"Analysing The Impact Of AI Integration On Equity Share Trading: A Pre And Post Comparison Of Market Efficiency And Investor Behaviour"

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Abstract This study investigates the impact of Artificial Intelligence (AI) on equity share trading, with a specific focus on comparing market efficiency and investor behaviour before and after AI integration. Employing a mixed-methods approach, data were collected through structured surveys from 100 respondents and secondary sources such as financial databases. The findings indicate that AI has significantly enhanced trading efficiency by reducing transaction costs, improving decision-making speed, and increasing returns. However, challenges such as limited accessibility, tool complexity, and ethical concerns persist. This study also elucidates behavioural changes among investors, including increased reliance on AI-driven platforms. Key recommendations include simplifying AI tools, enhancing transparency, and implementing educational initiatives to support diverse investor groups. These insights contribute to the understanding of AI's transformative role in equity trading and provide actionable solutions to optimize its adoption.

1.Introduction

Artificial intelligence (AI) is transforming the financial industry, primarily through advancements in trading and investment methodologies. AI facilitates data analysis, trend predictions, and decision-making capabilities through machine learning and neural networks. These technologies efficiently process vast quantities of data, enabling traders to rapidly identify trends and make informed decisions. AI-based algorithms enhance the execution of trades and portfolio management by improving the accuracy of asset allocation and risk assessment. However, artificial intelligence presents several challenges, including potential impacts on market volatility, ethical considerations, and regulatory complexities. This paper examines the role of AI in financial trading, its advantages, and associated risks.

2.Statement of the problem

The integration of Artificial Intelligence (AI) in equity share trading has transformed market efficiency and investor behavior, while simultaneously presenting significant challenges. A primary concern is the assessment of AI's impact on market dynamics and the accuracy of trading decisions. There exists a necessity to comprehend the behavioral modifications in investors who utilize AI-driven platforms. Furthermore, evaluating the influence of AI on trading confidence and satisfaction is of paramount importance. Addressing the complexities of AI tools and their accessibility to diverse investor groups remains a critical issue. This investigation aims to compare market efficiency before and after AI integration, analyze investor behavior changes, and propose solutions to enhance trading experiences with AI.

3.Objectives of the study

1. To compare the market efficiency of equity shares before and after AI integration.
2. To analyse behavioural changes and preferences of equity investors with AI adoption.
3. To propose solutions to enhance equity trading experiences using AI tools.

4.Review of literature

1. **Goudarzi, S., & McMillan, D. (2022):** Investigates the future of AI in finance, predicting that AI will evolve to complement human decision-making, creating hybrid models that combine the speed and accuracy of AI with human intuition and expertise in portfolio management.
2. **Zhang, Y., & Xie, L. (2021):** This study highlights the role of machine learning algorithms in financial trading, demonstrating how AI can improve market predictions and optimize trading strategies by analysing large datasets in real-time.
3. **Finzi, M., & Maggi, S. (2021):** Examines the importance of human oversight in AI-driven financial decision-making, suggesting that while AI can enhance decision-making processes, human judgment is still essential, particularly in volatile market conditions.
4. **Fama, E.F., & French, K.R. (2020):** Explores the impact of algorithmic trading on financial markets, addressing both its benefits in enhancing trade execution speed and the ethical concerns regarding market manipulation and transparency in AI-driven decisions.
5. **Kearns, M., & Nevins, M. (2020):** Explores the effects of AI on market volatility, analysing how AI-driven trading algorithms can either stabilize markets by predicting trends or exacerbate volatility during periods of market crisis.
6. **Zohar, O., & Orbach, D. (2020):** Focuses on the regulatory challenges posed by AI in financial markets, arguing that existing financial regulations are inadequate for addressing the complexities of AI technologies and calling for the development of new governance frameworks.
7. **Chui, M., Manyika, J., & Miremadi, M. (2020):** Analyses how AI tools can optimize portfolio management by adjusting asset allocations in real-time, while also highlighting concerns about the over-reliance on automated systems and the loss of human intuition.
8. **Pástor, L., & Stambaugh, R.F. (2019):** Investigates the use of AI in risk management, focusing on its ability to predict financial risks and improve asset allocation, providing a more effective means of mitigating potential losses compared to traditional methods.
9. **Heaton, J.B., Polson, N.G., & Witte, J.A. (2019):** Provides a comprehensive review of AI in risk assessment, demonstrating how AI can improve financial risk models by integrating diverse data sources to predict potential market disruptions more accurately.
10. **Binns, A. (2018);** Discusses the ethical challenges of AI in financial markets, particularly the risks of algorithmic biases and the lack of accountability in AI-driven decision-making processes, advocating for regulatory frameworks to address these issues.

5.Research Methodology

1. **Research Design:** Mixed-methods approach combining quantitative and qualitative analyses to study pre- and post-AI impacts on equity trading.
2. **Data Collection:**
   - **Primary Data:** Structured surveys with 100 respondents capturing demographics, trading practices, and AI tool usage.
3. **Sampling Method:** Random sampling with a sample size of 100.
4. **Tools for Analysis:**
   - **Frequency and Percentage Analysis:** To identify trends in trading practices and confidence.
   - **Chi-Square Test:** To analyse relationships between demographics (e.g., age, experience) and AI challenges.

6.Analysis and Interpretation

6.1.Demographic Profile

Demographic	Particulars	No Of Response	Percentage
Age	18–25	55	55
	26–35	21	21
	36–50	20	20
	Above 50	4	4
	Total	**100**	**100**
Gender	Male	48	48
	Female	52	52
	Total	**100**	**100**
Educational Qualification	High school	5	5
	Bachelor's degree	58	58
	Master's degree	31	31
	Doctorate	6	6
	Total	**100**	**100**
Annual Income	Less than 2,50,000	38	38
	2,50,000-5,00,000	25	25
	5,00,001-10,00,000	27	27
	10,00,001-15,00,000	6	6
	More than 15,00,000	4	4
	Total	**100**	**100**

Source: Primary Data

Interpretation:

1. The table shows that 55% of respondents are aged 18–25, 21% are aged 26–35, 20% are aged 36–50, and 4% are above 50.
2. Out of the total respondents,52% are female and 48% are male.
3. The table indicates that , 58% hold a bachelor's degree, 31% have a master's degree, 6% have a doctorate and 5% have a high school education
4. Regarding income, 38% have an income of less than ₹2,50,000 annually, 25% have an income that falls between ₹2,50,000 and ₹5,00,000, 27% have an income that falls between ₹5,00,001 and ₹10,00,000, 6% have an income that falls between ₹10,00,001 and ₹15,00,000, and 4% have an income of more than ₹15,00,000.

6.2.Market Efficiency In Equity Trading Before AI Integration

Before AI	Particulars	No Of Response	Percentage
Tools For Stock Analysis	Manual analysis	36	36
	Basic trading platforms	47	47
	Advisory services	17	17
	Total	**100**	**100**
Equity Trading Frequency	Daily	6	6
	Weekly	49	49
	Monthly	30	30
	Rarely	15	15
	Total	**100**	**100**
Trading Confidence	Very confident	14	14
	Moderately confident	58	58
	Slightly confident	21	21
	Not confident	7	7
	Total	**100**	**100**
Annual Returns	Less than 5%	27	27
	5%–10%	42	42
	10%–15%	24	24
	Above 15%	7	7
	Total	**100**	**100**
Trading Challenges	Lack of real-time data	31	31
	Time-consuming analysis	56	56
	High transaction costs	13	13
	Total	**100**	**100**

Source: Primary Data

Interpretation:

1. The table shows that 47% used basic trading platforms, 36% relied on manual analysis and 17% used advisory services.
2. Trading frequency was weekly for 49%, monthly for 30%, daily for 6%, and rarely for 15%.
3. Most respondents (58%) were moderately confident in trading, 14% were very confident, 21% slightly confident, and 7% not confident.
4. Annual returns for 5%–10% are 42%, below 5% is 27%, 10%–15% is 24%, and for above 15% is 7%.
5. Key challenges were time-consuming analysis (56%), lack of real-time data (31%), and high transaction costs (13%).

6.3.Market Efficiency In Equity Trading After AI Integration

After AI	Particulars	No Of Response	Percentage
AI Tools	Robo-advisors	23	23
	Algorithmic trading	47	47
	Predictive analytics	30	30
	Total	**100**	**100**
AI Usage Frequency	Always	22	22
	Frequently	43	43
	Occasionally	28	28
	Rarely	7	7
	Total	**100**	**100**
AI Confidence	Very confident	20	20
	Moderately confident	45	45
	Slightly confident	32	32
	Not confident	3	3
	Total	**100**	**100**

Trading Improvements	Increased accuracy	37	37
	Faster decision-making	49	49
	Reduced costs	14	14
	Total	**100**	**100**
Annual Returns (After AI)	Less than 5%	28	28
	5%–10%	41	41
	10%–15%	24	24
	Above 15%	7	7
	Total	**100**	**100**

Source: Primary Data

Interpretation:

1. The table shows that 47% used algorithmic trading, 30% relied on predictive analytics, and 23% used Robo-advisors.
2. AI tools were used frequently by 43%, always by 22%, occasionally by 28%, and rarely by 7%.
3. Confidence levels improved, with 45% moderately confident, 20% very confident, 32% slightly confident, and 3% not confident.
4. Improvements included faster decision-making (49%), increased accuracy (37%), and reduced costs (14%).
5. Annual returns after AI adoption were 5%–10% for 41%, below 5% for 28%, 10%–15% for 24%, and above 15% for 7%.

6.4.Equity Investors Behaviour

Investor Profile	Particulars	No Of Response	Percentage
Type Of Investor	Retail investor	61	61
	Institutional investor	39	39
	Total	**100**	**100**
Investment Experience	Less than 1 year	46	46
	1–5 years	34	34
	6–10 years	16	16
	More than 10 years	4	4
	Total	**100**	**100**
AI Accessibility	Yes, fully accessible	36	36
	Partially accessible	48	48
	Not accessible	16	16
	Total	**100**	**100**
Ethical Consideration	Regulatory oversight	34	34
	Algorithm audits	45	45
	Investor education	21	21
	Total	**100**	**100**
Performance Evaluation	Annual returns	29	29
	Risk-adjusted returns	56	56
	Sharpe ratio	15	15
	Total	**100**	**100**

Source: Primary Data

Interpretation:

1. The table shows that 61% of respondents are retail investors, while 39% are institutional investors.
2. Regarding experience, less than 1 year have 46%,1–5 years have 34%,6–10 years have 16%, and more than 10 years have 4%.
3. AI tools are partially accessible for 48%, fully accessible for 36%, and not accessible for 16%.
4. Ethical considerations include algorithm audits (45%), regulatory oversight (34%), and investor education (21%).
5. Performance evaluation is based on risk-adjusted returns (56%), annual returns (29%), and Sharpe ratio (15%).

2.Chi-square Analysis:

This below chi-square test examines the relationship between age groups and challenges faced in AI trading.

6.5.Age * Challenges faced by AI trading Crosstabulation

Count

		challenges faced by AI trading			
		complexity of tools	lack of transparency	high cost	Total
Age	18-25	21	32	2	55
	26-35	4	11	6	21
	36-50	9	5	6	20
	Above 50	2	1	1	4
Total		36	49	15	100

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.813[a]	6	.010
Likelihood Ratio	18.497	6	.005
Linear-by-Linear Association	1.761	1	.184
N of Valid Cases	100		

Source: Primary Data

a. 5 cells (41.7%) have expected count less than 5. The minimum expected count is .60.

Interpretation:
- The Pearson Chi-Square value is 16.813, with a degree of freedom (df) of 6 and a significance level (p-value) of 0.010.
- Since $p < 0.05$, the results indicate a statistically significant relationship between age and challenges faced in AI trading.
- There is a significant association between age groups and the type of challenges faced in AI trading, with younger investors (18–25) reporting the highest concerns about transparency and tool complexity

This below chi-square test assesses the relationship between years of experience in AI trading and satisfaction levels with AI tools

6.6.No.of years * AI tool satisfaction Crosstabulation

Count

		AI tool satisfaction					Total
		1	2	3	4	5	
no.of years	less than 1 year	1	0	15	16	14	46
	1-5 years	0	5	14	13	2	34
	6-10 years	0	0	9	7	0	16
	more than 10	0	0	0	2	2	4
Total		1	5	38	38	18	100

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.542[a]	12	.009
Likelihood Ratio	31.778	12	.001
Linear-by-Linear Association	1.246	1	.264
N of Valid Cases	100		

Source: Primary Data

a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .04.

Interpretation:

- The Pearson Chi-Square value is 26.542, with a degree of freedom (df) of 12 and a significance level (p-value) of 0.009.
- Since $p < 0.05$, there is a statistically significant relationship between experience in AI trading and satisfaction levels.
- The results indicate a significant association between experience and satisfaction with AI tools. Respondents with less experience (less than 1 year) generally reported higher satisfaction levels, while those with more experience showed a more varied distribution.

Findings:

- The majority of respondents aged 18–25 reported "lack of transparency" as the primary challenge, followed by "complexity of tools".
- Respondents aged 26–35 also highlighted "lack of transparency", but "high cost" was more prominent in this group compared to others.
- Older age groups (36–50) had minimal counts across all challenges, suggesting less engagement with AI tools or fewer challenges reported.
- 41.7% of cells have an expected count less than 5, which may affect the reliability of the chi-square test.
- Respondents with less than 1 year of experience showed a high level of satisfaction, with most rating 3 and 4.
- Those with 1–5 years of experience were distributed across satisfaction levels, with notable counts for ratings 3 and 4.
- Respondents with 6–10 years of experience primarily rated 3 and 4.
- Participants with more than 10 years of experience were fewer, with only 2 counts each for ratings 4 and 5.
- 60% of cells have an expected count less than 5, which may reduce the reliability of the chi-square test.

Suggestion:

1. Enhance the accessibility of artificial intelligence platforms for retail investors through the implementation of intuitive interfaces and comprehensive, step-by-step tutorials.

2. Implement algorithm audits and provide detailed elucidations of artificial intelligence decision-making processes to augment transparency and foster trust.

3. Develop artificial intelligence tools incorporating advanced risk assessment functionalities to assist investors in evaluating potential losses and effectively managing trading risks.

4. Establish collaborative initiatives among financial institutions to disseminate best practices for the adoption and ethical utilization of artificial intelligence in trading.

5. Conduct regular educational symposia and webinars for investors to cultivate confidence and comprehension of artificial intelligence-driven trading systems.

Conclusion:

The integration of AI into equity share trading has transformed traditional trading methods, making markets more efficient and accessible. The study demonstrates that AI has improved trading speed, accuracy, and decision-making for investors, particularly in post-AI adoption scenarios. However, challenges such as algorithm transparency, usability for retail investors, and ethical concerns remain barriers to widespread adoption. Behavioural shifts indicate that investors are increasingly relying on AI tools, but they also express the need for better education and risk management features. By addressing these issues through enhanced transparency, regulatory oversight, and investor training, AI can be leveraged to its full potential in equity trading. The study highlights that AI integration in equity share trading has had a positive impact by enhancing market efficiency, improving trading speed and decision-making accuracy.

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