



## **Algorithmic Trading and its impact on Finance sector and Markets: A case study of AI-driven strategies**

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### **ABSTRACT:**

The paper presents the growing incorporation of artificial intelligence (AI) into financial analysis transforming the industry, necessitating a modernized finance curriculum to equip upcoming analysts with the requisite skills for an AI-centric landscape. This paper explores the essential components of an updated curriculum and proposes potential courses to address these demands. It emphasizes the critical need for a comprehensive grasp of AI and data analysis, alongside ethical and regulatory considerations

The experimental work strikes a harmonious balance between conventional financial analysis principles and AI integration holds paramount importance. Theoretical and practical knowledge, enriched with case studies, hands-on projects, industry partnerships, research prospects, and collaborative learning, form the cornerstone of these new curricula. By integrating these components into the finance curriculum, future financial analysts can excel in an AI-driven ecosystem, uphold ethical standards, make well-informed decisions, and propel financial innovation forward.

**Keywords** - artificial intelligence, curriculum, ethics, financial analysis, transformation

### **Introduction :**

Financial markets have come across a phenomenal adoption of advanced and complex technologies in the pursuit of efficient markets. Algorithmic Trading (AT) is one of the prominent moves in this direction and is widely adopted across world markets. The existing literature on AT and its impact on markets is still in the beginning stage primarily due to the inability of most of the markets to directly identify AT.

#### ***Influence on the magnitude of trades***

In this study, we directly identify AT and examine its impact on trade sizes which has a key impact on the liquidity and price impact of trades. It is expected that AT can break large orders into smaller sizes to access liquidity and reduce price impact. AI has picked up rapidly in recent years. The usage and dependency on the usage of AI have increased to such high and above levels that people today are actually scared of it taking over their jobs in each and every sector. AI has made an impact on every type of industry now and has the potential to increase its area of impact and go deeper into the roots to make a tough grasp on the business.

#### ***Share in the market***

Algorithmic Trading is a prominent phenomenon in our electronic trading markets across the globe. Developed markets accepted AT in order to take advantage of latency and improve upon the profitability of market participants. However, developing markets struggling with liquidity issues accepted AT in order to tackle the issues pertaining to liquidity supply and make their markets more efficient.. Though every market had its own reasons to adopt AT did AT actually fulfill those expected motives, has not been examined extensively in existing literature. Not many exchanges define and identify AT, however, we have the advantage of the unique setting where the Securities Exchange Board of India (SEBI) has mandated the tagging of all AT orders and trades with unique identifiers in order to create an audit trail. This was purposefully done to ensure that the reasons for flash crashes and other erroneous trades could be easily identified. Algorithmic trading has the capability to quickly gather the information from the market and also incorporate the same in the market thereby facilitating an efficient trade. One aspect of AT that we have always come across is that it places orders at a very high frequency and also modifies its orders rapidly. This leads to one of the major apprehensions pertaining to high-frequency order placement: what happens if the orders are placed just to drive the prices in a specific direction?

### Opinions of the experts

Existing literature and the practitioners have always supported AT in this aspect by suggesting that AT is smart enough to place the orders in small quantities of stocks to reduce the price impact as AT is not only going to place the orders it's also going to trade. So, any price impact will actually affect the cost of trading for the AT. Even though if someone wants to trade a huge chunk of stocks, what AT does is, place smaller orders over a period of time to fulfill the eventual goal of trading the bulk. This reduces the cost of trading for the traders.

### Algorithmic Trading

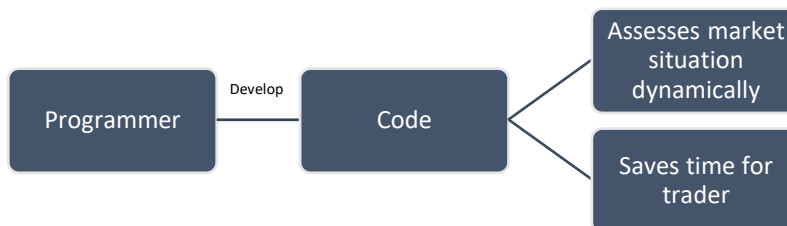


Fig 1 This image on the left defines the usage of Algorithmic trading in the general form.

### Literature review –

The following studies on the usage of AI in the trading market to understand its work A literature review on the topic of "Algorithmic Trading and its impact on Finance sector and Markets : A case study of AI-driven strategies " provides an overview of the existing research and developments in the field of artificial intelligence (AI) and its application within financial markets. This review synthesizes key findings and trends in AI-driven trading strategies, highlighting the various approaches, challenges, and implications for the financial industry.

### Introduction

The integration of artificial intelligence in trading has witnessed significant growth in recent years, revolutionizing the way financial markets operate. This literature review aims to consolidate the current state of knowledge regarding AI's role in trading, with a focus on algorithmic trading, machine learning models, and their impact on market efficiency and risk management.

### Historical Perspective

Historically, the use of AI in trading dates back to the 1980s when rule-based systems were first introduced. Over time, advances in computational power and data availability have paved the way for more sophisticated AI algorithms. In the 21st century, machine learning techniques have gained prominence, enabling traders to develop predictive models that adapt to changing market conditions.

### AI-Driven Trading Strategies

**Algorithmic Trading:** Algorithmic trading, often referred to as algo trading, utilizes AI algorithms to execute trades automatically based on predefined criteria. This approach has been widely adopted by institutional investors and high-frequency traders to optimize execution and minimize market impact.

**Sentiment Analysis:** Natural language processing (NLP) techniques are employed to analyze news articles, social media, and financial reports to gauge market sentiment. Sentiment analysis models can help traders anticipate market moves driven by public sentiment.

### Challenges and Risks

**Data Quality and Bias:** The accuracy of AI models heavily depends on the quality of data. Biases in historical data can lead to biased models and suboptimal trading strategies.

**Overfitting:** Overfitting remains a challenge in developing AI-based trading models. It occurs when a model performs well on historical data but fails to generalize to new market conditions.

**Regulatory Concerns:** The use of AI in trading has raised regulatory concerns, particularly around market manipulation and fairness. Regulators are continuously adapting to the evolving landscape of AI-driven trading.

### Market Efficiency and Implications

AI's increasing influence in trading has raised questions about market efficiency. Some argue that AI-driven trading strategies may contribute to market microstructure changes and increased volatility, while others suggest that they enhance market efficiency by swiftly incorporating new information.

### Study objective –

- To enhance the purview of the knowledge of the consumer on information
- To make sure the usage of AI is being done for the betterment of the human
- To know about in what other ways it can be used in trading area
- To find out the tactics and tools used by the professionals
- To know about the marketing methods used to make the users aware

### Research Methodology

Collecting data for a study on "Algorithmic Trading and its impact on Finance sector and Markets: A case study of AI-driven strategies" typically involves a combination of primary and secondary data sources. Here's a methodology outline that we followed :

### Sample size –

We with the help of the questionnaire (for 100 people) completed the requirement for the feedback and the opinions for collecting data for utilizing the information on recruitment and selection of the best possible sources and the online apps to be utilized for further research and usage.

### Tools for Data collection –

#### Primary Data Sources:

a) Survey – A set of questionnaires was set up for the people to make them aware of the growing usage of AI in the trader market. As with the increasing number of consumers for the data, the users of AI too were necessary to be understood for further movement of the project

Questions like the following were also asked –

Q. Can you briefly introduce yourself and your experience as a trader?

Q. What motivated you to start using AI in trading, if applicable?

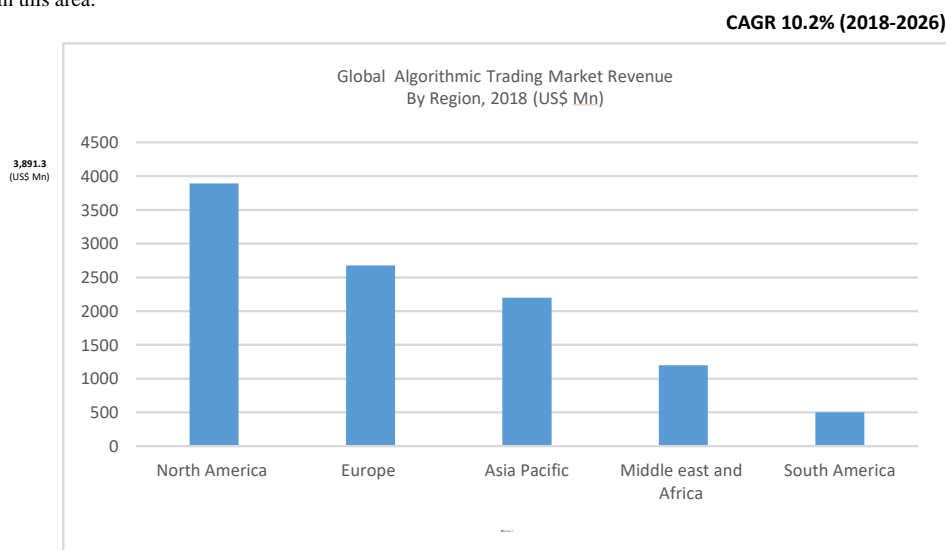
Q. How do these AI tools assist you in your trading decisions?

Q. Could you describe the AI-driven trading strategies or models you employ?

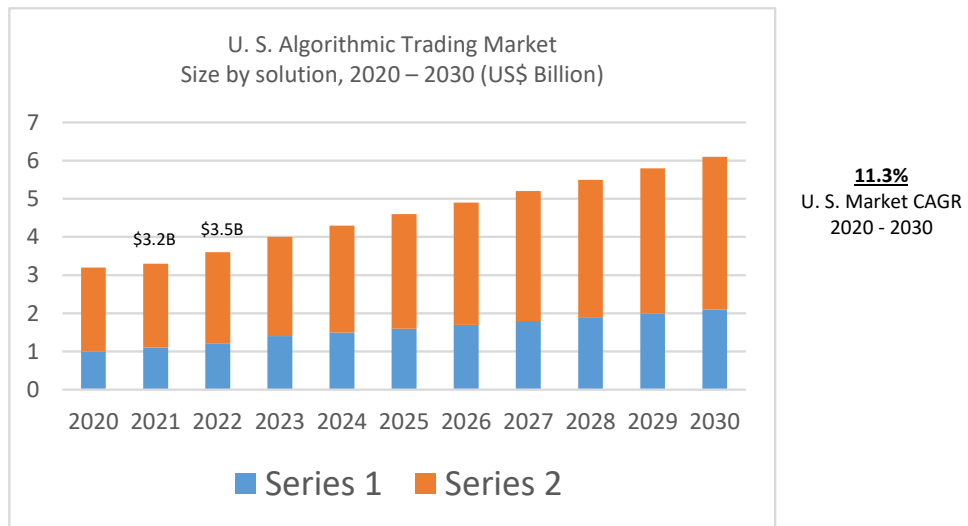
Q. How have these strategies evolved?

b) Interviews – The selected subjects in the research were asked appropriate questions for the queries about the topic and worked on its analysis.

c) Experiments – With the collected data we made multiple charts and made them into work as well to enhance even our purview about the topic as per our knowledge in this area.



**Fig 2** The image shows the revenue generated by the usage of the algorithm on a global.



**Fig 3** The image on the left shows the usage of the trading market in the US to showcase the increase in the usage of such methods.

**Secondary Data Collection:**

The gathered data was from existing information and data from secondary sources, which may include:

- Academic journals and articles: Relevant studies and literature on AI in trading to understand the current state of research.
- Financial news and reports: Analysed reports and news articles on AI adoption and trends in the financial industry.
- Regulatory filings: Reviewed regulatory documents and filings related to AI usage in trading.
- Market data providers: Utilized data from financial data providers like Bloomberg, Reuters, or market exchanges for historical trading data and market conditions.
- Data Cleaning and Pre-processing

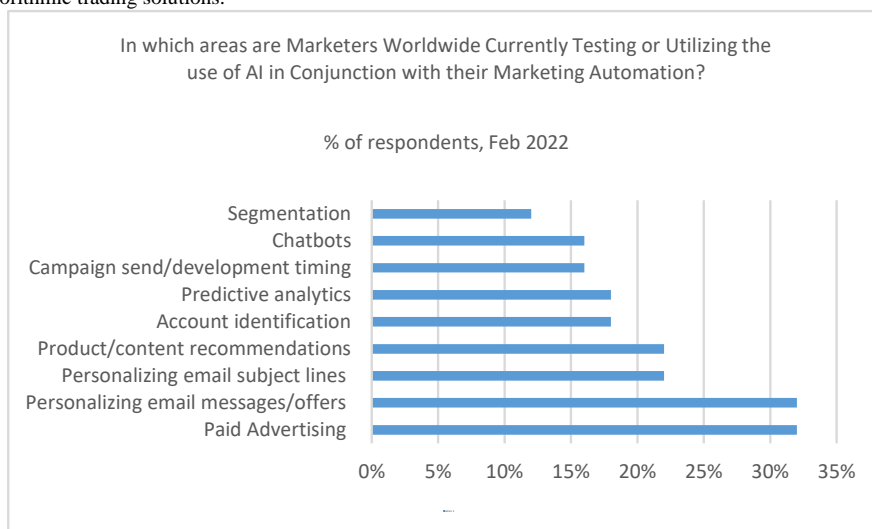
Prepared the collected data for analysis by cleaning and pre-processing it. This may involve removing outliers, handling missing values, and ensuring data consistency.

**Data Analysis:**

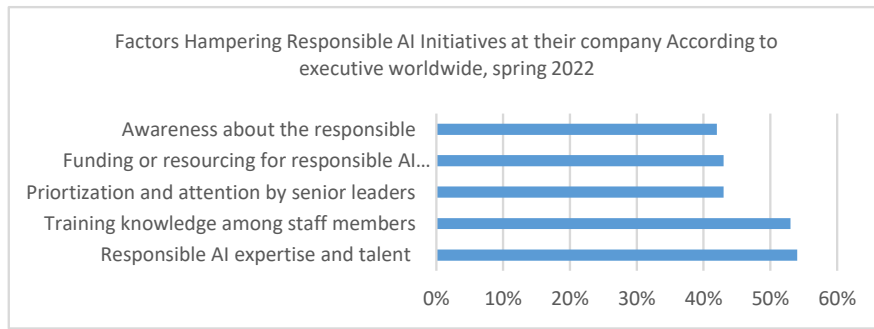
The algorithmic trading market is poised for substantial growth, with projections indicating a surge from USD 15.77 billion in 2023 to a remarkable USD 23.74 billion by 2028. This upward trajectory is underpinned by a strong Compound Annual Growth Rate (CAGR) of 8.53 percent over the forecast period spanning from 2023 to 2028.

Findings from TRADE's Algorithmic Trading Survey in January 2022 offer intriguing insights into the adoption of algorithmic trading strategies by hedge funds. The survey sheds light on the increasing reliance on algorithms for managing trading portfolios, with a specific emphasis on the utilization of multi-asset solutions. A diverse range of algorithm types is being deployed, including single stock algorithms, VWAP algorithms, and those designed for seeking dark liquidity.

Moreover, the survey's results point to a noteworthy surge in automation and electronification, largely driven by heightened market volatility and the growing demand for algorithmic trading solutions.

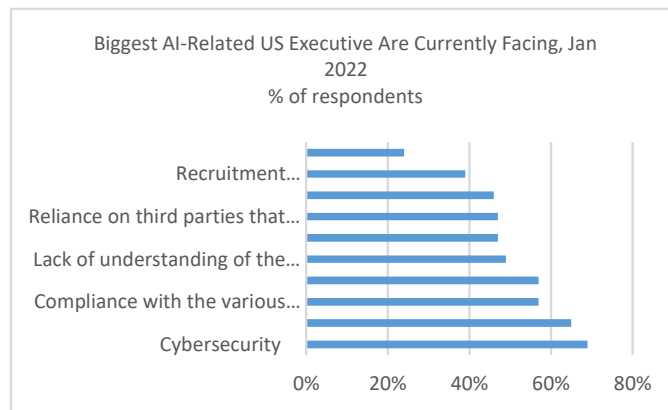


**Fig 5** This image shows the areas that are marketing worldwide and currently testing AI for market automation.



Note: respondents indicated factors that prevent the starting, sustaining, or scalling of initiatives to a moderate or great extent.

**Fig 6 This image shows the factors responsible for AI initiatives in companies worldwide according to the spring of 2022.**



Note – n = 500 C-level executive who are involved in decision-making for their organization’s adoption, use, and management of AI – enabled tools.

**Fig 7 This image shows the AI-related risks currently faced by the people in the UK.**

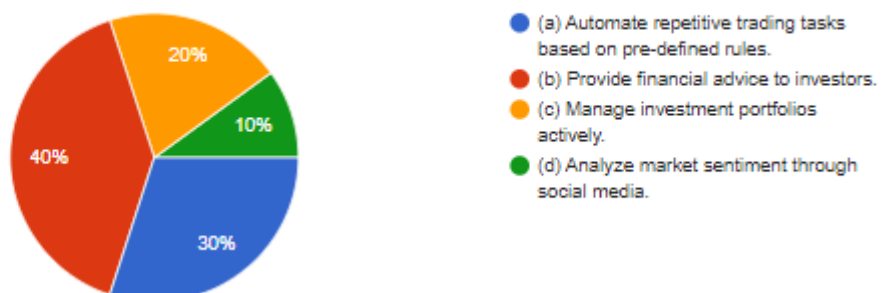
**Findings –**

- The cyber security has turned out to be the biggest risk with the 69% of occupancy.
- Data privacy has tuned to 65% being the second largest part of data risk.
- 57% is occupied by compliance with the various state and local regulations in the risk category.
- Legal liability has 57 % of the risk in this area.
- The users in the market utilize AI in their work occupying 32% of the area.
- Also the 32% area is occupied by the personalizing email messages sent by the companies.
- Account identification has an 18% share in the usage of AI in this segment.
- with time the utility has also turned the score of usage up to 18%.
- Segmentation of the market has a share of 12%.
- On the global level the largest continent in the AI segment is North America.
- The CAGR rate of AI users has been stuck at 10.2% from (2018-2026)
- The Revenue generated but the usage of AI has finally increased up to 3891.3 Mn

**Data analysis :**

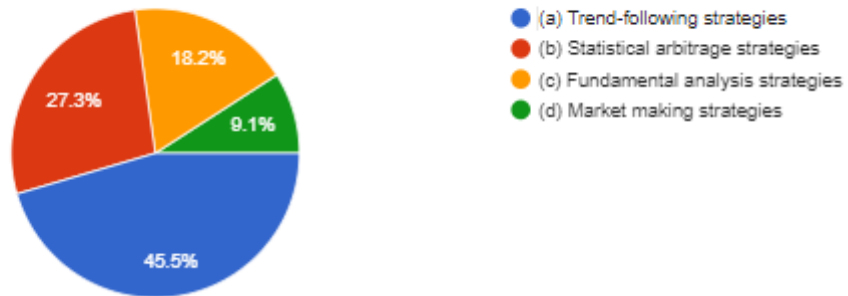
*Q. What is the primary function of algorithmic trading?*

10 responses



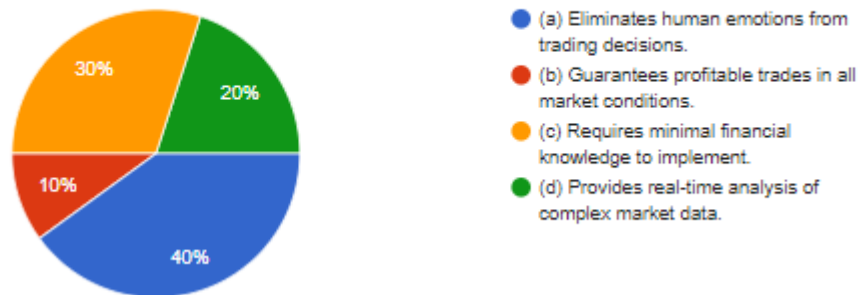
*Q. Algorithmic trading strategies can be broadly categorized into two main types. Which of the following is NOT typically considered one of them?*

11 responses



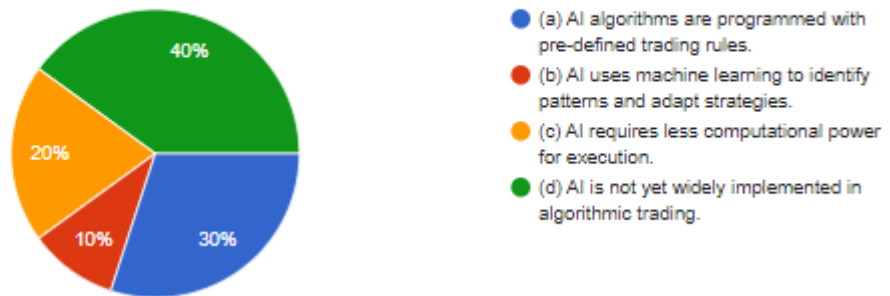
*Q. What is a key advantage of using algorithmic trading?*

10 responses



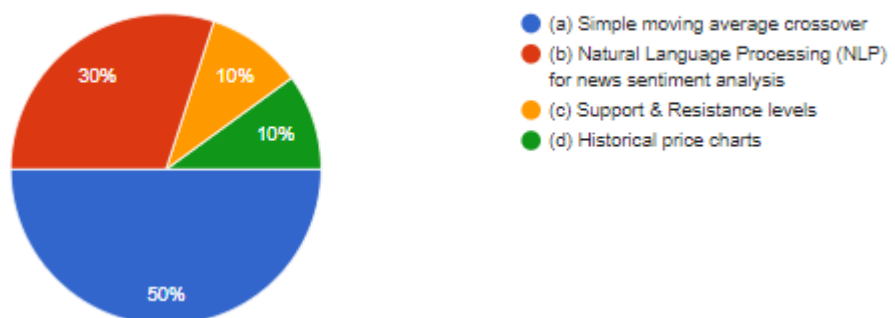
*Q. How does AI differ from traditional algorithmic trading approaches?*

10 responses



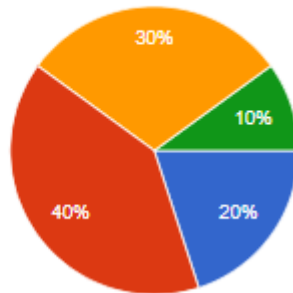
*Q. Which of the following is an example of an AI technique used in algorithmic trading?*

10 responses



**Q. What is a potential concern regarding the use of AI in algorithmic trading?**

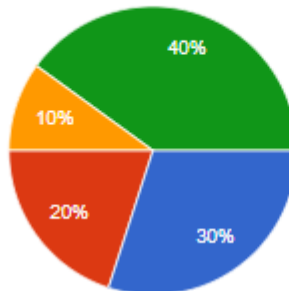
10 responses



- (a) AI can eliminate the need for human traders altogether.
- (b) AI algorithms may be susceptible to bias based on training data.
- (c) AI cannot handle unexpected market events effectively.
- (d) AI trading requires significant upfront investment.

**Q. How might AI-driven algorithmic trading impact market efficiency?**

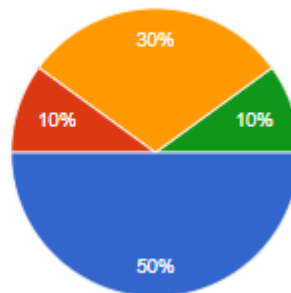
10 responses



- (a) Increase market volatility due to high-frequency trading.
- (b) Lead to more accurate price discovery through faster analysis.
- (c) Reduce the role of traditional financial institutions.
- (d) All of the above

**Q. What is a potential regulatory challenge associated with AI-driven algorithmic trading?**

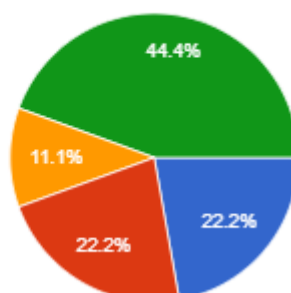
10 responses



- (a) Difficulty in monitoring and auditing complex trading algorithms.
- (b) Lack of transparency in how AI models make trading decisions.
- (c) Increased risk of systemic failures due to interconnected algorithms.
- (d) All of the above

**Q. In your opinion, what is the overall impact of AI on the future of algorithmic trading?**

9 responses



- (a) AI will completely replace human traders in the financial markets.
- (b) AI will enhance algorithmic trading by offering more sophisticated strategies.
- (c) AI will lead to increased market instability and potential crashes.
- (d) The impact of AI on algorithmic trading remains uncertain.

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**Conclusion :**

The literature on AI usage in trading demonstrates the rapid evolution of technology in financial markets. AI-driven trading strategies, including algorithmic trading and machine learning models, have the potential to improve trading efficiency and risk management. However, they also present challenges related to data quality, overfitting, and regulatory compliance. As AI continues to shape the financial industry, further research is needed to better understand its long-term implications and to develop robust methodologies for harnessing its full potential.

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**REFERENCES :**

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A reference list **MUST** be included using the following information as a guide. Only cited text references are included. Each reference is referred to in the text by a number enclosed in a square bracket (i.e., [3]). References **must be numbered and ordered according to where they are first mentioned in the paper**, NOT alphabetically.

**Examples follow:****Journal Papers:**

- [1] Krause, Adapting the finance curriculum for an AI-driven future (2023), Marquette University, Available at SSRN 4448143, 2023.
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