Representativeness, Mental Accounting, Overconfidence and Loss Aversion On Investment Decision: Mediated by Risk Tolerance

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Abstract. Risk tolerance mediated the relationship between investment decisions and the variables of representativeness, mental accounting, overconfidence, also loss aversion, which was the objective of this study. This is a survey-based investigation. A random sampling technique was employed to select 150 respondents for the sample in this research. Assessing the value of outer loading, validity and reliability, R square, path coefficients, specific indirect effects, and total effects through data analysis utilising SmartPLS. SEM (Structural Equation Model) analysis reveals that the overconfidence variable mediates a significant indirect impact of risk tolerance on investment decision. Besides, the investment decision is impact by the representativeness bias variable, which is mediated by risk tolerance.

Keywords: Representativeness, mental accounting, overconfidence, loss aversion, investment decision, risk tolerance

1 Introduction

Behavioral finance according to [23] basically tries to understand also explain investor behavior. Traditional finance theory argues that investors behave rationally while the concept of behavioral finance says that investors behave normally. Fundamentally, behavioral finance is about understanding how people make decisions, either individually or in groups. By gaining a comprehension of investor behaviour, it becomes feasible to modify policies and strategies to enhance economic results. There are two types of behavioral finance: micro behavioral finance, which investigate the biased behavior of individual investors, and macro behavioral finance, which is market behavior related to the behavior of investors as a whole.

According to [18], based on previous literature shows that feelings, spontaneous emotions and intuition from investors can influence their investment decision making. In his research, he tries to identify differences in irrational beliefs measured through emotional biases that has an impact on an investor's investment decision making. The biases are overconfidence, home bias, loss

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aversion bias, endowment effect. According to [25], emotions and psychology are the main factors that cause bias in making investment decisions. Investors are susceptible to a number of biases, errors also illusions as a result of their limited capacity to comprehend comprehensive and pertinent information. The errors and biases also occur due to the use of shortcuts made by investors in making investment decisions. From the central theme of behavioral finance, [13] in their research raised eight psychological biases that represent criteria in individual investors' decision-making to invest. The eight biases chosen include representative bias, overconfidence bias, availability bias, anchoring bias, regret aversion bias, mental accounting bias, loss aversion bias, also herding bias.

From their article, [7] discuss the biased behavior of investors in family businesses (family firms) using four important cognitive factors, namely: representativeness, anchoring, stereotype heuristic, also information availability. Because they constitute a prevalent source of cognitive bias at the individual, group, also even societal levels, these factors are examined. Furthermore, [21] assert in their article that investment decision making can be impacted by cognitive also emotional factors. They employ herding bias, risk perception, overconfidence, and representativeness when analysing investment decisions.

Several prior investigations have also explored the concept of risk tolerance, which serves to elucidate the correlation between psychological biases also the investment decisions of individual investors. Given the prevalent nature of risk-taking among investors, bias in isolation is insufficient to characterise their decision-making process; risk perception must also be considered [12]. Furthermore, it is widely acknowledged that individuals with greater financial literacy exhibit a greater propensity for risk tolerance [10].

Stock investment is currently one of the most attractive investments for many people from teenagers to adults. In West Kalimantan itself, the number of stock investors always increases every year. This can be seen from the data published by the KSEI (Indonesian Central Securities Depository) obtained from the number of Securities Sub Accounts (SRE). The quantity of stock investors residing in West Kalimantan is detailed in the subsequent table:

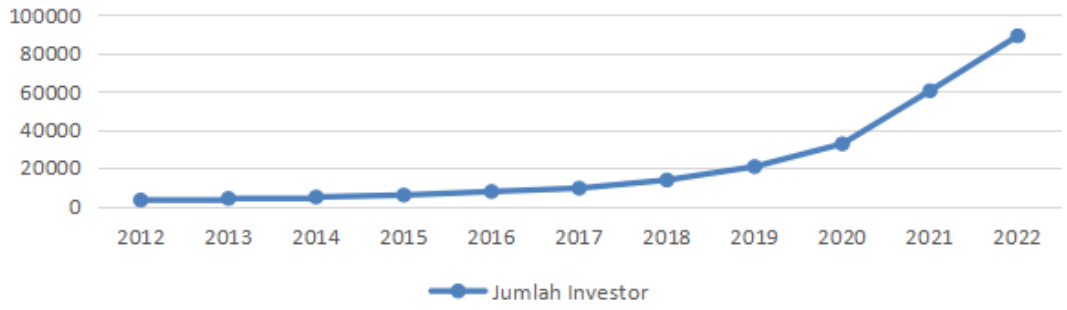

Fig.1. Number of Stock Investors in West Kalimantan 2012-2022

The graph shows that in the last 10 years the number of stock investors in West Kalimantan has managed to experience a very significant increase. The focus of this study pertains to the investor's investment decision concerning equities. Furthermore, this study tries to examine whether representativeness, mental accounting, overconfidence also loss aversion has an

influence on the investment decisions of individual stock investors. This research also adds risk tolerance in moderating and financial literacy as mediation. In addition, the inconsistent research results make the discussion of individual bias an interesting thing to research, especially for stock investors in West Kalimantan.

2 Literature Review And Hypothesis Development

2.1. Prospect Theory

The primary characteristic of prospect theory, according to [14], is that it alludes to two concepts from the psychological literature. The first notion posits that individuals are preoccupied with fluctuations in wealth and finances; the second notion contends that they fail to notice such changes. Prospect theory, as defined by [31], is a descriptive model of risk-averse decision making that was initially constructed to account for numerous deviations from the expected utility paradigm and has since been extensively documented.

2.2. Behavioral Biases

According to [23], behavioral biases are classified into cognitive errors and emotional biases. These two behaviors are not easy to understand but they are fundamental in understanding the type of behavior investors introduce and then create. [26] cognitive bias is caused by faulty reasoning that can arise due to a lack of proper statistical analysis techniques whether it be errors from information processing, faulty reasoning or memory errors. Such errors can be corrected or reduced by getting better information. In contrast, emotional bias is not related to conscious thought but comes from thoughts, impulses and intuitions. In bias, it is very likely to have elements of both cognition and emotion.

2.3. Representativeness

Representativeness pertains to the inclination of an investor to validate his judgement by drawing upon his prior experiences. The processing of information is commonly predicated on prior experience [13]. [6] define representativeness as the degree to which actual situations and illustrative instances resemble the characteristics of the entire population. [14] state that people usually predict future values based on representativeness. Representativeness is commonly used in valuation under uncertainty. It focuses investors on analyzing companies according on characteristics such as management, products, publicity, returns, also investment decisions are usually centered on these characteristics [22]. According to [28], heuristic bias, namely representativeness, has a real negative influence on investment decisions made by individual investors. Meanwhile, according to [21], representativeness has a significant influence on investment decisions.

H1: Representativeness has a positive influence on Investment Decision

2.4. Mental Accounting

Mental accounting pertains to a perception of the worth of money that fluctuates in accordance with its source. Those investors who approach trading decisions with an accounting mentality take into account the associated costs and benefits [20]. The results of previous studies show that mental accounting does not significantly influence investment decisions [13],[30].

According to [27] mental accounting significantly effects investment decision making.
H2 : Mental Accounting has a positive effects on Investment Decision

2.5. Overconfidence

Overconfidence is a bias that occurs when investors greatly intensify their predictions when investing. A common tendency among investors is to overestimate their own intelligence in comparison to other investors. This predisposition and the subsequent erroneous stock selection frequently diminish their investment returns [19]. Based on several previous studies, it is said that individual investor overconfidence affects decisions [4], [24], [2].

Meanwhile, based on research conducted by [32], it is stated that overconfidence is statistically insignificant to investor investment decisions. In addition, [15] found that overconfidence bias has a negative effect on investment decision making.

H3 : Overconfidence has a positive impact on Investment Decision

2.6. Loss Aversion

The original proponents of behavioural finance [33] identified loss aversion bias as a highly potent bias. It pertains to the inclination of individuals to preserve capital from depletion as opposed to concentrating on capital augmentation. This prejudice is predicated on the notion that individuals respond differently to positive also negative fluctuations in the market value of investments. Losses exhibit a magnitude twice as great as profits. After suffering previous losses, individuals afflicted with this bias typically develop a risk aversion and sell equities that appreciate in value [13]. From the results of previous research, it is said that loss aversion affects investment decisions [15], [17]. In contrast to the results of previous findings that said loss aversion bias has no effects on investment decision making [5]

H4 : Loss Aversion has a negative influence on Investment Decision

2.7. Risk Tolerance

Placing an individual's financial decisions within the realm of risk tolerance entails accepting the utmost degree of uncertainty [9]. [29] argues that risk assessment is inherently subjective and influenced by various factors, including cultural, political, psychological, and social elements. The relationship between overconfidence, anchoring, representativeness, also availability heuristics and investment decisions can be substantially and positively mediated by risk tolerance, according to [16]. Further support for this notion can be found in the findings of [3], who discovered that the connection between overconfidence heuristics also investment decision making is entirely mediated by risk perception.

H5 : Risk Tolerance is able to mediate the relationship between Representativeness on Investment Decision

H6 : Risk Tolerance is able to mediate the relationship between Mental Accounting and Investment Decision.

H7 : Risk Tolerance is able to mediate the relationship between Overconfidence on Investment Decision

H8 : Risk Tolerance is able to mediate the relationship between Loss Aversion to Investment Decision.

3 Research Methods

3.1. Data Collection Techniques and Research Samples

This investigation was carried out quantitatively through the use of survey methods. For this investigation, the data were gathered via a questionnaire completed by the participants. The participants in this research were West Kalimantan stock investors. The number of samples utilised in this investigation was ascertained with a 10% level of precision utilising the Slovin formula. As determined by the sample calculation, a minimum sample size of 99.887 was required for this study. Therefore, this study ensures a sample size of ≥150 participants. The sampling methodology employed in this study is random sampling. The survey makes use of a seven-point Likert scale. Utilising a seven-point Likert scale can reduce measurement errors also produce more accurate results. This study employed the following Likert scale responses: strongly agree, agree, moderately agree, neutral, moderately disagree, disagree, strongly disagree.

3.2. Variable Measurement

This study employs SmartPLS in conjunction with PLS-SEM to analyse the model under investigation. Utilising a variance value-based methodology, PLS-SEM simultaneously examines the relationship between variables. Prior to subjecting a total of 150 samples to data analysis, the researcher performed a pre-test to ascertain the validity also reliability of the statement items in the questionnaire. Following this, samples of the reflective measurement model's validity also reliability were evaluated in the first test. Furthermore, correlation analysis and structural equation models were conducted.

4 Results And Discussion

4.1 Construct Reliability and Validity

Prior to conducting model testing, it is imperative to establish the validity also estimate the reliability of the constructed model. Validity is attributed to an indicator when its AVE (average variance extracted) value > 0.5. The AVE value, as defined by [1], signifies the average percentage of variance scores achieved by a set of latent variables through the iterative procedure of the PLS algorithm, as estimated by the standardised loading of their indicators. The outcome of the tests are as follows:

Table 1. Construct Reliability and Validity

	Cronbach's Alpha	Average Variance Extracted (AVE)
ID	0,891	0,615
LOSS	0,884	0,639
MA	0,856	0,636
OVER	0,901	0,567
REP	0,875	0,585
RISK	0,889	0,575

As evidenced by the Cronbach's Alpha value exceeding 0.6 also the composite reliability value surpassing 0.7, it is evident that all constructs pertaining to the independent also dependent variables exhibit commendable reliability in the validation and reliability assessment of the mediation model. Furthermore, this value is employed to generate rigorous scientific findings. The validity test yields favourable outcomes due to the fact that the AVE value for each variable exceeds 0.5. In light of this, it can be stated that all variables possess discriminant validity values.

4.2. Outer Loadings

In order to determine the loading factor of each indicator, outer loadings are utilised. A loading factor value among 0.5-0.6 is deemed adequate for preliminary research, according to Chin [8]. When the loading factor exceeds 0.7, the indicator demonstrates high validity and is deemed appropriate for utility. The results of outer loading for the mediation model can be seen that there are no indicators that have a loading factor value < 0.4. Therefore, all indicators contained in this study can be used in the research questionnaire.

4.3. Coefficient of Determination (R Square)

The correlation between the exogenous and endogenous constructs is quantified using the R Square. An indication of a significant relationship between the exogenous and endogenous constructs can be made when the R Square value exceeds 0.7. The following represent the outcomes of the R-squared value:

Table 2. R Square

	R Square	R Square Adjusted
ID	0,983	0,983
RISK	0,995	0,995

The R Square values for investment decision and risk are 0.983 and 0.995, respectively. These values indicate that the variables of representativeness, overconfidence, mental accounting, also loss aversion can account for the variability observed in the two endogenous variables. The relationship between exogenous also endogenous variables in this model is also robust.

4.4. Path Coefficient

The results of path coefficient analysis are used to measure the relationship between exogenous variables and endogenous variables. The significance value to see the relationship that occurs is P-value < 0,05 [11]. The path coefficient results can be seen in the following table:

Table 3. Path Coefficient

	P Values	Results
LOSS -> RISK	0,502	Not Significant
MA -> RISK	0,935	Not Significant

	P Values	Results
OVER -> RISK	0,000	Significant
REP -> RISK	0,000	Significant
RISK -> ID	0,000	Significant

By a P-value of 0.000, the test outcome indicate that the overconfidence variable has a direct effect on risk tolerance. By a P-value of 0.000, the representativeness bias variable, which is directly related to risk tolerance, has a significant influence. Furthermore, by a P-value of 0.000, the risk tolerance variable also exerts a substantial influence on investment decisions. In contrast, by a P-value of 0.502, the Loss Aversion variable does not exhibit a direct impact on Risk Tolerance. By a P-value of 0.935, the Mental Accounting variable also has no direct effect on Risk Tolerance.

4.5. Specific Indirect Effect

To determine the indirect relationship with the mediating variable, testing is employed. The P-value of 0.05 is the significance threshold used to determine whether or not there is an impact. The following table displays the particular indirect impact findings.

Table 4. Specific Indirect Effect

	P Values	Results
LOSS -> RISK -> ID	0,502	Not Mediated
MA -> RISK -> ID	0,935	Not Mediated
OVER -> RISK -> ID	0,000	Mediated
REP -> RISK -> ID	0,000	Mediated

The Overconfidence variable has a strong indirect impact on investment decision, that mediated by risk tolerance and has a P-value of 0.000, according to the findings of the particular indirect effect. Furthermore, by a P-value of 0.000, the representativeness bias variable influences the investment choice mediated by risk tolerance. When risk tolerance is used as a mediating variable and each variable has a value of P-value 0.502 and 0.935, loss aversion also mental accounting factors don't significantly affect investment decisions.

The model obtained from the research results using the mediation variable is as follows:

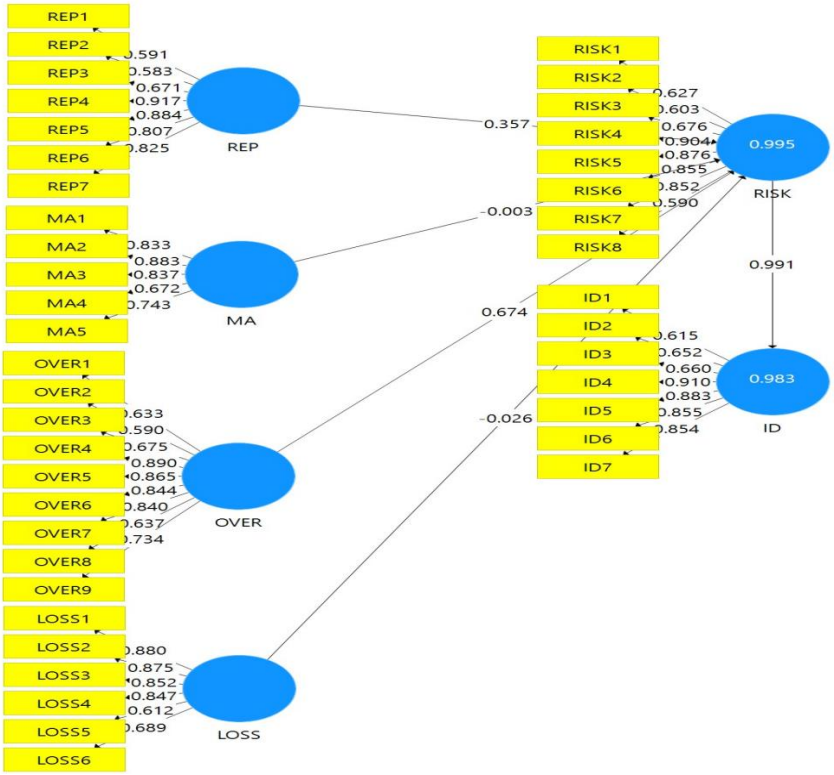

Fig. 2. Mediation Model

4.6. Total Effect

To examine how endogenous and exogenous factors are quantified as predictors, total effect is used. The P-value > 0.05 is the significance value that is applied. The following are the total effect results:

Table 5. Total Effect

	P Values	Results
LOSS -> ID	0,502	Not Significant
LOSS -> RISK	0,502	Not Significant
MA -> ID	0,935	Not Significant
MA -> RISK	0,935	Not Significant
OVER -> ID	0,000	Significant
OVER -> RISK	0,000	Significant
REP -> ID	0,000	Significant
REP -> RISK	0,000	Significant

	P Values	Results
RISK -> ID	0,000	Significant

By the total effect results, it can be seen that loss aversion has no relationship to investment decision and risk tolerance by a P-value of 0.502. The mental accounting variable has no relationship to investment decision and risk tolerance by a P-value of 0.935. The overconfidence variable has a significant relationship to both investment decision and risk tolerance with a P-value of 0.000. Representativeness variable has a significant relationship to investment decision and risk tolerance by a P-value of 0.000. The risk tolerance and investment decision variables have a significant relationship by a P-value of 0.000.

4.7. Hypothesis Discussion

The results showed that representativeness has a positive effect on investment decisions, thus proving that H1 is accepted. The outcome of this research are in line with research conducted by [21]. Mental accounting variables have no relationship to investment decisions. This proves that H2 is rejected. The outcome of this article are the same as research conducted by [13] and [30]. The overconfidence variable has a positive relationship with investment decisions. This demonstrates that H3 is accepted, and the findings agree with studies by [2], [4] and [24]. By the total effect results, it can be seen that loss aversion has no relationship to investment decisions. This shows that H4 is rejected. The outcome of this research are in line with research conducted by [5].

According on the outcome of the specific indirect effect, it shows that risk tolerance is able to mediate the relationship between representativeness on investment decisions. This shows that H5 is accepted. Furthermore, the association between overconfidence and investment choices might also be mediated by risk tolerance, indicating that H7 is accepted. This outcome is consistent with the findings of [16]. Moreover, the association between mental accounting and investment choices is not mitigated by risk tolerance, indicating the rejection of hypothesis H6. Then, risk tolerance is also unable to mediate the relationship between loss aversion also investment decision and states that H8 is rejected.

5 Conclusion

The outcome of the research conducted show that both cognitive bias also emotional bias have one bias each that has a positive effect on investment decisions. This shows that an investor's investment decision making is influenced by biases that occur from the investor's own reasoning and emotions. In addition, risk tolerance also has a strong influence in seeing the relationship between cognitive and emotional biases on investment decisions. Meanwhile, financial literacy is only able to strengthen the relationship between overconfidence also investment decision.

Reference

[1] Abdillah, W., & Jogiyanto, H. (2009). *Konsep dn Aplikasi PLS (Partial Least. Square) Untuk Penelitian Empiris.* Yogyakarta: BPFE.

[2] Adil, M., Singh, Y., & Ansari, M. S. (2022). How financial literacy moderate the association between behaviour the association between behaviour. *Asian Journal of Accounting Research*, 17-30.

[3] Ahmad, M., & Shah, S. Z. (2020). Overconfidence heuristic-driven bias in investment decision-making and performance: mediating effects of risk perception and moderating effects of financial literacy. *Journal of Economic and Administrative Sciences*, 1-31.

[4] Bakar , S., & Yi, A. N. (2016). The Impact of Psychological Factors on Investors' Decision Making in Malaysian Stock Market: A Case of Klang Valley and Pahang. *Procedia Economics and Finance*, 319-328.

[5] Bashir, T., Azam, N., Butt, A. A., Javed, A., & Tanvir, A. (2013). Are Behavioral Biases Influenced By Demographic Characteristics and Personality Traits? Eviden From Pakistan. *European Scientific Journal*, 277-293.

[6] De Bondt, W., & Thaler, R. (1995). Chapter 13 Financial decision-making in markets and firms: A behavioral perspective. *Handbook in Operation Research and Management Science*, 385-410.

[7] Fang, H. C., Siau, K., Memili, E., & Dou, J. (2018). Cognitive Antecedents of Family Business Bias in Investment Decisions: A Commentary on ''Risky Decisions and the Family Firm Bias: An Experimental Study based on Prospect Theory''. *Entrepreneurship Theory and Practice*, 1-8.

[8] Ghozali, I., & Latan, H. (2015). *Konsep, Teknik, Aplikasi Menggunakan. Smart PLS 3.0 Untuk Penelitian Empiris.* Semarang: BP Undip.

[9] Grable, J. (2000). Financial Risk Tolerance and Additional Factors That Affect Risk Taking in Everyday Money Matters. *Journal of Business and Psychology*, 625-630.

[10] Grable, J., & Roszkowski, M. (2008). The influence of mood on the willingness to take financial risks. *Journal of Risk Research*, 905-923.

[11] Hair, J., Hult, T., Ringle, C., Sarstedt, M., Danks, N., & Ray, S. (2017). *Partial Least Square Structural Equation Modeling (PLS-SEM) Using R.* Los Angeles: Sage Publications.

[12] Ishfaq, M., Nazir, M. S., Qamar, M. A., & Usman, M. (2020). Cognitive Bias and Extraversion Personality Shaping the Behavior of Investors. *Original Research*, 1-11.

[13] Jain, J., Walia, N., & Gupta, G. (2020). Evaluation of behavioral biases affecting investment decision making of individual equity investors by fuzzy analytic hierarchy process. *Review of Behavioral Finance*, 297-314.

[14] Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis Of Decision Under Risk. *Econometrica*, 263-291.

[15] Kengatharan, L., & Kengatharan, N. (2014). The Influence of Behavioral Factors in Making Investment Decisions and Performance: Study on Investors of Colombo Stock Exchange, Sri Lanka . *Asian Journal of Finance & Accounting*, 1-23.

[16] Kasoga, P. S. (2021). Heuristic biases and investment decisions: multiple mediation mechanisms of risk tolerance and financial literacy-a survey at the Tanzania stock market. *Journal of Money and Business*, 102-116.

[17] Khan, M. U. (2017). Impact of Availability Bias and Loss Inversion Bias On Investment Decision Making, Moderating Role of Risk Perseption. *IMPACT: Journal of Modern Developments in General Management & Administration (IMPACT: JMDGMA)*, 17-28.

[18] Khilar, R. P., & Singh , S. (2020). Role Of Emotional Bias On Investment Decision From Behavioural Finance Perspective. *International Journal Of Scientific & Technology Research*, 3457-3460.

[19] Mittal, S. (2022). Behavior biases and investment decision: theoretical and research framework. *Qualitative Research in Financial Markets*, 213-228.

[20] Nofsinger, J. (2005). *The Psychology of Investing.* New Jersey: Prentice-Hall Inc.
[21] Novianggie, V., & Asandimitra, A. (2019). The Influence of Behavioral Bias, Cognitive Bias, and Emotional Bias on Investment Decision for College Students with Financial Literacy as the Moderating Variable. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 92–107.
[22] Onsumu, Z. N. (2014). The Impact Of Behavioral Biases On Investor Decisions In Kenya: Male VS Female. *IMPACT: International Journal of Research in Humanities, Arts and Literature*, 87-92.
[23] Pompian, M. M. (2012). *Behavioral Finance and Investor Types.* Canada: John Wiley & Sons, Inc.
[24] Pradikasari, E., & Isbanah, Y. (2018). Pengaruh Financial Literacy, Illusion of Control, Overconfidence, Risk Tolerance, dan Risk Perception Terhadap Keputusan Investasi Pada Mahasiswa di Kota Surabaya. *Jurnal Ilmu Manajemen*, 424-434.
[25] Rasheed, M. H., Rafique, A., Zahid, T., & Akhtar, M. W. (2018). Factors influencing investor's decision making in Pakistan: moderating the role of locus of control. *Review of Behavioral Finance*, 70-87.
[26] Schweser, K. (2019). *Ethical and Professional Standards, The Asset Management, Industry and Profesionalism, and Behavioral Finance.* United States: SchweserNotes™.
[27] Seiler, M., Seiler, V., & Lane, M. (2012). Mental Accounting and False Reference Points in Real Estate Investment Decision Making. *The Journal Of Behavioral Finance*, 12-26.
[28] Shah, S. Z., Ahmad, M., & Mahmood, F. (2018). Heuristic biases in investment decision-making and perceived market efficiency. *Qualitative Research in Financial*, 85-110.
[29] Slovic, P. (1986). Informing and educating the public about risk. *Risk Analysis*, 403-415.
[30] Sukamulja, S., & Senoputri, A. Y. (2019). Regret Aversion Bias, Mental Accounting, Overconfidence, and Risk Perception in Investment Decision Making on Generation Y Workers in Yogyakarta. *SSRG International Journal of Economics and Management Studies (SSRG-IJEMS)*, 102-110.
[31] Thaler, R. (2005). *Advances in Behavioral Finance.* New York: Princeton University Press.
[32] Toma, F. M. (2015). Behavioral Biases of the Investment Decisions of Romanian Investorson the Bucharest Stock Exchange. *Procedia Economics and Finance*, 200-207.
[33] Tversky, A., & Kahneman, D. (1992). Advances in Prospect Theory: Cumulative Representation of Uncertainty. *Journal of Risk and Uncertainty*, 297-323.