% of respondents strongly agreed that the biggest worry is the difficulties integrating AI with existing processes or systems. This suggests that integrating AI-driven solutions with current infrastructure is a common challenge.

The high computational and infrastructure expenses are another significant impediment, as reported by 92% of participants (32% strongly agree and 60% agree). This emphasizes how expensive and complex implementing AI technologies   can   be   for   institutions. Another significant difficulty was the lack of domain-specific, high-quality data, with 60% strongly agreeing or agreeing, while a sizable portion (16%) was neutral. In contrast, the complexity of AI models and tools received a more mixed response—56% were neutral, and only 8% strongly agreed—indicating that while complexity is acknowledged, it may not be the most urgent issue when compared to integration and cost. This suggests that data availability and quality vary depending on context or subfield.

Table 3: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Medical and Health Sciences

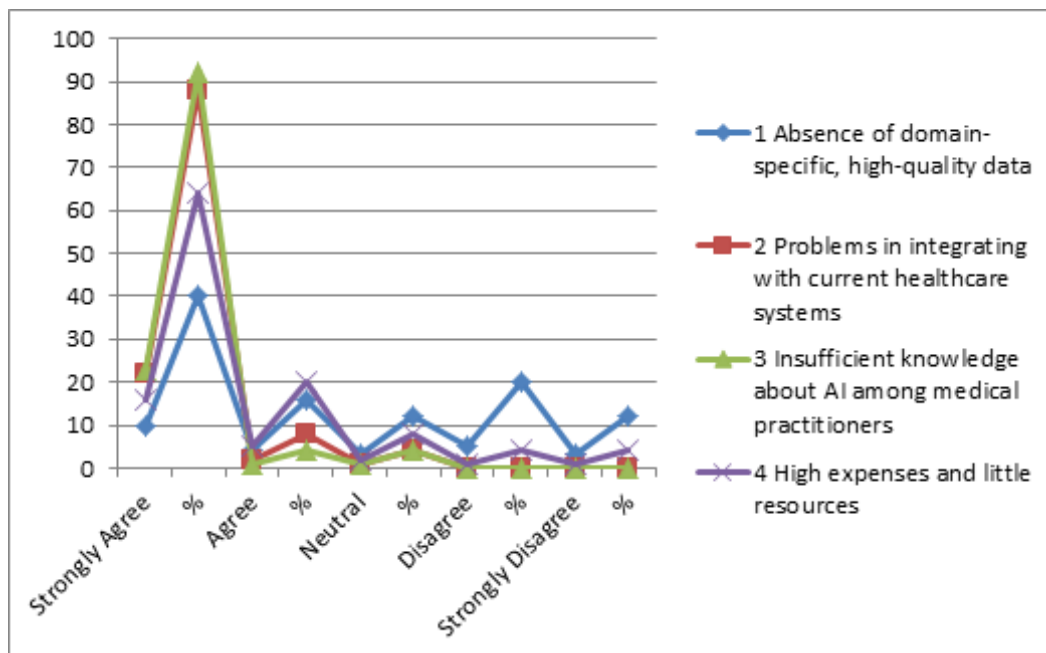|	Difficulties and Challenges in Implementing Artificial Intelligence In the Field of Medical and Health Sciences										
S. No.	Statements	Strongly Agree	%	Agree	%	Neutral	%	Disagree	%	Strongly Disagree	%
1	Absence of domain-specific, high-quality data	10	40.00	4	16.00	3	12.00	5	20.00	3	12.00
2	Problems in integrating with current healthcare systems	22	88.00	2	8.00	1	4.00	0	0.00	0	0.00
3	Insufficient knowledge about AI among medical practitioners	23	92.00	1	4.00	1	4.00	0	0.00	0	0.00
4	High expenses and little resources	16	64.00	5	20.00	2	8.00	1	4.00	1	4.00

Figure 3: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Medical and Health Sciences

A number of important concerns are brought to light by the examination of the difficulties in applying artificial intelligence in the medical and health fields. The lack of domain-specific, high-quality data is also a concern, though opinions are more divided; 56% agree or strongly agree, while notable portions remain neutral or disagree, suggesting variability in data availability or quality across different healthcare contexts. The two biggest challenges are medical practitioners' lack of knowledge about AI and issues integrating AI with current healthcare systems, with 96% total agreement, respectively, indicating strong consensus on these barriers. A significant obstacle is also presented by high costs and few resources; 84% of respondents concur that these factors prevent the widespread use of AI.

Table 4: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Social Sciences and Humanities

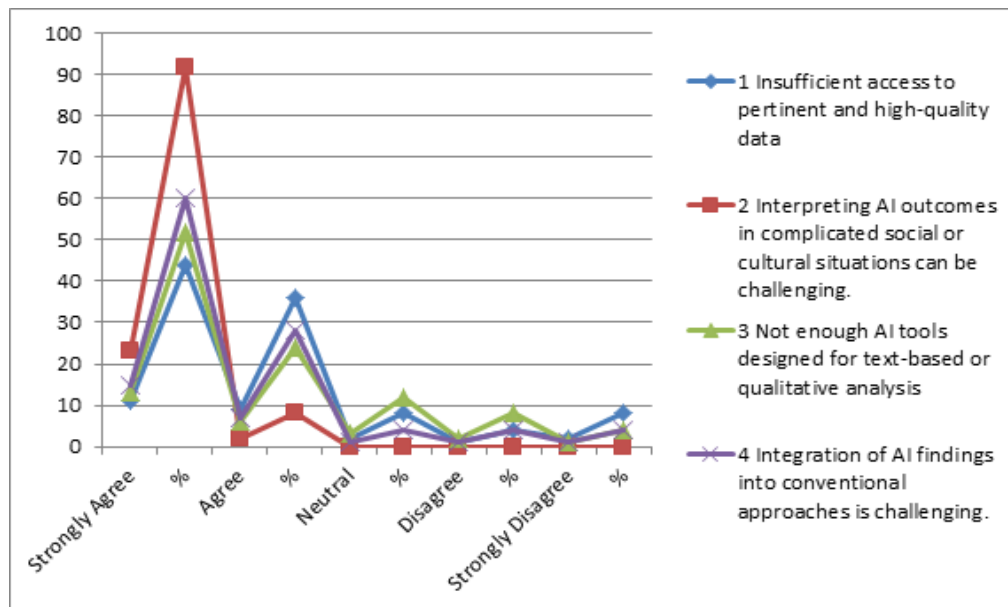| S. No.	Statements	Strongly Agree	%	Agree	%	Neutral	%	Disagree	%	Strongly Disagree	%
	Difficulties and Challenges in Implementing Artificial Intelligence In the Field of Social Sciences and Humanities										
1	Insufficient access to pertinent and high-quality data	11	44.00	9	36.00	2	8.00	1	4.00	2	8.00
2	Interpreting AI outcomes in complicated social or cultural situations can be challenging.	23	92.00	2	8.00	0	0.00	0	0.00	0	0.00
3	Not enough AI tools designed for text-based or qualitative analysis	13	52.00	6	24.00	3	12.00	2	8.00	1	4.00
4	Integration of AI findings into conventional approaches is challenging.	15	60.00	7	28.00	1	4.00	1	4.00	1	4.00

Figure 4: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Social Sciences and Humanities

Several significant barriers are revealed by the examination of the problems and challenges associated with integrating artificial intelligence in the social sciences and humanities. The subtle and complex character of these domains is highlighted by the large majority (100%) who agree or strongly agree that it is difficult to interpret AI results in complex social or cultural contexts. Furthermore, a significant obstacle identified by almost three-quarters of respondents (76%), is the lack of access to relevant and high-quality data, pointing to problems with data availability and relevance.

Additionally, 76% of participants acknowledge the dearth of AI tools made especially for text-based or qualitative analysis, indicating a technological gap that is peculiar to social science research methodologies. Finally, 88% of respondents found it difficult to integrate AI findings into traditional procedures, highlighting the challenges of combining new AI-driven insights with conventional methodologies.

Table 5: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Business and Economics

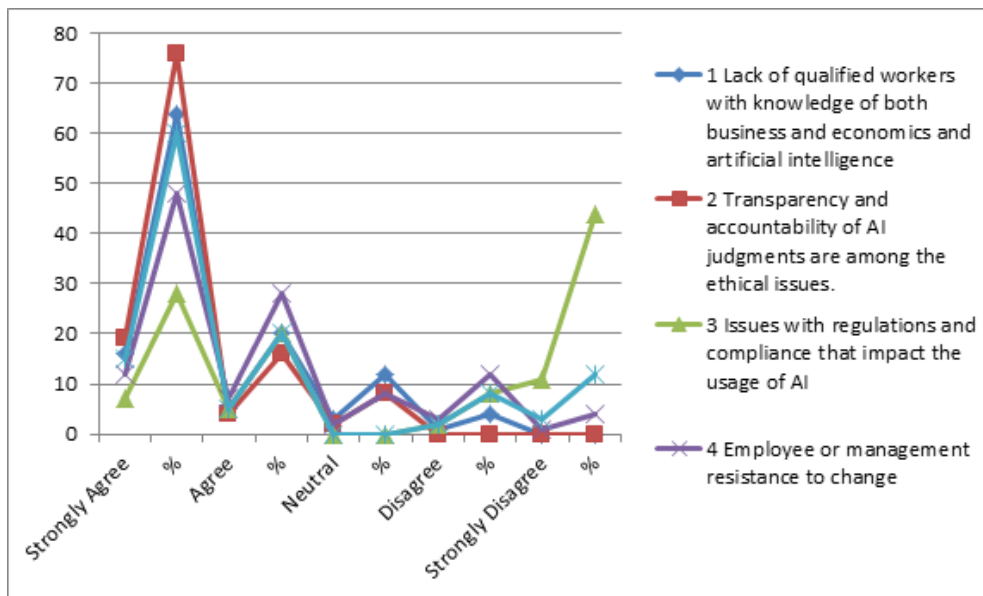| S. No.	Statements	Strongly	%	Agree	%	Neutral	%	Disagree	%	Strongly Disagree	%
	Difficulties and Challenges in Implementing Artificial Intelligence In the Field of Business and Economics										
1	Lack of qualified employees with knowledge of both business and economics and artificial intelligence	16	64.00	5	20.00	3	12.00	1	4.00	0	0.00
2	Transparency and accountability of AI judgments are among the ethical issues.	19	76.00	4	16.00	2	8.00	0	0.00	0	0.00
3	Issues with regulations and compliance that impact the usage of AI	7	28.00	5	20.00	0	0.00	2	8.00	11	44.00
4	Employee or management resistance to change	12	48.00	7	28.00	2	8.00	3	12.00	1	4.00
5	Measuring AI's influence on economic models or commercial outcomes is challenging.	15	60.00	5	20.00	0	0.00	2	8.00	3	12.00

Figure 5: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Business and Economics

Several important topics are brought to light by the examination of the obstacles and difficulties associated with integrating artificial intelligence in the fields of business and economics. The first finding highlights a substantial skills gap that may impede the successful adoption of AI: the majority of respondents (84%) agree or strongly agree that there is a shortage of skilled individuals with understanding of business, economics, and AI. Second, 92% of respondents think that openness and accountability of AI decisions are important ethical issues, highlighting the significance of ethical considerations and trust in the application of AI in this field.

Although 48% of respondents agree or strongly agree that rules and compliance are problems, a sizable 52% disagree or strongly disagree, indicating that different people experience and perceive regulatory impacts differently. 76% of respondents agree or strongly agree that change presents a difficulty, showing organizational and cultural impediments. Employee or management resistance to change is particularly noteworthy. Finally, 80% of respondents acknowledge that it is difficult to measure AI's impact on economic models or commercial outcomes, indicating that it is tough to quantify AI's practical effects.

Table 6: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Arts and Design

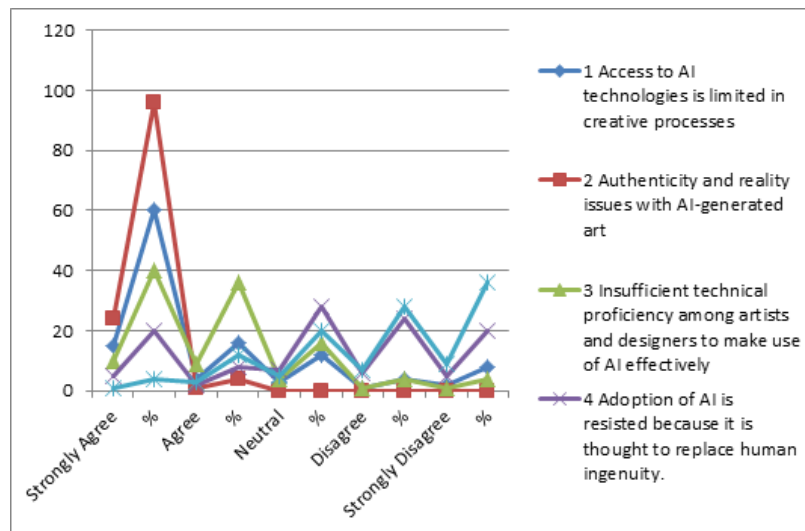| S. No.	Statements	Strongly	%	Agree	%	Neutral	%	Disagree	%	Strongly Disagree	%
	Difficulties and Challenges in Implementing Artificial Intelligence In the Field of Arts and Design										
1	Access to AI technologies is limited in creative processes	15	60.00	4	16.00	3	12.00	1	4.00	2	8.00
2	Authenticity and reality issues with AI-generated art	24	96.00	1	4.00	0	0.00	0	0.00	0	0.00
3	Insufficient technical proficiency among artists and designers to make use of AI effectively	10	40.00	9	36.00	4	16.00	1	4.00	1	4.00
4	Adoption of AI is resisted because it is thought to replace human ingenuity.	5	20.00	2	8.00	7	28.00	6	24.00	5	20.00
5	AI integration challenges in conventional artistic workflows	1	4.00	3	12.00	5	20.00	7	28.00	9	36.00

Figure 6: Difficulties and Challenges in Implementing Artificial Intelligence in the Field of Arts and Design

Several significant insights are revealed by the examination of the obstacles and problems associated with integrating artificial intelligence in the arts and design fields, almost unanimous 96% of respondents strongly agreed that authenticity and reality difficulties with AI-generated art are the most significant challenge. This raises serious questions regarding the legitimacy and reception of AI-generated art in the creative community. Furthermore, 76% of respondents agreed or strongly agreed that access to AI technologies in creative processes is viewed as constrained. This implies that many designers and artists have obstacles while trying to acquire or make efficient use of AI tools.

A thorough examination of the obstacles and problems associated with integrating AI in the arts and design sector yields a number of significant findings. Almost all respondents (96%) strongly agreed that authenticity and reality difficulties with AI-generated art are the biggest challenge. Regarding the legitimacy and reception of AI-generated artworks in the creative world, this raises serious concerns. Furthermore, according to 76% of respondents, access to AI technologies in creative processes is thought to be limited. This implies that a lot of designers and artists have trouble accessing or successfully using AI tools.

8. Findings

The results highlight that human factors, especially teacher readiness, are the most significant obstacles to the successful implementation of AI in education, even though there are technical and policy impediments as well. For implementation to be effective, these issues must be addressed through focused training, awareness campaigns, and strong privacy frameworks. Improving system interoperability and controlling high deployment costs are the main factors that determine whether AI is successfully implemented in engineering and technology; data quality and model complexity are secondary but still significant issues. Targeted funding, standardization initiatives, and technical and institutional strategic planning will be needed to address these problems.

Enhancing practitioner expertise, enhancing system integration, addressing data quality challenges, and securing sufficient financial and infrastructure resources are all essential for the successful application of AI in the medical and health sciences. Addressing data accessibility, enhancing AI interpretability in complicated contexts, creating specialized tools, and allowing integration with current research frameworks are all necessary for the successful application of AI in the social sciences and humanities, authenticity, accessibility, and technical proficiency are major obstacles to AI acceptance in the arts and design sector, whereas resistance and workflow integration reveal a wider range of viewpoints. For AI to be successfully applied in this creative field, several issues must be resolved.

9. Conclusion

The results show that, in addition to technical and legislative concerns, human factors particularly teacher readiness are the main obstacles to the implementation of AI in education. Strong privacy protections and efficient training and awareness initiatives are essential for success in this field. The key to integrating AI in engineering and technology is resolving issues with system compatibility and controlling high costs; data quality and model complexity also require consideration. Enhancing practitioner expertise, improving system integration, improving data quality, and securing adequate infrastructure are all pressing demands in the medical and health sciences.

Better data access, more interpretable AI tools for intricate social situations and easier integration with conventional research methodologies are all necessary for the social sciences and humanities. While resistance and process constraints vary more broadly, authenticity concerns, limited access to AI, and a lack of technical expertise are challenges faced by the arts and design. All things considered, in order for AI to realize its full potential in a variety of sectors, these domain-specific issues must be addressed using customized approaches. Overcoming these obstacles will mostly need stakeholder collaboration, focused investments, and continual education. Implementing AI well and sustainably requires striking a balance between its technological, human, and policy aspects. If AI is planned and implemented appropriately, it can create new jobs, improve ways to manage daily operations, introduce new business models and bring valuable contributions to our society (Petridou & Lao, 2024)

Improved data quality and integration among key stakeholders are the main requisites for AI implementation (Sharma et al., 2021), Users need confidence that AI systems will perform consistently and that the decision-making processes are transparent and explainable (Rane et al., 2024c), Addressing these challenges requires a multi-faceted approach. Promoting ethical AI practices, enhancing algorithmic transparency, and implementing robust data protection measures are crucial steps. Public awareness campaigns and education initiatives can demystify AI and build societal trust (Rane et al., 2024c).

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