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The Effect of Overconfidence Bias, Herding Bias, and Regret Aversion Bias on Generation Z Investment Decision Making in Surabaya with Moderation in the Use of Artificial Intelligence

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A B STR A CT

This study aims to analyze the influence of overconfidence bias, herding bias, and regret aversion bias on investment decisions of Generation Z in Surabaya using artificial intelligence (AI) as a moderating variable. The background of this study is based on the phenomenon of increasing participation of Generation Z in digital investment which is susceptible to behavioral bias despite being supported by AI-based technology. This study uses a quantitative method with a Structural Equation Modeling (SEM) approach and involved 400 Generation Z respondents in Surabaya. The results show that overconfidence bias and regret aversion bias have no significant effect on investment decisions, while herding bias has a positive and significant effect. Meanwhile, AI has a significant effect on investment decisions, but is unable to moderate the relationship between behavioral bias and investment decisions. This finding indicates that AI acts as an independent factor that directly strengthens the quality of investment decisions, rather than as a counterweight to behavioral bias. The results of this study contribute to the development of modern behavioral finance theory and have practical implications for the development of more objective investment technology

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INTRODUCTION

Investing is an important way to manage personal finances and develop your economy, as it aims to generate future profits (Wulandari & Iramani, 2014). Unlike saving, investing carries a high risk, commensurate with the potential profit (Damayanti, 2024). Therefore, investment decisions require careful consideration of the instrument, risk, and market factors (Karo et al., 2025). With economic and technological developments, investment is now more accessible through digital instruments, including those utilizing artificial intelligence (AI) (Nurhaliza, 2023; Kamal & Apriani, 2025). However, the use of AI does not always guarantee optimal decisions, as over-reliance on systems without a basic understanding of investment can lead to errors. Therefore, the effectiveness of AI as an objective decision-making tool still needs to be studied (Zahara, 2023).

Source: KSEI

Figure 1. Investment Growth Age

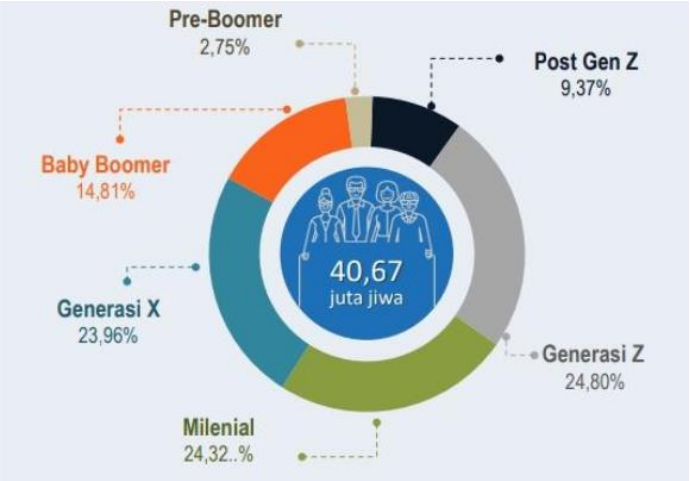
Table 1. Growth investment Age

Usia	Aset	
	Jul-23	Agt-23
≤30	Rp34,03 T Rp16,05 T	Rp34,09 T Rp16,42 T
31-40	Rp91,33 T Rp21,33 T	Rp90,60 T Rp22,32 T
41-50	Rp142,74 T Rp28,45 T	Rp142,68 T Rp30,47 T
51-60	Rp211,66 T Rp38,25 T	Rp209,61 T Rp40,98 T
≥60	Rp836,56 T Rp55,34 T	Rp836,32 T Rp60,12 T

Source: KSEI

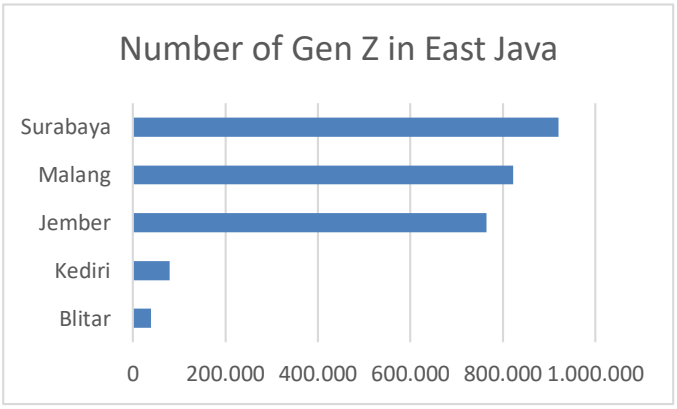
In 2023, individual investors under 30 years old reached 57.04 percent of the total 11.54 million investors with assets of IDR 50.51 trillion, indicating significant investment interest in the Indonesian capital market (Kompas.com, 2023). Generation Z has a high interest in investing, especially in the financial sector such as stocks, because high property prices and increasing loan interest make it difficult for them to buy property, so the digital stock market has become the main choice (Wulansari, 2024). Data from the Indonesia Stock Exchange as of June 2024 recorded that around 55 percent of the total 13 million investors are Generation Z (Setiawan, 2024), driven by easy access to information through digital technology and social media that facilitate learning and stock transactions

(Aulia, 2025), while also reflecting their awareness of financially profitable investments (Erliana & Tjokrosaputro, 2023).



Source: Population Census
Figure 2. Growth Population in East Java

Amount resident in Java Province East recorded increase by 0.79 percent, according to results 2020 Population Census. Results census resident that is taking place February – March, as well as extended until May of the year then, get the total number of data East Java residents now as many as 40.67 million souls Of that, Gen Z born between the years 1997 until 2012 reached 24.80%, this figure show that more from a quarter East Java residents is Gen Z, making it group age the biggest second after Millennials (born 1981–1996) reached 24.32%.



Source: Population Census
Figure 3. Growth Generation Z in East Java

Based on the 2020 Population Census, Surabaya has the largest Generation Z population in East Java, at approximately 920,363, making it a representative city for understanding the investment behavior of the younger generation in this region. As the largest city and center of education, economy, and technology in East Java, Surabaya has a rapidly developing digital infrastructure, including numerous startups, fintech companies, and easily accessible artificial intelligence (AI)-based investment applications (Priyowidodo, 2024; Santoso & Indudewi, 2025). AI in the investment context, such as robo-advisors, enables automated big data analysis to provide investment recommendations and predictions based on the user's risk profile, thus making it easier for both novice and experienced investors to make smarter, data-driven decisions (Sironi, 2016; Ismiatul Khairiyah, 2023).

However, Generation Z in Surabaya's investment decisions are not entirely determined by technological sophistication. Psychological factors such as overconfidence bias, herding bias, and regret aversion bias still influence how they use AI in making investment decisions. Overconfidence bias makes investors overconfident and use AI only to confirm decisions they already believe are correct, while herding bias encourages them to follow the majority or popular trends, even if they are irrational. Regret aversion bias, on the other hand, tends to avoid risk due to fear of regret, even when the potential for profit is high. AI can help mitigate the impact of these biases by providing objective data, analysis, and risk simulations, but its effectiveness depends on how investors utilize it (Aqilla & Juanda, 2023; Afriani & Halmawati, 2019; Mahmood et al., 2021; Maheshwari & Samantaray, 2025; Takayanagi et al., 2025).

AI plays a moderating role in this study due to its ability to influence the relationship between behavioral bias and investment decision-making. Robo-advisors can balance the impact of behavioral bias, improve decision rationality, and help investors make more objective decisions (Podille et al., 2024; Statista, 2023; Accenture, 2022). However, the uniform use of AI without critical evaluation can actually strengthen collective biases, such as herding bias, resulting in homogenous market behavior. Therefore, this study aims to analyze the influence of overconfidence bias, herding bias, and regret aversion bias on investment decision-making among Generation Z in Surabaya, with the moderate use of AI, to understand how the younger generation utilizes technology to make smarter and more informed investment decisions .

Previous studies have shown varying effects of behavioral biases on investment decision-making. Some studies have found that overconfidence bias has a significant positive effect, suggesting that overconfident investors tend to make bolder, though not always rational, decisions. High self-confidence can encourage investors to invest. Conversely, some studies have shown that the effects of herding bias and regret aversion bias are not always significant, while the use of artificial intelligence (AI) as an investment tool can have both positive and negative effects depending on how the technology is utilized. These findings highlight the variation in the effects of behavioral biases and the importance of further research to understand the interactions between overconfidence bias,

herding bias, regret aversion bias, and the role of AI in improving investment decision quality.

Research on the influence of cognitive biases on investment decisions has yielded mixed results. Reynard & Anastasia (2023) found overconfidence bias to have a negative impact, while Pratiwi & Anwar (2022) and Yazma & Anwar (2023) reported a positive effect, indicating that overconfident investors tend to make more aggressive decisions. Herding bias has a mostly positive effect according to Ardiansari et al. (2024) and Jain & Sinha (2024), although Mayora & Lestari (2024) found no significant effect, indicating its effectiveness is context-dependent. Meanwhile, regret aversion bias consistently shows a positive effect, indicating that investors tend to avoid decisions that could lead to regret .

Various studies confirm that regret aversion bias has a positive effect on investment decisions. Wei et al. (2024), Sankaran & Joshi (2024), and Bai et al. (2022) show that this bias makes investors more cautious, risk-averse, and tends to avoid decisions that could lead to regret when making investment decisions .

This study aims to analyze the influence of overconfidence bias, herding bias, and regret aversion bias on investment decision-making among Generation Z in Surabaya. Furthermore, this study explores the role of artificial intelligence as a moderating variable that can influence the relationship between these three biases and investment decisions. With this objective, the study is expected to provide a deeper understanding of how cognitive biases influence Generation Z's investment behavior and the extent to which technology, particularly artificial intelligence, can assist investors in making more rational and informed decisions. The results of this study are expected to not only contribute theoretically to the literature on investment behavior but also provide practical implications for young investors and financial technology developers in improving the quality of investment decision-making.

LITERATURE REVIEW

1. Behavioral Finance
   This is a branch of finance that studies individual decision-making behavior, including emotional and cognitive aspects, as well as the influence of psychological biases on investment preferences. This field emphasizes that investors do not always act rationally, and biases such as overconfidence, herding, and regret aversion can influence decision outcomes (Ricciardi & Simon, 2000; Abdolazimi et al., 2024).
2. Overconfidence Bias
   Overconfidence Bias is the tendency of individuals to overestimate their own decision-making abilities, leading investors to take high risks, trade excessively, and sometimes without adequate analysis, which can potentially lead to financial losses (Aqilla & Juanda, 2023; Budiarto & Susanti, 2017; Wijayanti & Juwita, 2024).
3. Herding Bias
   Herding bias is the behavior of following the majority's decision without independent evaluation, often occurring in unstable market conditions or with limited information. This bias can lead to asset bubbles or sharp price

declines because investors perceive collective action as more accurate than their own analysis (Budiman & Ratnasari, 2022; Scharfstein & Stein, 1990; Yazma & Anwar, 2023; Jain & Sinha, 2024).

4. Regret Aversion Bias
   Regret Aversion Bias is the tendency to avoid decisions that could lead to regret, leading investors to be more cautious even when the potential for profit is high. This bias influences the behavior of Gen Z, who often refrain from risky investments to avoid loss or regret (Anggraini, 2022; Ardiansari et al., 2024; Wei et al., 2024; Rahawarin, 2023; Sari et al., 2024).
5. *Artificial Intelligence (AI)*
   Artificial intelligence (AI) plays a role in assisting investment decision-making by providing data-driven recommendations through robo-advisors, machine learning, and expert systems, thereby reducing the impact of psychological bias and increasing decision rationality (Russell & Norvig, 2021; Nilsson, 2014; Sironi, 2016; Roy & Dasgupta, 2023). AI also functions as a moderating variable that can strengthen or weaken the influence of bias on investment decisions, depending on the intensity of its use, as tested through interactions in research models (Sironi, 2016).

METHODOLOGY

The data collection method in this study used a questionnaire technique distributed online to respondents belonging to the generation Z category in the city of Surabaya. The questionnaire was chosen because it was able to reach a large number of respondents efficiently and allowed researchers to obtain data relevant to the research variables, namely *overconfidence bias* , *herding bias* , *regret aversion bias* , investment decision making, and the use of artificial intelligence (AI). The questions in the questionnaire were structured and systematically arranged, so that respondents could provide answers that are appropriate to their personal conditions and experiences in the context of investment decision making.

Furthermore, data collection was conducted using a Likert-based measurement instrument. This scale is used to measure respondents' attitudes, opinions, and perceptions regarding social phenomena identified by the researcher. The Likert scale was chosen because it provides a quantitative overview of respondents' level of agreement with each statement. Thus, the results obtained can be statistically analyzed to determine the relationships between the variables studied.

Each statement item in the questionnaire was scored with a gradation of answers from very positive to very negative. The scoring categories used were as follows: score 1 for "Strongly Disagree," score 2 for "Disagree," score 3 for "Neutral," score 4 for "Agree," and score 5 for "Strongly Agree." The use of this scale allowed researchers to objectively measure the level of tendency or intensity of respondents' opinions, so that the analysis results could provide an accurate picture of the influence of behavioral bias on investment decisions moderated by the use of AI among Generation Z in Surabaya.

RESULT

Research Result

This study involved 400 respondents, all of whom were Generation Z in Surabaya and had been actively investing in the past three months. Based on the survey results, the majority of respondents were male (62.5%), while female (37.5%). In terms of age, the majority were in the 20–28 year range (92.5%), while the remaining 7.5% were aged 13–20. All respondents resided in Surabaya and were actively investing, demonstrating high relevance to the focus of this study, which highlights the investment behavior of the younger generation in the metropolitan city.

In terms of economic conditions, the average monthly income of respondents is in the range of Rp2,500,000–Rp3,500,000 with the highest percentage of 37.5%, while the highest expenditure is in the range of Rp1,500,000–Rp2,500,000 at 32.5%. All respondents (100%) also admitted to using artificial intelligence (AI) such as robo-advisors or automatic analysis features in making investment decisions. This shows that Generation Z in Surabaya is not only active in investing, but also very adaptive to the development of AI-based financial technology in their investment decision-making process .

Descriptive Statistical Analysis Results

The results of the descriptive analysis of respondents' answers are the results Respondents' answers in each generation of research, namely *overconfidence bias, herding bias, and regret aversion bias* . This analysis was carried out by calculating the average value (mean) of the respondents' answers to each statement item and Overall using the SPSS application. The three box method analysis according to Ferdinand (2014) is as follows:

Class interval:

$$\frac{\text{Highest Value} - \text{Lowest Value}}{\text{Class Total}}$$

Note: The highest score is 5 and the lowest score is 1, and the number of classes is 3. So the calculation is as follows:

$$\text{Class Interval} = \frac{5-1}{3} = 1{,}33$$

From these calculations, it can be seen that the class interval distance in each category is 1.33 so that the value criteria are as follows:

Table 2. Criteria It's Value

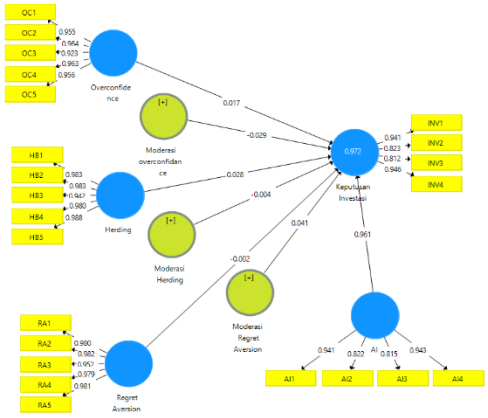
Score	Interpretation	Information
1.00 – 2.33	Low	The average respondent did not agree with the questionnaire statement
2.34 – 3.67	Currently	The average respondent agreed with the questionnaire statement
3.68 – 5.00	Tall	The average respondent strongly agreed with the questionnaire statement.

The table above displays the output of respondents' answers based on the frequency and average calculation of all indicators for each variable. The analysis of respondents' answers to each statement item is as follows:

Table 3. Frequency Answer Respondents

Statement Items	1	2	3	4	5	Mean Item	Mean Variable
Overconfidence Bias							
X1.1	2	7	31	141	219	4.42	4.43
X1.2	1	8	31	140	220	4.43	
X1.3	2	10	30	137	221	4.41	
X1.4	1	7	29	140	223	4.44	
X1.5	1	6	31	143	219	4.43	
Herding Bias							
X2.1	6	45	39	124	186	4.10	4.12
X2.2	6	41	37	125	191	4.14	
X2.3	5	42	37	126	190	4.14	
X2.4	6	41	41	123	189	4.12	
X2.5	6	45	34	122	193	4.13	
Regret Aversion Bias							
X3.1	8	0	23	147	222	4.44	4.43
X3.2	8	1	22	145	224	4.44	
X3.3	7	2	23	148	220	4.43	
X3.4	7	2	22	150	219	4.43	
X3.5	8	0	24	149	219	4.43	
Investment Decisions							
Y1	8	38	23	134	197	4.19	4.13
Y2	9	44	43	114	190	4.08	
Y3	6	41	44	134	175	4.08	
Y4	9	39	23	130	199	4.18	
AI							
Z1	10	39	21	130	200	4.18	4.12
Z2	9	45	43	114	189	4.07	

Statement Items	1	2	3	4	5	Mean Item	Mean Variable
Z3	6	42	43	137	172	4.07	
Z4	10	39	22	131	198	4.17	



Source: Data Processed by Researchers, 2025

Figure 4. Calculation results study

Analysis results show that all over variables in study This own trend answer respondents in the " agree " and "strongly agree " categories . The overconfidence bias variable has a mean of 4.43, which indicates height trust self respondents in investing , while herding bias with a mean of 4.12 illustrates existence influence social in decision investment . In regret aversion bias, the mean of 4.43 indicates that respondents tend be careful For avoid regret . Variable decision investment has a mean of 4.13, indicating behavior taking good decision , whereas The artificial intelligence (AI) variable obtained a mean of 4.12, which confirms that respondents Lots utilizing AI as tool help in analysis investment . The data Then analyzed using Structural Equation Modeling (SEM) based on Partial Least Square (PLS) with help SmartPLS 3.2.9 for test connection direct and indirect direct between variables as well as role AI moderation in the influence of behavioral bias to decision investment Generation Z in Surabaya.

There are two assessment models for engineering SEM PLS analysis , namely the measurement model (*outer model*) and the structural model (*inner model*) as following :

Evaluation of Measurement Model (Outer Model)

- *Indicator* Reliability and *Convergent* Validity

The initial step in the analysis is to test the indicator's reliability using the *outer loading value* to determine the strength of the relationship between the indicator and the construct. According to Hair et al. (2022), a good *outer loading value* is above 0.70, while convergent validity is tested using *the Average Variance Extracted* (AVE), where an AVE value > 0.50 indicates that the construct is able to explain more than 50% of the indicator's variance .

The figure above shows the results of convergent validity testing on the variables of *overconfidence bias, herding bias, and regret aversion bias* in investment decisions of Generation Z in Surabaya, using *AI* as a moderating variable. The outer loading results for all AVE values for statement items are >0.50. The following table shows the test results:

Table 4. Outer Loading

Variables	Item	Outer Loading	AVE	Information
Overconfidence Bias	X1.1	0.955	0.907	Valid
	X1.2	0.964		Valid
	X1.3	0.923		Valid
	X1.4	0.963		Valid
	X1.5	0.956		Valid
Herding Bias	X2.1	0.983	0.951	Valid
	X2.2	0.983		Valid
	X2.3	0.942		Valid
	X2.4	0.980		Valid
	X2.5	0.988		Valid
Regret Aversion Bias	X3.1	0.980	0.950	Valid
	X3.2	0.982		Valid
	X3.3	0.952		Valid
	X3.4	0.979		Valid
	X3.5	0.981		Valid
Investment Decisions	Y1	0.941	0.780	Valid
	Y2	0.823		Valid
	Y3	0.812		Valid
	Y4	0.946		Valid
Artificial Intelligence (AI)	Z1	0.941	0.779	Valid
	Z2	0.822		Valid
	Z3	0.815		Valid
	Z4	0.943		Valid

The table above shows that all AVE values are greater than 0.50. According to Hair *et al.* (2021), if the loading factor value for an indicator meets the established criteria and produces a good AVE value, then the indicator can be retained. Therefore, no statement items were removed, and all existing statement items were used as the basis for data analysis in this study.

Table 5. Convergent Validity Overconfidence Bias

Variables	Item	Outer Loading	AVE	Information
Overconfidence Bias	X1.1	0.955	0.907	Valid
	X1.2	0.964		Valid
	X1.3	0.923		Valid
	X1.4	0.963		Valid
	X1.5	0.956		Valid

Source: Data Processed by Researchers, 2025

In the table above, it can be seen that all indicators have an AVE value ≥ 0.50, so it can be said that all indicators in the *overconfidence bias variable* have good *convergent validity.*

Table 6. Convergent Validity Herding Bias

Variables	Item	Outer Loading	AVE	Information
Herding Bias	X2.1	0.983	0.951	Valid
	X2.2	0.983		Valid
	X2.3	0.942		Valid
	X2.4	0.980		Valid
	X2.5	0.988		Valid

Source: Data Processed by Researchers, 2025

In the table above, it can be seen that all indicators have an AVE value ≥ 0.50, so it can be said that all indicators in the *herding bias variable* have good *convergent validity .*

Table 7. Convergent validity Regret Aversion Bias

Variables	Item	Outer Loading	AVE	Information
Regret Aversion Bias	X3.1	0.980	0.950	Valid
	X3.2	0.982		Valid
	X3.3	0.952		Valid
	X3.4	0.979		Valid
	X3.5	0.981		Valid

Source: Data Processed by Researchers, 2025

In the table above, it can be seen that all indicators have an AVE value ≥ 0.50, so it can be said that all indicators in the *regret aversion bias variable* have good *convergent validity .*

Table 8. Convergent Validity of Investment Decisions

Variables	Item	Outer Loading	AVE	Information
Investment Decisions	Y1	0.941	0.780	Valid
	Y2	0.823		Valid
	Y3	0.812		Valid
	Y4	0.946		Valid

Source: Data Processed by Researchers, 2025

In the table above, it can be seen that all indicators have an AVE value ≥ 0.50, so it can be said that all indicators in the investment decision variable have good *convergent validity* .

Table 9. Convergent Validity of Artificial Intelligence (AI)

Variables	Item	Outer Loading	AVE	Information
Artificial Intelligence (AI)	Z1	0.941	0.779	Valid
	Z2	0.822		Valid
	Z3	0.815		Valid
	Z4	0.943		Valid

Source: Data Processed by Researchers, 2025

In the table above, it can be seen that all indicators have an AVE value ≥ 0.50, so it can be said that all indicators in the *artificial intelligence variable* have good *convergent validity* .

1) Internal Consistency Reliability

The next step of internal consistency is (Internal is measured using *composite reliability (CR)* and *Cronbach's alpha* . Based on Hair *et al.* (2021, 2022), the ideal CR and *Cronbach's alpha values* should be more than 0.70, although for exploratory research, values between 0.60 and 0.70 are still acceptable. The recommended maximum value is less than 0.95 to avoid excessive indicator redundancy.

Table 10. Internal Consistency Reliability

Variables	CR	CA	Information
Overconfidence Bias	0.980	0.974	Reliable
Herding Bias	0.990	0.987	Reliable
Regret Aversion Bias	0.990	0.987	Reliable
Investment Decisions	0.933	0.903	Reliable
Artificial Intelligence (AI)	0.933	0.903	Reliable

Source: Data Processed by Researchers, 2025

The Composite Reliability (CR) and *Cronbach's Alpha (CA)* tests show that all variables have very high internal consistency. The CR and CA values for *Overconfidence Bias* , *Herding Bias* , and *Regret Aversion Bias* are 0.980 and 0.974, respectively, while *Investment Decisions* and *Artificial Intelligence (AI)* have CR values of 0.933 and CA values of 0.903. All of these values are above 0.70, according to the recommended reliability standards, so the research instrument is declared highly reliable and valid for measuring the constructs studied.

Table 11. Discriminant Validity

	artificial intelligence	*Herding Bias*	Keputusan Investasi	Moderasi *Herding Bias*	Moderasi *Regret Aversion Bias*	Moderasi *Overconfidence Bias*	*Overconfidence Bias*	*Regret Aversion Bias*
artificial intelligence	0.882							
Herding Bias	0.781	0.975						
Keputusan Investasi	0.984	0.781	0.882					
Moderasi *Herding Bias*	-0.731	-0.667	-0.718	1000				
Moderasi *Regret Aversion Bias*	-0.354	-0.258	-0.315	0.459	1000			
Moderasi *Overconfidence Bias*	-0.416	-0.300	-0.405	0.464	0.762	1000		
Overconfidence Bias	-0.368	0.280	0.365	-0.336	-0.478	-0.487	0.952	
Regret Aversion Bias	0.336	0.216	0.314	-0.344	-0.622	-0.571	0.381	0.975

Source: Data Processed by Researchers, 2025

The results of the correlation analysis show that all variables have good discriminant validity, with the root of the AVE value higher than the correlation between other variables. Artificial intelligence (AI) has the strongest relationship with investment decisions (0.984), indicating that the use of AI-based technology plays a dominant role in helping Generation Z in Surabaya make more rational investment decisions. Herding bias also shows a fairly high correlation (0.781), illustrating the continued tendency of investors to follow the majority, although its influence is lower than AI. Meanwhile, overconfidence bias (0.365) and regret aversion bias (0.314) have a smaller influence on investment decisions. The moderating role of AI appears significant, with negative correlations with herding bias (-0.718), regret aversion bias (-0.315), and overconfidence bias (-0.405), indicating that AI is able to suppress these psychological bias tendencies. Overall, AI not only has a direct influence on investment decisions but also effectively moderates and reduces the impact of behavioral biases, making Generation Z decisions more objective and data-driven .

Structural Model Evaluation (Inner Model)

- R-Square (R^2)

The R-square value describes the proportion of variation in a variable. In other words, the higher the R-square value, the better the model's ability to explain the phenomenon under study. In this study, the variables included *overconfidence bias, herding bias, regret aversion bias,* and the moderating variable *artificial intelligence* in investment decisions. The results of the R-square test are shown in the following table:

Table 12. R-Square

Variables	R-Square
Overconfidence bias	
Herding bias	
Regret aversion bias	
Artificial intelligence	
Investment Decisions	0.972

Source: Data Processed by Researchers, 2025

The R-Square (R^2) value of 0.972 indicates that the *overconfidence bias* , *herding bias* , *regret aversion bias , and artificial intelligence* moderation variables are able to explain 97.2% of the variation in investment decisions, while the remaining 2.8% is influenced by other factors outside the model. This value indicates that the research model has very strong predictive capabilities, where Generation Z investment decision-making in Surabaya is largely influenced by behavioral bias factors and the use of AI technology in the investment process.

- Q-Square (Q^2)

The Q-Square value is used as a measure of *predictive relevance* . A good Q^2 value should have a Q^2 value > 0, as this indicates that the model has relevant predictive ability (Hair *et al.,* 2022). The following are the results of the Q-Square value test in this study:

Table 13. Q-Square

Variables	Q-Square
Overconfidence bias	
Herding bias	
Regret aversion bias	
Artificial intelligence	
Investment Decisions	0.750

Source: Data Processed by Researchers, 2025

The Q-Square (Q^2) value of 0.750 indicates that the model has very strong *predictive relevance . Based on the criteria of Chin (1998) and Hair et al. (2017), this value is in the high category, indicating that overconfidence bias , herding bias , regret aversion bias* , and *artificial intelligence* provide a large predictive contribution to investment decisions. This result is in line with the R-Square value, which shows that the model is able to significantly explain the investment decision-making behavior of Generation Z in Surabaya .

- *Relevance*

Significance testing was performed using the *bootstrapping method* involving *path coefficients. The path coefficient* is considered significant at the 5% level if the zero value is not included in the 95% confidence interval. For a two-tailed hypothesis, the t-statistic value must be greater than 1.96, while for a one-tailed hypothesis, the t-statistic value must be greater than 1.64. The higher the *path coefficient value,* the greater the influence of the independent variable on the dependent variable. Furthermore, the p-value must be less than 0.05 for the hypothesis to be considered significant.

Table 14. Significance and Relevance

Variabel	Original sample	Sample mean	Std deviasi	T statistics	P values
Artificial intelligence ➢ Keputusan Investasi	0.961	0.962	0.020	47.552	0.000
Herding bias ➢ Keputusan Investasi	0.028	0.027	0.014	2.019	0.044
Moderasi *Herding bias* ➢ Keputusan Investasi	-0.004	-0.004	0.009	0.443	0.658
Moderasi *Regret aversion bias* ➢ Keputusan Investasi	0.041	0.042	0.034	1.194	0.233
Moderasi *Overconfidence bias* ➢ Keputusan Investasi	-0.029	-0.030	0.026	1.131	0.259
Overconfidence bias ➢ Keputusan Investasi	0.017	0.017	0.012	1.434	0.152
Regret aversion bias ➢ Keputusan Investasi	-0.002	-0.003	0.013	0.185	0.853

Source: Data Processed by Researchers, 2025

The results of the study indicate that *artificial intelligence* (AI) and *herding bias* significantly influence the investment decisions of Generation Z in Surabaya. AI has a very strong influence (original sample 0.961; *t* -stat 47.552; *p* -value 0.000), indicating that this technology helps investors make more accurate and rational decisions. *Herding bias* is also significant (original sample 0.028; *t* -stat 2.019; *p* -value 0.044), indicating that the tendency to follow the majority still influences investment decisions. Meanwhile, *overconfidence bias* and *regret aversion bias* do not have a significant effect, nor does AI moderation on all three. Thus, Generation Z's investment decisions are more influenced by social factors and technology utilization than individual psychological biases.

DISCUSSION

The results of the study indicate that overconfidence bias does not significantly influence the investment decisions of Generation Z in Surabaya. This indicates that overconfidence is not a primary factor in determining investment decisions. This finding differs from Zhang's (2023) research but aligns with Sari & Putri's (2022) and Lim et al.'s (2022) findings, which explain that the use of digital technology and AI-based investment applications helps mitigate the effects of overconfidence. Generation Z in Surabaya, who are considered digital natives, tend to rely on data analysis and algorithmic recommendations before investing, resulting in more rational and measured decisions.

Meanwhile, herding bias was shown to have a positive and significant impact on investment decisions. These results indicate that herd-following behavior remains a significant factor in Generation Z's investment decision-making, particularly due to the dominance of social media and influencers shaping investment trends. Most young investors trust recommendations from digital communities more than from formal financial institutions. This phenomenon demonstrates that social factors remain a powerful influence, with investment decisions often influenced by collective trends rather than rational personal analysis.

Regret aversion bias, however, had no significant impact on investment decisions. Generation Z in Surabaya tends to be more willing to take risks and rely on analytical technology in decision-making, so the fear of regret is no longer a dominant factor. Their risk-tolerant nature and the use of risk simulation applications and AI recommendations also help mitigate the influence of this bias. This aligns with the findings of Mayora & Lestari (2024), who explained that technological advances can suppress the psychological effects of regret aversion in young investors.

Furthermore, the moderation results indicate that AI does not play a significant role in moderating the influence of overconfidence bias, herding bias, or regret aversion bias on investment decisions. Although AI is expected to weaken the influence of psychological biases through objective analysis, the results show that Generation Z tends to use AI only as a supporting tool, not as a primary determinant of investment decisions. Overconfident or trend-following investors continue to rely on personal beliefs and social opinions, while AI has not yet fully functioned as a corrector for behavioral biases.

Overall, AI is more appropriately positioned as an independent variable with a direct and significant influence on investment decisions. Artificial intelligence technology has been shown to improve the rationality, analytical accuracy, and quality of decision-making among Generation Z. Therefore, investment decisions among the younger generation in Surabaya are more influenced by a combination of social factors and data-driven technology, rather than individual psychological biases.

CONCLUSION AND RECOMMENDATION

This study concludes that overconfidence bias and regret aversion bias do not significantly influence Generation Z's investment decisions in Surabaya, while herding bias and artificial intelligence (AI) have been shown to have positive and significant effects. Generation Z, who grew up in a digital environment, is able to reduce the effects of overconfidence and fear of regret through the use of data-driven technology, while herd-based behavior remains strong due to the influence of social media and digital communities. AI plays an important role in improving the quality of investment decisions, but is ineffective as a moderator against these three psychological biases. This means that AI is more appropriately positioned as a stand-alone independent variable because it directly increases the rationality and accuracy of Generation Z's investment decisions.

The implications of this research indicate that herding behavior requires major attention because it has the potential to lead to irrational investment decisions and the risk of losses due to short-term trends. Young investors need to improve their financial literacy to avoid relying solely on social influence when investing. Furthermore, investment service providers and AI-based platforms are expected to strengthen their risk analysis features and objective recommendations so investors can balance digital information with rational analysis. These findings also open up opportunities for further research on the role of technology and financial literacy in moderating the influence of behavioral biases in the future. Each study has limitations; thus, you can describe it here and briefly provide suggestions for further research.

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