Behavior and Artificial Intelligence: Ethical Impact Investment Decision on Capital Market

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Abstract: This research aims to analyze the literature review and bibliography on the influence of behavioral finance and artificial intelligence on investment decisions, and the ethical impact of artificial intelligence on investors and capital markets. Behavioral finance is a widely discussed topic in addition to modern finance with a mathematical approach, the use of artificial intelligence is advancement for the world of stock investment. Investment decisions are not only influenced by behavior but also artificial intelligence. The research method uses bibliographic analysis using Publish or Perish, Vosviewer, and Elicit software. The results show that investment decisions are influenced by several things including the existence of investment advisors and information from companies which are external factor stimulation, while internal factor stimulation, namely investor sentiment, past behavior, cognitive bias, psychological factors, and personal factors affect stock investment decision making in the capital market. In this paper, we look at artificial intelligence from the perspective of firstly the corporate or institutional user dimension, secondly the individual user dimension and thirdly the regulator dimension. We will look at the ethical impact of using AI in two dimensions, firstly the corporate or institutional user dimension and secondly the individual user dimension.

Keyword: Capital Market, Psychology Factor, Dimensions of AI usage, Ethical effect.

1 Introduction

Investment is a form of holding some wealth to be transferred into productive assets which are expected to increase income in the future. Investment in the capital market is closely related to technical and fundamental analysis. However, sometimes investors do not use analysis but according to their behaviour such as sentiment, mood, past experience, and excessive confidence [1]. This kind of investor behaviour is considered irrational investor behaviour. To get investment returns requires investors to remain rational in the decision-making process. Rational investors focus on facts rather than emotions or perceptions. When investors are too emotional, they may make investment mistakes that can result in long-term losses or excess volatility. Investment decisions can also be influenced by past experiences [2]. Exposure to trauma and other adverse events can make investors or their advisors risk-averse, or overly risky. The advent of artificial intelligence can be a middle ground for investors to be able to analyse their best investment decisions.

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Artificial intelligence-based technology has arrived and changed investment behaviour in the capital market. In particular, artificial intelligence (AI) has the ability to process data, which can help organisations make better predictions and explore potential patterns [3]. The ethics of AI is a topic of conversation in disciplines related to this technology including social sciences, humanities, media, and policy. Concerns range from discrimination due to biased data sets to domination of humans by living machines [4]. Current concerns include concerns about impacts related to social justice, individual privacy, cultural identity, and environmental and mental issues. Major concerns that have a major impact include responsibility, inclusion, social cohesion, autonomy, security, bias, accountability, and environmental impact [3].

Since the world economic crisis in 2008 financial practices have become more ethical. Development is being pushed towards sustainable development such as taking into account environmental and human issues. Artificial intelligence (AI) technology, which promises increased productivity, efficiency and creativity, has transformed a number of corporate industries with its rapid growth and widespread adoption. However, in addition to its benefits, the application of AI into business operations also raises significant ethical issues that should not be ignored. This is why it is important to analyse the ethical impact of the use of AI both in corporations and in the capital market.

There are many articles that address the issue of ethical impact of the use of artificial intelligence, but there are very few that address the use of AI and its ethical impact in the capital market. This paper tries to explain some other things, namely the investment determination factors in the capital market from the financial behavioural aspect of the external and internal factor stimulation approach. The use of AI and its ethical impact will be explained from the point of view of users, namely companies or institutions, individuals and regulators. This paper also presents future research on the topic of behavioural finance, AI and its ethical impact. In addition, bibliometric analysis explains different maps based on the number of citations, best authors, productive journals, analysis of the occurrence of a topic, overlay view of frequently researched topics, research fields, number of articles per year, and kruskal walis test on google scholar rankings.

The objectives of this study are (1) what are the behavioural factors that influence investment decisions in the capital market? (2) How does artificial intelligence affect investment decisions in the capital market? (3) What are the ethical implications of using artificial intelligence for investors and capital markets? (4) How are bibliometric analysis of three topics? The arrangement of the presentation of this article is first (1) opening, (2) Factors determining financial behaviour, (3) Ethical impact of using artificial intelligence, (4) Impact of applying artificial intelligence, (5) Research methodology, (6) Results and analysis, (7) Conclusion.

2 Literature Review

2.1 Determination of behavioral finance on capital market

2.1.1 The existence of external factor stimulation

An investor's behaviour is influenced by investment advisors, the approach used by investment advisors with a regulatory approach, namely recommending investments based on certain regulations [5]. This is proven to influence investors' decisions in investing in stocks. Framing effects also influence investors' decisions, for example, an innovator will offer a new idea in terms of "why" for beginners and "how" for expert investors [6]. So it is necessary for an analyst to know that the investor is a beginner or an expert in the world of investment. A revolution in the financial world is the discovery of financial technology, known as the crowdfunding platform [7], which is a financing instrument that connects entrepreneurs with investors directly without involving traditional financial intermediaries. The presence of information on these platforms affects the amount of investment [8]. Socially responsible investments often influence investors' decisions [9]. Socially responsible investment is an ethical investment alternative, such as socially responsible mutual funds. Information in social media and media sentiment that provides information about corporate social responsibility also affect investment performance [10][11].

Signals that indicate growth potential are favoured over signals that indicate financial risk coverage. This study has major implications for investors to optimise their decision-making process and allows entrepreneurs to understand the investors' valuation process[12]. Decision-making time also influences the level of return an investor earns, quick decisions reduce decision quality and increase investment risk[13]. Outside information and advocates' recommendations influence investment decisions more than accounting information [14]. Investment managers also often use intuition which is the case for most investment managers in China, whereas western investment managers tend to use experience and expertise in determining investments [15]. Other information such as peers, managers‘ network, internal funds, information asymmetry, governance, financial crisis, policy uncertainty, financing diversification, idiosyncratic risk, and cash holdings affect firms' investment decisions [16].

2.1.2 Personal factors

Behavioural finance theory deals with the influence of investor psychology in investment decisions [17]. Psychological factors such as anger, stress, positive mood and fear affect investment decision-making in the stock market[18]. On the other hand, social media has a framing effect that provides a mental filter so that it also affects investment decision-making among investors [18]. Psychological and emotional factors such as fear of loss[19], framing (the way information is presented)[20], and herd behaviour are behavioural economics concepts that influence investor behaviour in the stock market[21]. Optimism (emotional bias), confirmation bias, representativeness bias, framing bias and overconfidence [22] (cognitive bias), self-control and regret avoidance [22] positively influenced investment decisions related to Ponzi and pyramid schemes [23]. Overconfidence, anchoring and regret avoidance biases have the most negative impact on

investment decisions than other cognitive biases [24][25]. Investors' risk perception affects investment decisions [26][27]. This suggests that psychological and emotional factors influence investors' decisions. However, high financial literacy can reduce the level of investor bias behaviour in the capital market [28]. The latest is the Barnum effect, which is a psychological phenomenon that affects investment decisions [29].

2.2 A Look at the ethical Effect

2.2.1 Enterprise or Institution Users

The application of AI technology can save the use of labour and comprehensively improve production efficiency and production quality. The most important AI technology has promoted the transformation of industrial production technology and the reform of industrial production [30]. This phenomenon will lead to a large-scale reduction in labour and the need for labour will decrease. In addition, there are ethical issues regarding privacy [4]. Privacy in the context of the capital market can be in the form of information and personal data of investors, such as name, address, identity number. Investors often have their own strategies in investing, this also includes privacy. Capital market transparency must also be balanced with the selection of appropriate information which can be shared and not. Companies must also comply with data protection regulations that will later be audited by auditors. Capital markets cannot be separated from the role of companies that need capital, other ethical issues also occur in corporate managerial accounting, namely data security, privacy, and misuse, accountability, accessibility, benefits and challenges, and transparency and trust in AI [31]. Ethical use of AI has several benefits for businesses, including increased operational efficiency, better decision-making capabilities, and higher customer satisfaction. Through AI initiatives that emphasise fairness, transparency, and accountability, businesses can forge stronger bonds with stakeholders and increase brand loyalty by building trust and confidence. Ethical AI implementation can also reduce implementation-related risks and drawbacks, and protect against potential legal, financial, and reputational consequences.

2.2.2 Individual Users

Another impact of AI is that humans will face human rights challenges. Large investors with access to AI technology will be able to make quick investment decisions, while individual or small investors will suffer losses, which is a violation of transparency and fairness. AI can be misused to manipulate the market, such as fried stock events. AI uses algorithms that can exacerbate biases in the capital market. The general issue of the ethical impact of AI use is broader in that issues of economic consequences, employment, justice, freedom, the ability to make human contact, individual autonomy, inequality, integrity, fairness, ownership, military use, power asymmetry, responsibility and sustainability all fall into that category[4]. The use of AI in military and warfare also raises the debate of whether or not it is ethical. Who is responsible for the development of AI for warfare purposes [32].

From a social perspective, social diversity, inclusion and equality can be supported by the ethical use of AI, resulting in fairer and longer-term outcomes for everyone. Ethical issues are then classified into several categories including ethical egoism, deontology, relativism, utilitarianism,

virtue ethics and ethics of care [33]. As an auditor, the use of AI has several benefits including improving audit and consulting functions, such as time savings, faster data analysis, increased accuracy rates, deeper insight into business processes, and improved client service [34]. Thus, the audit opinion issued will be faster and more accurate, and can reduce the time lag between the balance sheet date and the date of issuance of the audit opinion.

2.3 A look at the Artificial Intelligence Impact

2.3.1 Firm or industry user dimension

The impact of AI technology on the way companies enter foreign markets is that AI technology can reduce uncertainty in international markets, which makes companies more confident in making higher resource commitments. However, the impact of AI is less felt when a company is majority controlled by the government for security reasons [35]. AI technology in the industry is by forming econometric modelling of multinational company networks that can help investors determine their investments [35]. The advancement of the financial industry in the 5.0 era has many AI technologies developing rapidly that are able to process financial data intelligently quickly. The industry will significantly increase efficiency, creating versatility between humans and machines, enabling interaction and responsibility for monitoring activities on an ongoing basis.

Co-operation between humans and machines aims to speed up decision-making. Industries can improve the quality of information by assigning repetitive and monotonous tasks to AI machines as well as tasks that require human critical thinking [30]. It is a breakthrough for intelligent financial investment analysis systems to formulate unified standards based on alternative data. This is of great significance for improving the reliability of information acquisition in the financial industry and the accuracy of data processing. Using a systematic and standardised financial investment intelligent analysis system makes the alternative data collected by Internet of Things (IoT) sensors accurate and effective. The development of AI in financial intelligence is developed based on financial data with an accurate prediction model of up to 95.44% so that it can accurately predict alternative financial data [30]. Rational framework modelling by developing machine learning is also used to analyse foreign investment entering a country [36]. The use of machine learning needs to be developed so that real-world implementation can be easier [37] and can be implemented directly by investors in making decisions.

The use of AI in investment portfolios can also accurately predict return and risk, by developing genetic algorithm models based on historical stock data with the sharpe model. This can accelerate investment decisions in an optimal portfolio [38]. Online algorithms are also developed to determine the investment decision of its portfolio, this encourages smart investment by combining elements of financial theory, investor views, and data analysis in its development [39]. The development of AI in investment is a neuro-fuzzy inference system, which is a system that adapts investment recommendations based on investor demographics and feedback [40]. This AI development is expected to be able to analyse investment portfolios quickly and accurately and produce maximum returns with certain risks.

2.3.2 Individual user dimension

Artificial intelligence is often used by humans as individuals, such as the ChatGPT app. Capital market investors are not only institutional investors, but also individuals. Data-focused uses of AI include increased efficiency, data accuracy, new capabilities in the domain, and also ethical ramifications such as privacy and security of sensitive data, overcoming inherent biases in data sets and algorithms, and maintaining transparency in AI processes. These concerns highlight the need for robust mechanisms to validate data, ensure fairness, and clarify the decision-making process [41]. Investors need to analyse more deeply and ensure the veracity of information from media in the form of images, audio, and video because AI can lead to DeepFakes which are currently a threat to modern society, significantly undermining trust in digital image, video, and audio content technologies due to the possibility of substituting identity-related information (faces, voices, and also spoken content) in media files or streams.

The development of artificial intelligence includes 4 phases, namely the physical development phase such as the development of new technologies whose purpose is to benefit society, improve dignity and well-being, safety and sustainability of life, the second phase is the cognitive aspect of AI intelligence, and who is responsible for the use of artificial intelligence, as well as justice for the use of AI, welfare, solidarity and autonomy or the ability of AI intelligence should not exceed humans in decision making. The data information phase is how surveillance and big data collection and data protection. The governance phase is the implementation of policies, procedures, standards, and even creating laws in the use of AI technology [42].

The use of AI can be seen through two perspectives, namely it can apply the principle of virtue ethics, where there are significant benefits of using AI that can support various dimensions of work, but on the other hand, the ethical principle of non-malefcence, showing the adverse effects that can be caused by AI if it is applied to make someone unable to do anything and less meaningful [43]. The ethical principles of AI are grouped into seven, namely humans as agents and overseers, resilience and technical security, data privacy and governance, transparency, diversity, non-discrimination and fairness, public welfare and the environment, and accountability [44].

2.3.3 Regulator Dimensions

There is a need for special laws on artificial intelligence to control the use and security of data [45], as well as laws to limit its use [46]. In addition to laws, a technical guideline for the ethical use of AI is also needed to make it easier for data scientists to develop AI to facilitate human activities to complete all their work [44]. The Explainable and Ethical Machine Learning (EEML) approach has great potential for the advancement of society in many social sectors. Ethical AI frameworks and guidelines are the future terms that this sector has, and will continue to use them in future technologies. With the advancement and spread of AI, there will be an increasing need for solid codes of conduct to steer AI developers and AI managers towards moral guidelines [47]. Laws and guidelines related to the use of AI and its ethical impact are very important for regulators in all countries of the world to consider because in the future we will face AI in our daily lives.

3 Research Methodology

The data in this study were collected based on the Scopus database including journal articles with publishers, namely emerald, Elsevier, emerald, springer, Taylor and France, ebscohost, wiley online library and MDPI. The tool to search for journal articles is publish or perish 8 software by selecting google scholar search, writing the word 'journal' on the publication name menu, then the journal publication year is written 2020 to 2024. Keywords in this application are typed in two main search topics, in the case of this research, three searches were carried out.

The first keyword is by writing 'behaviour' and 'investment decision', the second topic is about 'artificial intelligence' and 'investment decision', the third is 'ethical impact' and 'investment decision'. Other software used by the author included Vosviewer to display visualisation images of previous research. Elicit software is very helpful in the initial review process of journal articles in finding several things including abstracts, methodology, and research results.

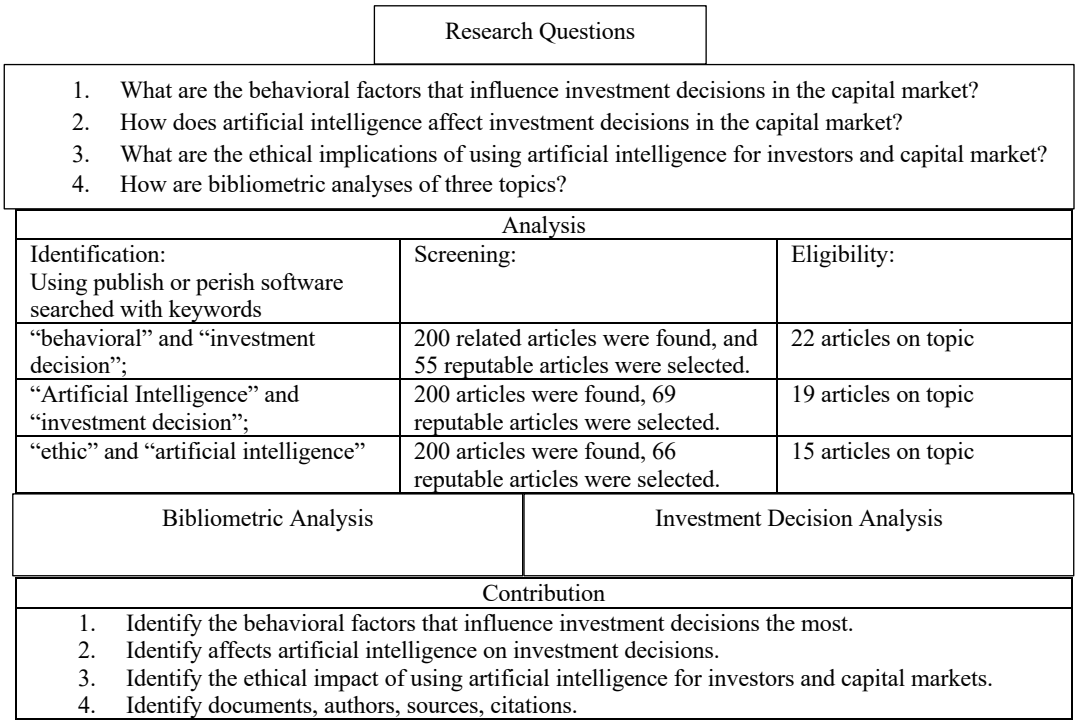

Fig. 1. Research Framework

4 Results

4.1 Publications and Citations

Table 1 shows information on the topic of behaviour and investment decisions with the level of articles cited, namely the five highest citations. The highest citation is 205 citations with topics that discuss behaviour and investment decisions with financial literacy as a moderating variable. Table 2 shows the topic of investment decisions and artificial intelligence with the highest citation of 709 citations. The article discusses the use of AI in relation to company performance. The article was published by publisher emerald. Table 3 shows the topic of ethical impact and investment decisions with the highest total citations of 442 citations. The article discusses the ethical impact of using AI in auditing. The article was published by publisher springer in the Journal Business of Ethics.

Looking at the comparison of the number of citations above, the most citations are on the topic of investment decisions and AI with a total of 709 citations, indicating that this topic has been widely researched. The next citation is on the topic of ethical impact and investment decisions with a total of 442 citations. This shows that this topic is still interesting for further research. Finally, the number of citations regarding behaviour and investment decisions is only 205, this shows that the topic is still not widely researched, and is still very likely to be researched.

Table 1. Behavior and investment decision: Most cited publications

Title	Author	Journal	Publisher	Year	#of Citation
How financial literacy moderate the association between behavior biases and investment decision?	M Adil, Y Singh, MS Ansari	Asian Journal of Accounting Research	emerald.com	2022	205
Financial literacy and behavioural biases of individual investors: empirical evidence of Pakistan stock exchange	N Rasool, S Ullah	Journal of Economics, Finance and Administrative Science	emerald.com	2020	134
Start with "Why," but only if you have to: The strategic framing of novel ideas across different audiences	D Falchetti, G Cattani, S Ferriani	Strategic Management Journal	Wiley Online Library	2022	74
Behavioral finance and portfolio management: Review of theory and literature	A Antony	Journal of Public Affairs	Wiley Online Library	2020	58
Nudges in SRI: the power of the default option	JF Gajewski, M Heimann, L Meunier	Journal of Business Ethics	Springer	2022	47

Table 2. Investment decision and artificial intelligence: Most cited publications

Title	Author	Journal	Publisher	Year	#of Citation
Influence of artificial intelligence (AI) on firm performance: the business value of AI-based transformation projects	SL Wamba-Taguimdje, SF Wamba	Business process management journal	emerald.com	2020	709
Investment decision and coordination of green agri-food supply chain considering information service based on block chain and big data	P Liu, Y Long, HC Song, YD He	Journal of Cleaner Production	Elsevier	2020	155
Behavioral finance in an era of artificial intelligence: Longitudinal case study of robo-advisors in investment decisions	M Shanmuganathan	Journal of Behavioral and Experimental Finance	Elsevier	2020	152
Robo advisory and its potential in addressing the behavioral biases of investors—A qualitative study in Indian context	A Bhatia, A Chandani, J Chhateja	Journal of Behavioral and Experimental Finance	Elsevier	2020	149
Does religiosity influence venture capital investment decisions?	J Chircop, S Johan, M Tarsalewska	Journal of Corporate Finance	Elsevier	2020	62

Table 3. Ethical Impact and Investment Decision: Most cited publications

Title	Author	Journal	Publisher	Year	#of Citation
The ethical implications of using artificial intelligence in auditing	I Munoko, HL Brown-Liburd, M Vasarhelyi	Journal of business ethics	Springer	2020	442
The impact of artificial intelligence on learner–instructor interaction in online learning	K Seo, J Tang, I Roll, S Fels, D Yoon	International journal of educational technology in higher education	Springer	2021	380
Ethical framework for Artificial Intelligence and Digital technologies	M Ashok, R Madan, A Joha, U Sivarajah	International Journal of information management	Elsevier	2022	249
ChatGPT and consumers: Benefits, pitfalls and future research agenda	J Paul, A Ueno, C Dennis	International Journal of Consumer Studies	Wiley Online Library	2023	207

Title	Author	Journal	Publisher	Year	#of Citation
The ethics of ChatGPT–Exploring the ethical issues of an emerging technology	BC Stahl, D Eke	International Journal of Information Management	Elsevier	2024	149

4.2 Top Author

Table 4 shows the most cited authors on the topic of investment decisions and financial behaviour. The top author is the highest with 68 citations with a total of three documents. Table 5 shows the most cited authors on the topic of investment decisions and artificial intelligence. Top author is highest with 236 citations with 3 documents. Table 6 shows the most cited authors on the topic of investment decisions and their ethical impact. Top author is the highest with 147 citations with 3 documents.

Comparison of the number of citations by top author shows that the most citations are on the topic of investment decisions and artificial intelligence, the second citations are on investment decisions and their ethical impact. The least citations are about investment decisions and behavioural finance with 68 citations. These fewest citations indicate that the topic is still under-researched and interesting to be discussed further.

Table 4. Top authors (Number of received citations) Investment decision and behavior

Name	#of Document	#of Citation	Name	#of Document	#of Citation
M Adil, Y Singh, MS Ansari	3	68	Y Li, D Ahlstrom	2	20
N Rasool, S Ullah	2	67	A Bhatia, A Chandani, R Divekar, M Mehta	5	8
D Falchetti, G Cattani, S Ferriani	3	25	R Saivasan, M Lokhande	2	18
A Antony	1	58	S Bender, JJ Choi, D Dyson, AZ Robertson	4	8
JF Gajewski, M Heimann, L Meunier	3	16	M Rossolini, A Pedrazzoli, A Ronconi	3	9

Table 5. Top authors (Number of received citations) Investment decision and artificial intelligence

Name	#of Document	#of Citation	Name	#of Document	#of Citation
SL Wamba-Taguimdje, SF Wamba	3	236	R Chopra, GD Sharma	2	29

Name	#of Document	#of Citation	Name	#of Document	#of Citation
P Liu, Y Long, HC Song, YD He	4	39	G Northey, V Hunter, R Mulcahy, K Choong	5	9
M Shanmuganathan	1	152	A Bhatia, A Chandani, R Divekar, M Mehta	5	8
A Bhatia, A Chandani, J Chhateja	3	50	W Buczynski, F Cuzzolin, B Sahakian	3	13
J Chircop, S Johan, M Tarsalewska	3	21	Y Ansari, MS Albarrak, N Sherfudeen	4	9

Table 6. Top authors (Number of received citations) Investment decision and ethical impact

Name	#of Document	#of Citation	Name	#of Document	#of Citation
I Munoko, HL Brown-Liburd, M Vasarhelyi	3	147	BC Stahl, A Andreou, P Brey, T Hatzakis	5	27
K Seo, J Tang, I Roll, S Fels, D Yoon	5	76	TM Tan, J Salo	2	57
M Ashok, R Madan, A Joha, U Sivarajah	4	62	S Bankins, P Formosa	2	56
J Paul, A Ueno, C Dennis	3	69	F Qin, K Li, J Yan	3	33
BC Stahl, D Eke	2	75	BC Stahl	1	92

4.3 Most prolific journals

Table 7 shows the productivity of journals with the number of documents and the number of citations as indicators. The most productive journal on the topic of investment decisions and behavioural finance is the Asian Journal of Accounting Research with 205 citations. Table 8 shows the productivity of journals on the topic of investment decisions and artificial intelligence, namely the Business Process Management Journal with a total of 709 citations to one article. Table 9 shows the productivity of journals based on the topics of investment decisions and ethical impact. The most highly cited journal with 677 citations and three documents is the Journal of Business Ethics.

Comparing the three citations above, the highest number of citations of 709 and 677 are on the topics of investment decision and artificial intelligence as well as ethical impact. These two topics are in demand by many researchers as their main topics, while the topics of behaviour and investment decisions are rarely researched.

Table 7. Most prolific journals (Number of published documents) Investment decision and behavior

Journal	#document	#citation	Journal	#document	#citation
Asian Journal of Accounting Research	1	205	Asia Pacific Journal of Management	1	40
Journal of Economics, Finance and Administrative Finance	1	134	International Journal of Innovation Science	1	39
Strategic Management Journal	1	74	Asian Journal of Economics and Banking	1	35
Journal of Public Affairs	1	58	Journal of Financial Economics	1	30
Journal of Business Ethics	1	47	International Journal of Bank Marketing	1	27

Table 8. Most prolific journals (Number of published documents) Investment decision and artificial intelligence

Journal	#document	#citation	Journal	#document	#citation
Business process management journal	1	709	International Journal of Bank Marketing	1	46
Journal of Cleaner Production	1	155	International Journal of Innovation Science	1	40
Journal of Behavioral and Experimental Finance	2	152+149	International Journal of Data Science and Analytics	1	39
Journal of Corporate Finance	2	62+32	International Journal of Financial Study	1	36
Journal of risk and financial management	1	57	Journal of Innovation & Knowledge	1	29

Table 9. Most prolific journals (Number of published documents) Investment decision and ethical impact

Journal	#document	#citation	Journal	#document	#citation
Journal of business ethics	3	442+114+111= 667	British Journal of Educational Technology	2	98+0
International journal of educational technology in higher education	1	380	International Journal of Accounting Information System	1	65
International Journal of Information Management	7	249+149+92+36+34+9+6= 575	International Journal of engineering and Scientific Research	1	56
International Journal of Consumer Studies	1	207	European Journal of Obstetrics & Gynecology and Reproductive Biology	1	49
Journal of Business Research	1	135	International Journal of Artificial Intelligence Research and development	1	48

4.4 Further research on the behavior, artificial intelligence and ethical impact on capital market

Figure 2 below, which shows the occurrence and relevance score for the topics of behaviour and investment decision. In the figure, it can be seen that the highest occurrence value on the most researched topic is investment decision making, but other topics that have not yet occurred, meaning that with a low occurrence rate, it is still possible to conduct research, namely with the sub-topics of behaviour finance, individual investors, risk perception and financial literacy.

Figure 3 below shows the occurrence rate of each topic, with the highest occurrence rate being the topic of artificial intelligence, but other topics with low occurrence rates show sub-topics that still

have the opportunity to be researched, namely behavioural bias, big data, overconvidence, robo advisors, machine learning.

Figure 4 shows the topics of investment decision and ethical impact which show high occurrence rates in the themes of systems, education, and technology. Topics with low occurrence still allow for further research, namely big data, business, society.

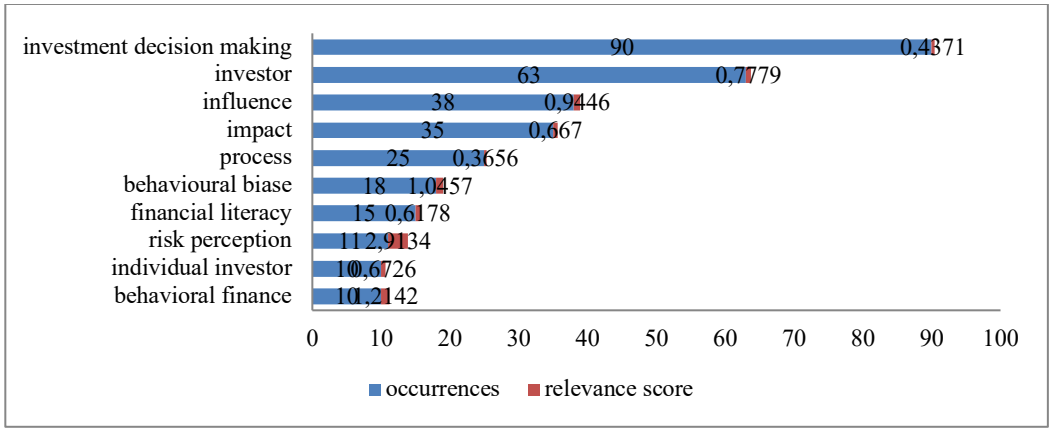

Fig. 2. Occurrence and Relevance Score Behavioral and Investment Decision

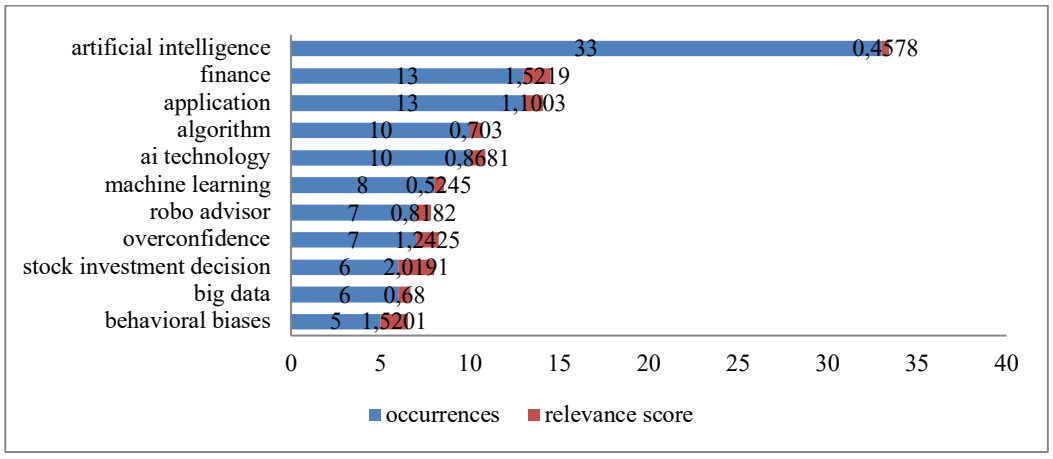

Fig. 3. Occurrence and Relevance Score Artificial Intelligence and Investment Decision

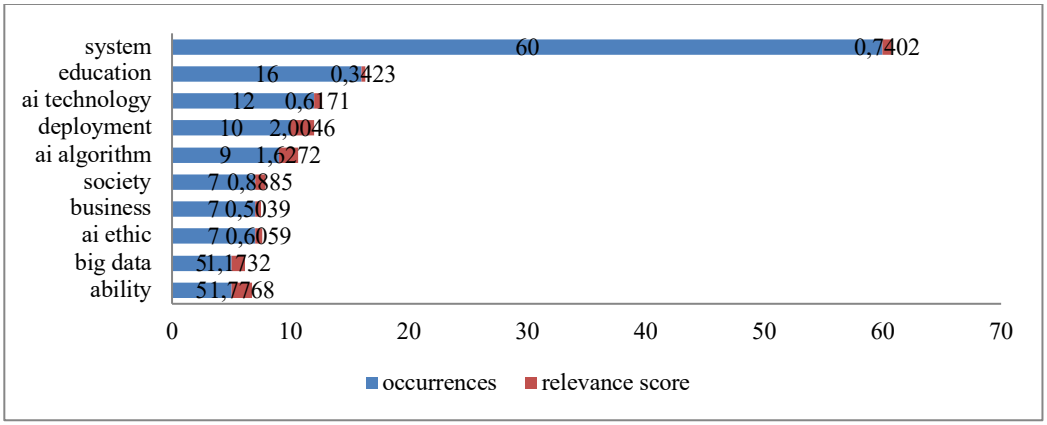

Fig. 4. Occurrence and Relevance Score Artificial Intelligence and Ethical Impact

4.5 Overlay of Current Topic Automate

In Figure 5 below the brightly colored line, it indicates that the topic is new and under-researched. Topics regarding matters related to investment decisions with biased behaviour, financial literacy, and financial behaviour and usually occur in individual investors.

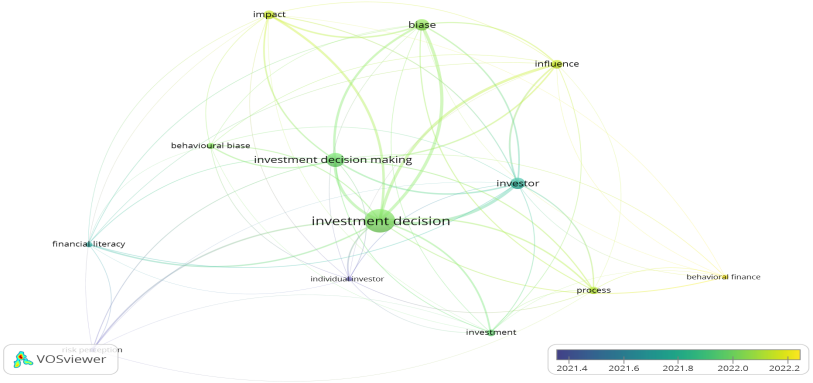

Fig. 5. Investment Decision and Behavioral finance (2020-2024)

Note: The colors range is automatized by the VOSviewer software

Meanwhile, Figure 6 shows a line with yellow color indicating the novelty of current and future research themes or topics. Research topics in yellow include investment trust, application, artificial intelligence, finance, big data, and machine learning. The visualization results using the Vosviewer application show that there are 7 clusters in the figure and then some relevant topics are about ai technology, algorithms, application, artificial intelligence, big data, machine, machine learning and

robo advisor. Some in cluster 2 consist of behavioural biases, behavioural finance, financial literacy. Finally, cluster 3 consists of cognitive biases, individual investment, overconfidence, psychological factors. Other clusters display less relevant topics.

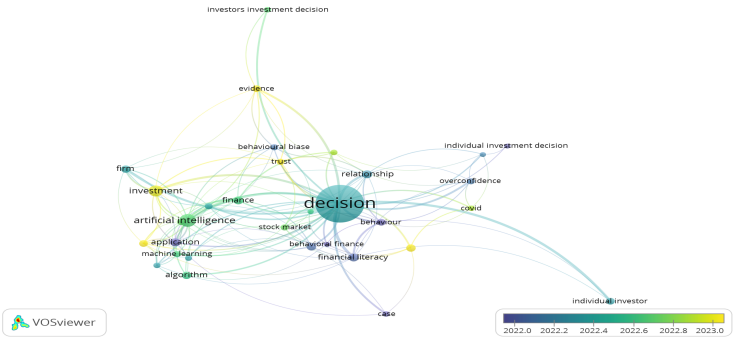

Fig. 6. Investment Decision and Artificial Intelligence (2020-2024)

Note: The colors range is automatized by the VOSviewer software

In Figure 7 the yellow color lines and dots show the current and still relevant topics to be continued, namely on the topics of AI Algorithms, AI Technology, Business, and ChatGPT.

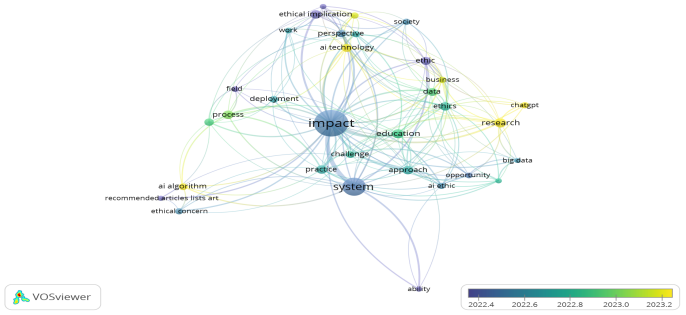

Fig. 7. Ethical Impact and Artificial Intelligence (2020-2024)

Note: The colors range is automatized by the VOSviewer software

4.6 Object of Research

Look at Figures 8 and 9 with the topic of investment decision and artificial intelligence, the use of AI has been widely discussed in the capital market 56%, money market 21% and companies 26%. The use of AI is widely discussed in these objects, while in education it is still small at 3%.

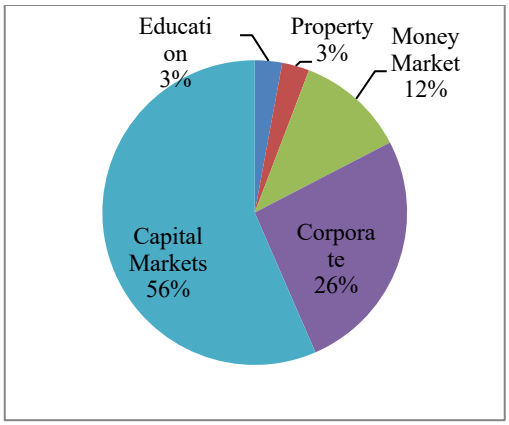

Fig. 8. Object of research
Artificial intellegence

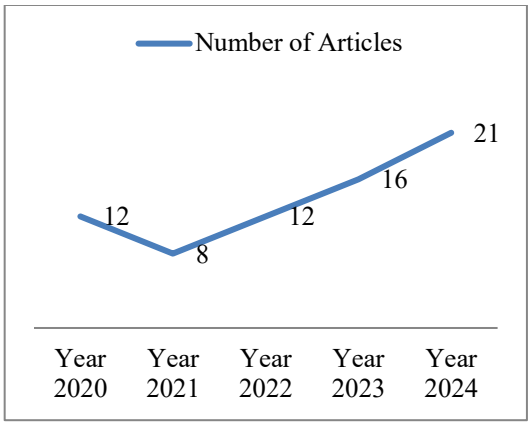

Fig. 9. Number of artikel per year
Artificial intellegence

Figures 10 and 11 with the topics of ethical impact and investment decision show that this ethical impact is widely discussed in society at 30%, education 14%, health 14% and management 12%. This means that although the use of AI has been widely discussed in the capital market and money market, the ethical impact of using AI is still not widely discussed in the capital market and money market. This is an interesting topic and needs to be researched.

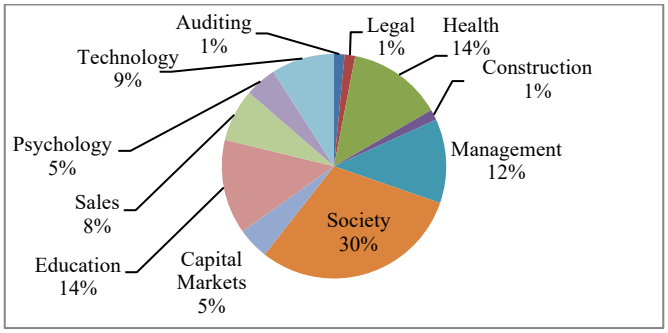

Fig. 10. Object of research Ethical Impact

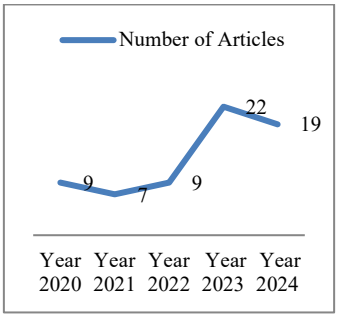

Fig. 11. Number of artikel per year
Ethical Impact

Figures 12 and 13 with the topic of behaviour and investment decision show that this topic is most discussed in capital markets at 56%, companies 14% and money markets 13%. Behaviour topics are less associated with the public sector and information systems.

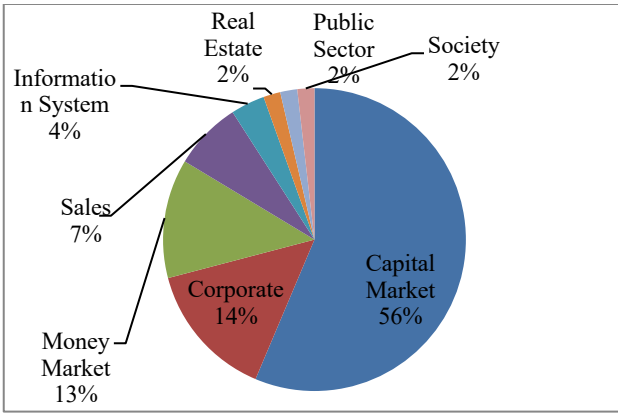

Fig. 12. Object of research Behavior

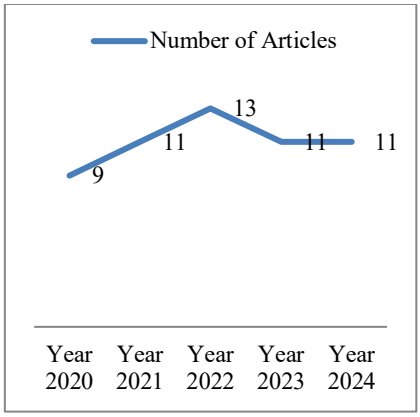

Fig. 13. Number of artikel per year Behavior

4.7 Quality and impact of the publications

Finally, we will conduct a t-test on three unrelated groups with goggle scholar rank data. Based on the results of the statistical normality test in table 10, the probability number is 0.0000 < 0.05, meaning that the data is not normally distributed. Because the GSrank data was not normally distributed, the Kruskall Wallis test was used to determine the difference between the three groups.

Table 10. Skewness and kurtosis tests for normality

Variable	Obs	Pr(skewness)	Pr(kurtosis)	Joint test -----	
				Adjchi2(2)	Prob>chi2
score	190	0.7150	0.0000	63.64	0.0000

Table 11 shows the result of the three groups difference test shows the probability value of 0.2915 which is 0.05 meaning that there is no significant difference between the three groups based on GSrank data. The result of statistical test between the difference of three groups which are GSrank AI, GSrank Behaviour and GSrank Ethics, by comparing the google scholar ranking which shows the result that the probability value is 0.2915 > 0.05 which means that there is no difference in google scholar ranking value between the three groups. The topics of behaviour, then artificial intelligence is both interesting topics to be researched in the context of capital market.

Table 11. Kruskal Wallis equality of populations rank test

GSrank*	Observation	Rank Sum	Mean	Standard Deviation
GSRank AI**	69	6393.00	102.84058	58.842417
GSRank Behavior***	55	5786.00	116.47273	59.392871
GSRank Ethics****	66	5966.00	100.48485	59.220901
chi2(2) with ties =	2.465			
Prob =	0.2915			

Google scholar ranking is a ranking determined by google scholar based on certain metrics, mainly related to the academic impact and number of citations of scholarly works published by a researcher or an institution. This ranking is usually used to measure how influential a researcher or institution is in their field based on how often their work is referenced by other researchers. There are several reasons why there are rankings in Google Scholar, measuring academic impact by identifying researchers and works that have a major impact in the scientific community, the higher the ranking, the more their works are referred to by other researchers, mincreasing accessibility of articles or researchers who are influential in a particular field, mencouraging research quality by making researchers motivated to improve the quality of their work in order to get more citations and be ranked higher. For institutions, the rankings serve as a benchmarking tool for academic institutions to evaluate their research performance and compare it with other institutions and policy makers to determine research strategies and resource allocation.

5 Conclusions

The objectives of this study are (1) what are the behavioral factors that influence investment decisions in the capital market? (2) How does artificial intelligence affect investment decisions in the capital market? (3) What are the ethical implications of using artificial intelligence for investors and capital market? (4) How are bibliometric analyses of three topics?

The first financial behavioural factors that influence investment decisions in the capital market are the stimulation of external and personal factors. External factor stimulation includes the existence of investment advisors, financial analysts, the existence of crowdfunding financial technology, socially responsible investment, information from social media, advocate recommendations, investment manager advice, and information from peers. Second, personal factors include psychological factors such as anger, stress, mood, fear of loss, the effects of social media on framing, herd behaviour, optimism, confirmation bias, representativeness bias, overconfidence, self-control, regret avoidance, anchoring, risk perception, financial literacy level, and the barnum effect.

The use of AI is grouped into three parts, firstly, the corporate user dimension helps companies enter foreign markets, improve efficiency, speed up decision making, improve information quality, and in the capital market the use of AI can predict returns and risks more accurately. Second, the individual user dimension of increased efficiency, data accuracy, new capabilities in the domain, and also ethical consequences such as privacy and security of sensitive data. Third, the regulatory dimension, special laws are needed to control the use of AI and technical guidelines for the ethical use of AI.

The ethical impact of using AI is grouped into two, the corporate user dimension, namely saving the use of labour, production efficiency, and improving production quality. Then ethical issues arise regarding data security privacy. Second, individual users, humans will face human rights challenges, market manipulation, the use of AI in the military raises ethical issues, other ethical issues are ethical egoism, deontology, relativism, utilitarianism, virtue ethics and ethics of care.

Bibliography analysis shows that the topic of financial behavior in capital markets is widely researched, but still little cited. The topic of artificial intelligence in the capital market is still interesting to research with the number of articles continuing to grow. While the ethical impact of AI use is still limited to the capital market, most articles discuss the impact of AI in the world of health, education, management and education. This shows that the ethical impact of AI use in the capital market is still interesting to study.

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