

Behavioral Biases on Generation Z's Investment Decisions in the Emerging Country's Stock Market

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DOI: <https://doi.org/10.9744/petraijbs.9.1.100-108>

Received: May 20, 2026

Revised: June 25, 2026

Accepted: July 03, 2026

Abstract

Generation Z is a digital native generation that today is becoming more and more actively engaged as stock market users. They grow up in an era of information and technology where, although they have access to financial data, they remain vulnerable to psychological factors in making their investment decisions. This research therefore aims to investigate the role of behavioral biases, which are covered in this study, including overconfidence bias, herding bias, loss aversion bias, and anchoring bias, on the investment decisions of Gen Z in the stock market. A quantitative approach was used, applying multiple linear regression with Weighted Least Squares to address potential heteroscedasticity. These results show that overconfidence bias and loss aversion bias have a major impact on investment decisions of Generation Z; however, herding bias did not significantly affect this group, thus indicating Generation Z tends to make investment decisions on their own and is less likely to fall in line with the opinion of the majority or the market trend. This contrasts with the results of several previous studies and illustrates Generation Z's more rational and financially savvy actions. Anchoring bias also has no significant impact at 5 percent, but it has a positive effect at the 10 percent significance level. These results indicate that Generation Z is adapted to new knowledge, reflection on the decisions they base on it, and less preoccupation with initial references.

Keywords: Behavioral Bias, Overconfidence Bias, Loss Aversion, Anchoring Effect, Stock Investment Decision.

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INTRODUCTION

Generation Z is a digital native generation distinguished by qualities such as valuing money, impatience, dependency on technology, and heightened awareness of sustainability and social issues (Pašiušienė et al., 2024). Despite a generally risk-averse profile, Generation Z is increasingly engaging in investments in stocks and high-risk instruments such as cryptocurrencies (Iswari & Budiyono, 2024). This trend suggests that investment behaviors among Generation Z are influenced less by purely rational calculations and more by psychological factors.

Behavioral finance research identifies several biases: overconfidence, herding, loss aversion, and anchoring that commonly affect investment decisions (Upashi & Kadakol, 2023; Owusu & Laryea, 2023; Karki, Bhatia & Sharma, 2024; Chishti et al., 2025). Generation Z, as a cohort highly exposed to rapid digital information flows and public opinion, is particularly susceptible to such biases (Iswari & Budiyono, 2024; Pašiušienė et al., 2024). While prior studies in Indonesia have explored behavioral biases in investment contexts (Hidayat & Moin, 2023; Sihotang & Pertiwi, 2023; Wibowo et al., 2023), these investigations typically focus on individual biases or broader demographic groups rather than on examining multiple biases simultaneously among Generation Z investors.

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This study addresses a clear gap in the literature by simultaneously testing the influence of four prominent behavioral biases (overconfidence, herding, loss aversion, and anchoring) on Generation Z's investment decisions in Indonesia's emerging stock market. By focusing specifically on this demographic and evaluating multiple biases simultaneously, the research offers novel insights into the psychological mechanisms that shape investment behavior in a market characterized by volatility and information asymmetry. Thus, the study contributes uniquely to Indonesian behavioral finance literature and enhances understanding of Generation Z's investment choices under digital and market pressures. The next section outlines the theoretical background and empirical findings that underpin these biases and frames the hypotheses that guide this inquiry.

Literature Review

Behavioral finance builds on classical financial theory by drawing on psychological measures, including affect, cognition, and social factors, to explain how people make financial decisions. We developed this perspective in response to a number of flawed theories of investment, e.g., the Efficient Market Hypothesis (which assumes a rational decision-making system) (Ricciardi & Simon, 2000; Shiller, 2003). Prospect Theory (Kahneman & Tversky, 1979) showed that people may be in a more negative psychological state when experiencing a loss than when experiencing a gain. In addition, cognitive shortcuts or heuristics (e.g., anchoring, availability) are part of systematic biases in decision-making, i.e., they lead to biased actions or decisions (Tversky & Kahneman, 1974; Barberis & Thaler, 2003). Gen Z especially relates to this issue due to the fact that they consume digital content and public opinion on a continuous basis, rendering them prone to these biases (Almansour, Elkrggli & Almansour, 2023; Hidayat & Moin, 2023; Upashi & Kadakol, 2023; Yasmin & Ferdaous, 2023; Sharma, 2024).

Overconfidence or overestimating one's know-how or abilities is one of the major behavioral biases associated with investment behavior, which is usually associated with overly optimistic and riskier investment decisions. It's manifested as concentrated portfolios, unreasonable return expectations, and the failure to assess downside risk--an especially worrying situation for Generation Z investors who place so much weight in judgment and the past (Singh et al., 2023; Wibowo, Indrawati & Aisjah, 2023; Karki, Bhatia & Sharma, 2024). Overconfidence has been found to play a major role in investment decisions and leads to speculative conduct (Yasmin & Ferdaous, 2023). Herding bias refers to the tendency among investors to imitate the actions of the majority, often to the detriment of their own market research. The impact of this social pressure and uncertainty is likely to lead to greater volatility and, at times, worse outcomes in market decision-making (Srinivasan & Karthikeyan, 2023; Ige & Adebayo, 2024; Rahahleh, 2024). In the digital age, where Generation Z is constantly exposed to trending opinions and viral investment narratives and trends, herd behavior is all the more likely; thus, they are highly likely to herd (Yasmin & Ferdaous, 2023; Chishti et al., 2025).

Loss aversion means that people are more likely to react more strongly to losses than to gains of equal size. Such a bias frequently induces investors to be risk-averse and stubbornly cling to subpar assets to avoid incurring losses (Aziz et al., 2024; Gurung et al., 2024). Empirical studies indicate that loss aversion directly affects investment decision-making, particularly in fluctuating markets, by promoting risk aversion (Hidayat & Moin, 2023; Yasmin & Ferdaous, 2023).

Finally, anchoring bias occurs when an investor excessively relies on initial information, such as prices, as a benchmark, despite having access to better (and higher-quality) information. As a result, not all investors make optimal decisions (Owusu & Laryea, 2023; Ige & Adebayo, 2024); more often, the focus on initial benchmarks can lead to holding onto poor investments or selling too early. Research from Upashi and Kadakol (2023) and Yasmin and Ferdaous (2023) suggests that anchoring plays an important role in stock valuation and decision-making and is most common among less experienced investors, such as those in Generation Z.

Overall, these four biases (overconfidence, herding, loss aversion, and anchoring) are major psychological influences that play a vital role in the investment behavior of Generation Z. Knowledge of these biases lays the groundwork for analyzing how this generation approaches making financial decisions in an increasingly complex, information-saturated world. According to the study's literature review and research framework, the following propositions emerge:

H₁: Overconfidence bias influences Generation Z's investment decisions in the stock market.

H₂: Herding bias influences Generation Z's investment decisions in the stock market.

H₃: Loss aversion bias influences Generation Z's investment decisions in the stock market.

H₄: Anchoring bias influences Generation Z's investment decisions in the stock market.

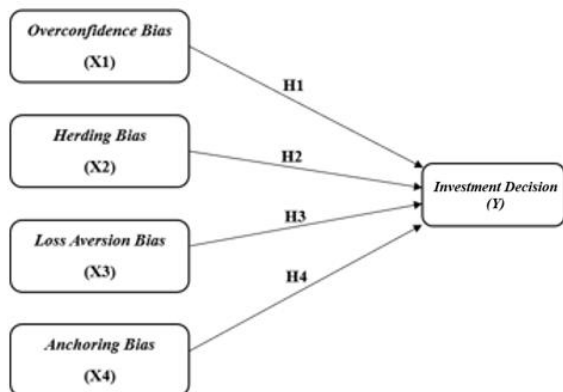


Figure 1. Research Framework

METHODS

This work adopted a descriptive research design to investigate the influence of behavioral biases on Generation Z's investment decisions in the stock market. The quantitative approach supports numerical data analysis and uses statistical methods to test the hypothesized results, while the descriptive component provides a systematic overview of Generation Z's investment behavior, particularly in light of psychological biases such as overconfidence, herding, loss aversion, and anchoring. This study aims to provide further insights into the irrational behavior patterns of emerging investors following this approach. In this study, the participants were Generation Z, who are actively invested in Indonesia's stock market. Purposive sampling (a non-probability sampling method based on selected criteria) was used to select participants (Hair et al., 2019). The inclusion criteria were: (a) active investment in the Indonesian stock market; and (b) Generation Z, defined as people born between the years 1997 and 2012. In accordance with Hair et al. (2019), the minimum sample size was calculated using a 5:1 ratio of measurement indicators. A minimum of 110 respondents were needed for the study, which used 22 indicators.

Data were collected via an online survey distributed through Google Forms between March 19 and April 16, 2025. The questionnaire was based on 22 statements, collected through comprehensive questions, as recognized in the behavioral finance studies by Jain et al. (2022) and Ullah (2015). It accounts for 5 research variables in this study, namely overconfidence bias (4 indicators), herding bias (4), loss aversion bias (3), anchoring bias (4), and investment decision (7). Respondents rated their agreement on a 5-point Likert scale, with 1 indicating "Strongly Disagree" and 5 "Strongly Agree."

Consistent with prior studies employing Partial Least Squares Structural Equation Modeling (PLS-SEM), this study adopts significance levels of 1%, 5%, and 10% for hypothesis testing. While the 5% significance level remains the conventional benchmark for statistical inference, the 10% significance level is also considered acceptable in exploratory and predictive research contexts, particularly when investigating emerging phenomena or developing theoretical relationships where empirical evidence remains limited (Hair et al., 2022). Therefore, path coefficients with p-values below 0.10 are regarded as statistically significant and indicative of meaningful empirical support, although findings significant only at the 10% level are interpreted with greater caution than those meeting the stricter 5% or 1% thresholds. This approach is consistent with recommendations in PLS-SEM literature, which emphasize balancing statistical significance, effect size, predictive relevance, and theoretical justification when evaluating research hypotheses.

RESULT

This research sought to determine the outcomes of 159 Gen Z respondents who actively invest in the Indonesian stock market. Table 1 presents the demographics of the study participants. Gender distribution was fairly even, with 78 males and 81 females participating, indicating that Gen Z investors are almost evenly divided in market participation.

On the demographic/age front, most of our total respondents were between 21 and 24 years old, or 105. This indicates that in early adulthood, members of Gen Z are likely to begin investing in the stock market. Just a few (9 respondents) of the respondents questioned were younger than 20 or older than 24 years, corresponding to a higher probability of participating in the stock market for students and young professionals.

Table 1. Respondent Demographics

| Category | Subcategory | Frequency |
|---------------------------------------|--|-----------|
| Gender | Male | 78 |
| | Female | 81 |
| Age (Years) | 17–18 | 2 |
| | 19–20 | 7 |
| | 21–22 | 64 |
| | 23–24 | 41 |
| | 25–27 | 45 |
| Domicile Region | Greater Jakarta (Jakarta, Bogor, Depok, Tangerang, Bekasi, Cikarang) | 82 |
| | Yogyakarta Area (Yogyakarta, Bantul) | 34 |
| | Central Java (outside Yogyakarta) | 12 |
| | East Java (Surabaya, Malang) | 7 |
| | West Java (Bandung) | 2 |
| | Sumatra (Medan, Pekanbaru) | 6 |
| | Kalimantan (Pontianak) | 2 |
| | Bali | 3 |
| | Batam | 11 |
| Securities Used | Ajaib Sekuritas | 34 |
| | Stockbit Sekuritas | 35 |
| | BCA Sekuritas | 19 |
| | BNI Sekuritas | 18 |
| | BRI Danareksa Sekuritas | 16 |
| | Indo Premier Sekuritas | 17 |
| | Mirae Asset Sekuritas Indonesia | 18 |
| | CGS-CIMB Sekuritas Indonesia | 9 |
| | Phillip Sekuritas Indonesia | 13 |
| | Mandiri Sekuritas | 9 |
| | Panin Sekuritas | 3 |
| | MNC Sekuritas | 1 |
| | RHB Sekuritas | 1 |
| IPOT (Indo Premier Online Technology) | 1 | |
| Length of Investment | Less than 3 months | 8 |
| | 3–6 months | 25 |
| | 6–12 months | 47 |
| | More than 12 months | 79 |

As for geographical distribution, most participants were in Greater Jakarta (Jakarta, Bogor, Depok, Tangerang, Bekasi, and Cikarang), with 82 participants there. Much of this is likely due to high internet penetration, robust financial infrastructure, and widespread use of investment portals in the area. The second-largest group was spread across the Yogyakarta Area (34 respondents), then Central Java (besides the Yogyakarta area) (12), East Java (7), and West Java (2). Those in Sumatra (Medan, Pekanbaru), Kalimantan (Pontianak), Batam, and Bali were fewer in number, possibly reflecting the digital divide and less exposure to stock market education in such areas outside Java.

Among investment apps, the most-used securities companies were Stockbit Sekuritas (35 answers) and Ajaib Sekuritas (34 answers), indicating that Gen Zs are opting for digital-centric, user-friendly investment applications. The most popular platforms were BCA Sekuritas (19), BNI Sekuritas (18), Mirae Asset Sekuritas Indonesia (18), Indo Premier Sekuritas (17), and BRI Danareksa Sekuritas (16). The diversity of brokerage options reflects the availability and rivalry of Indonesia's retail sector. About their investment history, almost half of the respondents (79) reported having invested for more than 12 months. 47 have invested for 6–12 months, 25 for 3–6 months, and 8 for <3 months. These results suggest that the majority of the Gen Z investors studied here have a moderate-to-high level of experience, which affects their susceptibility to behavioral biases in more subtle ways.

Validity and reliability testing results are shown in Table 2. Based on the validity test, we have item-total correlation coefficients (r_{xy}) exceeding the critical r -value of 0.1557, indicating that all items in the questionnaires are valid and usable. R_{xy} values range from 0.555 to 0.864, indicating that the items have a strong correlation with their constructs. Reliability analysis, with Cronbach's Alpha results, also shows that all

variables are above the minimum standard of 0.6, all indicating that the instrument content is coherent and reliable. It can be determined that Herding Bias has the highest reliability coefficient (0.875), and Loss Aversion Bias has the lowest (0.682), both within acceptable ranges. These findings confirm that the items on the scale used in this study are valid and accurately and reliably measure the construct, which was found to be a helpful measure of the influence of behavioral biases on Gen Z investment decisions.

Table 2. Validity and Reliability Test

| Variable | r_{xy} Range | Cronbach's Alpha |
|---------------------|----------------|------------------|
| Overconfidence Bias | 0.808–0.844 | 0.836 |
| Herding Bias | 0.846–0.864 | 0.875 |
| Loss Aversion Bias | 0.724–0.825 | 0.682 |
| Anchoring Bias | 0.692–0.813 | 0.753 |
| Investment Decision | 0.555–0.753 | 0.804 |

Table 3. Data Robustness Test

| Test | Indicator / Value | Description |
|---------------------------|--|--|
| Normality Test | Kolmogorov–Smirnov Exact Sig. = 0.073 | Residuals are normally distributed |
| Multicollinearity | Tolerance = 0.438–0.498 VIF = 2.007–2.283 | No multicollinearity detected |
| Heteroskedasticity | Park Test Sig. = 0.059–0.893 (after WLS) | No heteroskedasticity detected after model repair |
| Heteroskedasticity | R = 0.585; Adjusted R Square = 0.325 | The model determines how to influence the dependent variable |

The results of the classical assumption tests on the regression model are presented in Table 3. Test of normality by the Kolmogorov-Smirnov method produced an Exact Sig. value of 0.073 and above 0.05 to indicate that the residuals are normally distributed. The multicollinearity test results showed that Tolerance values ranged from 0.438 to 0.498 across independent variables, and Variance Inflation Factor (VIF) values ranged from 2.007 to 2.283, indicating the absence of multicollinearity among the independent variables. Heteroskedasticity testing (Glejser test) identified problems with the Overconfidence Bias variable as the initial test. But after applying the WLS regression approach and returning to the Park test, all variables had a significance level of 0.05 or greater. Meaning that our final WLS regression model is without heteroskedasticity and can be further studied accordingly. The coefficient of determination test results are also found in Table 3.

Table 3 also shows an Adjusted R Square of 0.325, indicating that 32.5% of the variance in investment decisions is explained by the independent variables: overconfidence bias, herding bias, loss aversion bias, and anchoring bias. The rest (67.5 percent) is affected by some other influence. The contribution is moderate, indicating a moderate influence of behavioral biases on the investment decisions of Generation Z.

Table 4. F-Test (Simultaneous Test)

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|------------|----------------|-----|-------------|--------|-------|
| Regression | 145.726 | 4 | 36.432 | 20.055 | 0.000 |
| Residual | 279.750 | 154 | 1.817 | | |
| Total | 425.476 | 158 | | | |

Table 4 presents the F-tests of examining whether all independent variables share a significant influence on the outcome (decision to invest). The significance is 0.000 (≤ 0.05), indicating a substantial simultaneous effect of overconfidence, herding, loss aversion, and anchoring biases on investment. The F-value of 20.055 also supports the regression model's efficiency. Thus, the model is statistically fit, and so we have used a t-test to perform partial (individual) analysis.

Table 5 presents the results of the t-test, which examines the partial effect of each independent variable on the dependent variable, namely Investment Decision (ID), using a Weighted Least Squares Regression model.

Table 5. t-Test (Partial Test)

| Model | Unstandardized B | Std. Error | Standardized Beta | t | Sig. |
|------------|------------------|------------|-------------------|--------|-------|
| (Constant) | 1.955 | 0.286 | — | 6.842 | 0.000 |
| OB | 0.280 | 0.076 | 0.372 | 3.707 | 0.000 |
| HB | -0.086 | 0.074 | -0.114 | -1.161 | 0.247 |
| LAB | 0.155 | 0.068 | 0.205 | 2.288 | 0.023 |
| AB | 0.174 | 0.095 | 0.180 | 1.828 | 0.069 |

DISCUSSION

The findings indicate that overconfidence bias has a strong positive impact on the stock market investment decisions of Gen Z. This result corresponds with previous studies carried out by Upashi and Kadakol (2023), Yasmin and Ferdaous (2023), and Almansour, Elkrghli, and Almansour (2023), who argue that exaggerated self-confidence is a force driving investors to make bolder and more aggressive investment decisions. With a penchant for tech-savvy, independent access to information, and exposure to success stories on social media, Generation Z feels confident they can accurately assess the market with limited experience. This overconfidence will lead to more investing behavior, but it can also lead to decision-making without deep analysis. This was in line with behavioral finance theory, which posits that overconfidence leads to excessively high rates of risk-taking by overestimating an individual's knowledge and judgment (Tjandrasa & Tjandraningtyas, 2018; Wibowo, Indrawati & Aisjah, 2023; Chishti et al., 2025).

Additionally, herding bias did not significantly affect Gen Z investment decisions. Although herding is generally defined as following the herd (i.e., not conducting one's own analyses; Singh et al., 2023; Chishti et al., 2025), this finding aligns with similar findings from Fitri and Hariyanto (2024) as well as Kanojia, Singh and Goswami (2018) that report negligible effects. Having grown up in the digital age, Generation Z tends to be more self-reliant in decision-making and often conducts independent research using online resources before investing. With the greatest increase in financial knowledge and one year of investment experience, the majority of respondents are more likely to make decisions based on fundamental or technical analysis than their peers. This rational and autonomous Gen Z character is why herding bias did not have a significant effect on Gen Z's investment behavior (Khan, 2020; Sihotang & Pertiwi, 2023).

Loss aversion bias has a large positive effect, which means that the fear of losses makes Gen Z more cautious investors. This observation is consistent with previous studies by Yasmin and Ferdaous (2023), Upashi and Kadakol (2023), and Hidayat and Moin (2023), which find that investors with strong loss aversion tend to adopt conservative strategies. From a behavioral finance perspective, this is indicative of a psychological preference in which the emotional pain associated with losses is greater than that of an equivalent gain (Sharma & Sarma, 2024). With many Gen Z investors relatively new to the investing space, they may be more sensitive to losses and, in the face of initial negative experiences, become more cautious in their approach. Hence, they tend to use safer investment instruments or diversify their portfolios to protect capital rather than chase high-risk, high-return opportunities.

Finally, anchoring bias was observed to have a positive effect, significant at the 10% level. This indicates that Gen Z investors still rely on baseline information, such as the purchase price or anticipated return, when making investment decisions. This is consistent with the results of studies (Yasmin & Ferdaous, 2023; Upashi & Kadakol, 2023) that found investors may continue to use the initial information as a decision anchor, even when it is misleading. The adaptive behavior of Gen Z and their speed of updating information, however, Pašiušienė et al. (2024) make anchoring bias less dominant. They can be rational comparators of relevant material from different sources, so the anchor effect appears a bit weaker than for other investor groups.

Limitations of the study and future research agenda

Although it yields valuable information about the behavioral determinants of Generation Z investment decisions, this research is limited in ways that should be taken into account when analyzing the findings. The sample was small, comprising stock investors in investment communities in Indonesia, which might limit generalization to broader Generation Z investors. These differences in regional characteristics, investment experience, educational background, and socioeconomic conditions can affect how behavioral biases and investment behavior manifest (Hair et al., 2019).

Second, the data were collected via an online self-administered questionnaire, which may introduce self-selection and response biases. Members of online investment communities and digital platforms may also exhibit qualities that are not shared by those less invested in the space. Furthermore, in testing for behavioral bias, the estimation of biases was largely based on self-reported behaviors and thus on subjective perceptions, which are subject to social desirability bias (Podsakoff et al., 2003). Moreover, the exclusion of outliers using case-wise diagnostics for normality may have suppressed variability in the sample, which might have limited its representativeness. Finally, the use of a purely quantitative methodology limited the study's potential to explore the underlying psychological processes and contextual factors influencing Generation Z investors' decisions about what constitutes a proper investment among decision-makers. Behavioral finance phenomena are often multi-faceted, requiring qualitative exploration to reveal deeper motivations, experiences, and cognitive processes (Creswell & Creswell, 2018).

Future studies should aim to broaden the range and rigor of our study by involving more heterogeneous samples across diverse geographic areas, occupations, educational stages, and investment-field classes. An extensive sampling framework would also increase the external validity of these outcomes, allowing us to provide a broader picture of how behavioral biases influence Generation Z investment behavior in emerging markets. Cultural and institutional differences in investment behavior across international contexts could also be elicited through cross-country comparative approaches (Nofsinger, 2018). Moreover, we suggest that in future research, mixed-methods designs that combine quantitative and qualitative methods (e.g., interviews, focus groups, or case studies) be employed. These are the techniques that would better show investment decisions rooted in cognitive and affective mechanisms. Methodologically, advanced analytic techniques such as Structural Equation Modeling (SEM), longitudinal analysis, or multi-group analysis can be used to examine more complex relationships among variables and explore potential mediating or moderating effects. Furthermore, future research should include additional factors influencing investors' adoption of financial literacy, risk tolerance, digital financial engagement, investment experience, and socioeconomic factors to provide a more comprehensive behavioral finance framework for studying Generation Z investors (Lusardi & Mitchell, 2014; Baker et al., 2019).

CONCLUSIONS

So, for Generation Z, behavioral biases are a big issue; thus, the bottom line that emerges from the results and discussion is the varying responses to different types of behavioral biases. Overconfidence bias is positively related; high levels of that kind of self-assurance motivate Gen Z to be more invested, but in some instances, without risk assessment. Herding bias, however, doesn't matter much, meaning Gen Z is less influenced by herd behavior; perhaps Gen Z is more independent, a critical decision maker—one aspect that can also be attributed to their digital literacies and independent research habits. A loss aversion bias is also positive, as it indicates a cautious approach among Gen Z and a tendency toward saving capital. In contrast, anchoring bias appears to exert a beneficial effect at the 10 percent significance level, but not at the 5 percent level, suggesting some flexibility in initial information responses enabled by the wider availability of information in the digital age.

As a result, Generation Z is fairly rational and information-driven in their investment decisions, whilst not completely immune to behavioral influences. These results provide valuable insights into future developments in financial literacy and their implications for investment products, specifically regarding young investors' behavior in the capital markets.

The results of this study are significant for regulators, financial institutions, and investment platforms in improving the quality of Generation Z investors' investment decision-making. The strong moderating effect of overconfidence bias indicates that investor education programs should focus more on managing risk, diversifying portfolios, and making data-driven decisions. Such overconfident investors are found, in recent research, to under-represent investment risk and to trade excessively, potentially harming portfolio performance (Baker et al., 2022; Chishti et al., 2025). Therefore, investment platforms should integrate tools for risk assessment, portfolio monitoring, and education on the importance of individualized finance to facilitate more rational investment behavior.

The prominence of herding bias indicates that financial literacy must be reinforced and that independent investment analyses should be promoted. Generation Z investors seek financial information on social media and community forums, which makes them more exposed to market trends and peer influence (Hendarto, Anastasia & Basana, 2021; Syukur et al., 2025). Financial institutions must also enhance information transparency and provide analytical tools that aid investors in evaluating investment opportunities through an

objective lens. Furthermore, the influence of loss aversion and anchoring biases indicates the importance of creating user-friendly investment platforms that present historical data, benchmark comparisons, and balanced market insights. Such features may moderate emotion-based investment decisions, promote more informed and disciplined investment strategies, and ultimately lead to better long-term investment outcomes (Chishti et al., 2025; Kaur & Badola, 2026).

AI DISCLOSURE STATEMENT

During the preparation of this work, the author(s) used Notebook LM and ChatGPT to improve the language and readability of the manuscript and to assist with specific tasks, such as literature categorization. After using this service, the author(s) reviewed and edited the content as needed and takes (s) full responsibility for the integrity and final conclusions of the published article.

ACKNOWLEDGMENT

The authors would like to thank Universitas Atma Jaya Yogyakarta, Indonesia, for the academic support provided during the preparation of this manuscript. Special thanks to all Generation Z investors who participated in the survey and shared valuable insights.

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