Impact of Cognitive Biases on Investment Decisions of Investors in Nepal

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Abstract

This study examines the impact of cognitive biases on the investment decisions of Nepalese stock market investors using a self-administered questionnaire as the primary data collection method. By analyzing a sample of 234 respondents, the research investigates the influence of six cognitive biases: overconfidence bias, herding bias, representativeness bias, anchoring bias, loss-aversion bias, and confirmation bias. The study used both descriptive and inferential statistical tools to analyze the data. The findings reveal that a significant proportion of respondents exhibited either high or moderate levels of bias, suggesting it to be a concerning issue. The study found that representativeness bias had the strongest effect on investment decision-making, followed by herding and anchoring biases. These results suggest that cognitive biases can significantly affect the investment decisions of Nepalese investors and may have negative consequences for their investment outcomes. The study recommends that investors be aware of these biases and take measures to reduce the impact on decision-making.

Keywords: Cognitive biases, Investment, Stock market, Overconfidence, Herding,

Representativeness, Anchoring, Loss-aversion, Confirmation.

I. Introduction

Behavioral Economists and psychologists have been observing and conducting studies on human behavior from time to time. Among various aspects of human behaviors, studies on human decision-making processes have focused on understanding the influence of cognitive and behavioral elements. Investment decision-making is a complex process. Brealey et al. (2019) defined investment decisions as the choices made by individuals or organizations about allocating their financial resources to achieve the desired return. Decisions in finance and investment are often made in conditions fraught with uncertainties and ambiguities. Investors have to select between multiple unknown outcomes and their unknown probabilities. Tversky and Kahneman (1974) suggested that when making decisions under uncertainty, people often use mental shortcuts known as "heuristics" to simplify their decision-making process. These heuristics lead to systematic biases in judgment.

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However, before the field of behavioral finance merged, economists had different views on the investors' rationality and the market's efficiency.

The crux of this view can be found in Efficient Market Hypothesis. Fama (1965) defined an efficient market as a market where many rational profit-maximizers actively compete, each trying to predict future market values of individual securities and where important current information is almost freely available to all the participants. This theory implies that it is impossible to consistently achieve abnormal returns and outperform the market through investment strategies.

However, studies in behavioral finance have shown the presence of market anomalies. One such anomaly is the "small firm effect, according to which small firms tend to outperform large firms over the long run, and thus it is possible to achieve abnormal returns by investing in small firms (Banz,1981). Studies also have highlighted the effect of cognitive biases on investment decisions. Baker and Puttonen (2017) defined cognitive bias as a thinking error that occurs when people collect, process, and interpret information. Thaler and Sunstein (2008) argued that cognitive biases could cause investors to make suboptimal decisions and suggested that financial advisors and policymakers could use "nudges" to help individuals make favorable decisions. Thus, a conceptual conflict between traditional finance theories and behavioral finance needs to be addressed. Studies on cognitive biases are very limited in the context of Nepal. The stock market in Nepal has seen rapid growth in terms of the arrival of new investors. These investors allocate a significant proportion of their wealth to securities. De Long et al. (1990) suggested that the irrationality of the investors is a prime instigator in market fluctuations. Shiller (2003) suggested that both big stock market booms and crashes have some relation to human foibles.

Barber and Odean (2000) concluded that behavioral and cognitive factors influence investors' investment decisions, and these factors can affect investors' wealth significantly. In this context, this research investigates the impact of six cognitive biases on the investment decisions of Nepalese investors. The findings of this research can be helpful for both investors and policymakers.

The objectives of this research are:

- To examine the effect of overconfidence bias, herding bias, representativeness bias, anchoring bias, loss aversion bias, and confirmation bias on the investment decisions of investors in Nepal
- To identify which cognitive biases are most relevant in the Nepalese context.
- To classify investors based on their level of cognitive bias
- To measure the differences among demographic variables about cognitive biases of the investors

II. Review of Literature

Empirical Review

The literature on rationality and biases of investors can be classified into two categories: Traditional finance theories, which assume that investors are rational and Behavioral finance theory, which suggests investors behave irrationally and are prone to various biases and errors.

Markowitz (1991) developed the Modern Portfolio theory based on the rationality assumption of investors. It describes how a rational investor would put together a diversified portfolio spanning a variety of asset classes to maximize expected return for a particular level of risk tolerance. The emerging theory created an "efficient frontier," or the ideal portfolio combination for any risk tolerance.

Based on the Expected Utility theory, Von Neumann and Morgenstern (1944) suggested that people have consistent, clear preferences; they are aware of what they want, and their choice for one option over another is independent of the circumstances. When faced with a decision, people will consider all their options before choosing the one they believe to be the best.

Treynor (1961), Sharpe (1964), and Lintner (1965) independently developed the Capital Asset pricing model (CAPM). Assuming risk-free borrowing, lending, and rational decisions, the model established the framework for modern finance. The relationship between systemic risk, and expected return for assets, specifically equities, is described by CAPM.

Basu (1977) found problems with the CAPM. After sorting the stocks by the characteristics of earning price, equities with greater earnings yields had better returns than the CAPM would have indicated.

Bernard and Thomas (1990) challenged the efficient market theory by presenting research that showed that following certain straightforward trading guidelines could lead to positive abnormal returns. They encouraged maintaining an open mindset to new ideas to understand how pricing in a seemingly competitive market could differ from underlying values.

Contrary to popular belief, Shiller (1999) stated that investors are often motivated by fear and greed and speculate about stocks between inflated highs and lows. In other words, investors consistently form unreasonable expectations for the future performance of businesses and the overall economy because of the extremes of their emotions, subjective thinking, and the whims of the crowd. As a result, stock prices swing above and beyond fundamental values and follow a somewhat predictable, wavelike path.

Mullainathan and Thaler (2000) suggested that the traditional economic model of human behavior is unrealistic, and the reason for it is that it contains unbounded rationality, unbounded willpower, and unbounded selfishness.

Thaler and Sunstein (2008) defined cognitive biases as systematic errors in judgment that arise from the brain’s attempt to simplify the decision-making process.

To explain the reason behind heuristics and biases, Haselton et al. (2015) concluded that there could be mainly three reasons behind heuristics. First, heuristics could benefit natural selection by providing some shortcuts. Second, if the biased solution costs less than the unbiased one and the work being done does not match the design of the mind.

Peters and Büchner (2013) defined overconfidence bias as a cognitive bias that occurs when an individual's subjective confidence in their abilities or judgments exceeds the objective accuracy of those abilities or judgments.

Trinugroho and Sembel (2011) found that very overconfident investors tend to engage in more trading than less overconfident investors. They also observed that highly overconfident investors continue to trade at the same rate before and after the negative news release, while less overconfident investors reduce their trading activity. The study showed that highly

overconfident investors performed significantly worse than those who were not as overconfident.

Bhatt andSidhpuria (2018) defined Herding Bias as people's tendency to imitate a crowd has observed actions.

Using daily data from the Greek, Italian, Portuguese, and Spanish stock markets for 1998–2008, Economou et al. (2010) investigated asymmetric herding behavior related to market returns, return volatility, and trading volume.

Additionally, they investigated whether herd behavior existed during the 2008 global financial crisis. According to the study, herding is more prevalent when certain stock markets are experiencing gains.

Kahneman and Tversky (1972) defined representativeness bias as the tendency to judge the likelihood of an event based on its similarity to a typical example or stereotype rather than on its objective probability.

De Bondt and Thaler (1987) revealed that investors influenced by representativeness bias become too pessimistic about equities that have historically underperformed and overly optimistic about stocks that have historically thrived, as a result of this overreaction to both good and negative news, companies that have historically performed poorly become undervalued, while the companies that have historically performed well become expensive.

Tversky and Kahneman (1974) defined anchoring bias as the tendency of people to make estimates by starting with an initial value or anchor, which is adjusted to get the final answer. People frequently construct estimates by starting with an initial number that is then altered to produce the final response. This process is known as anchoring, a cognitive heuristic.

Klibanoff et al. (2005) discovered that initial IPO prices are frequently set higher than the underlying asset value and that this overpricing is frequently not corrected by subsequent market forces. They concluded that anchoring bias might contribute to overpricing because investors may be anchored to the initial offering price and slow to adjust their expectations in the face of new information.

Kahneman and Tversky (1979) defined Loss aversion bias as a tendency of people to be more sensitive to a reduction in their capital than to an increase in it. It is the propensity for people to strongly prefer avoiding losses to achieving benefits. Loss aversion can affect how people manage their resources and react to changes in the value of their investments when making investment decisions. Losing investments may be kept longer by risk-averse investors in the expectation that they will eventually recover rather than being sold and resulting in a loss.

Odean (1998) looked at how individual investors traded and discovered that they frequently sold winning stocks too soon and hung onto loser stocks for too long. He concluded that this "disposition effect" is probably the result of loss aversion since people may be more driven to prevent losses than to realize prospective gains.

Park et al. (2010) suggested that overconfidence may be significantly influenced by confirmation bias, which affects how investors process information. According to the theory of confirmation bias, people tend to choose which information they learn based on their preexisting opinions. Investors should expose themselves to confirming and disconfirming

information, objectively analyze the relevance and reliability of new information, and integrate all the information before being impartial in their information collection and processing.

Research gap

There is a conflict between traditional finance theories, which assume that investors are rational and free of biases, and behavioral finance theories, which suggest that biases and psychological factors influence investors. Studies on behavioral finance have challenged assumptions like the efficient market hypothesis, which states that all information is equally available to investors and that stock prices reflect all relevant information. More research is needed to resolve this contradiction, and there has been relatively little research on behavioral finance in developing economies like Nepal. This study aims to contribute to the existing literature by examining investors' cognitive biases in Nepal.

III. Research Methodology

Research Design

Descriptive research design and Correlational research design. Descriptive research design has been used to analyze the characteristics of different groups of investors, and correlational research design has been used to establish the relationship between the dependent and independent variables.

Population and sample size

All the individual investors active in the Nepali Share market, engaging in buying/selling of the securities, constitute the population of this study. To determine the sample size formula given by Cochran (1977) has been used. According to the formula, the sample size is 384. The initial sample size for this research was taken at 390. Based on the properly filled in questionnaires and sample selection criteria, the final sample size was 234, corresponding to a response rate of 60%.

Sampling method

Non-probability sampling techniques have been used: Judgment, Convenience, and Snowball sampling techniques.

Data collection

Primary data collection through a self-administered survey questionnaire was conducted. The questionnaire was distributed both online (through Google Forms) and physically. Investors for the sample comprised college teachers, students, businessmen, and private and government employees. A pilot test of the questionnaire was done with academicians and experienced investors, and their suggestions were incorporated into the making of the final questionnaire. The reliability of the questionnaire, as measured by both Cronbach's alpha and McDonald's Omega, was 0.7 and above.

Data analysis

Arithmetic means have been used to classify the investors based on their level of biasedness. Investors are biased in 5-6 cognitive biases are classified as highly biased investors. Those biased in 3-4 cognitive biases are classified as moderately biased. Investors biased in 1-2 cognitive biases are classified as lowly biased, and those who are not biased in any biases are

classified as unbiased investors. Descriptive statistics tools like maximum, minimum, and standard deviation have been used. The normality of data has been checked with the help of the Shapiro-Wilk test and Kolmogorov-Smirnov tests. A multicollinearity test has been done with the Variance Inflation factor analysis.

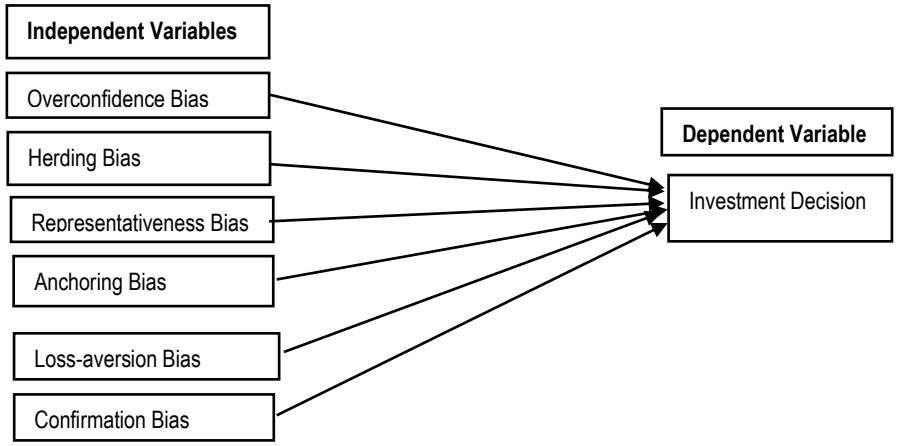
One way-ANOVA test has been done to check the differences among demographic variables about the independent variables in the study. Pearson's correlation test is done to check the association between the variables. Finally, regression analysis is done to check the model's fit, and p-values generated from the regression have been analyzed to test the hypotheses.

The following are the hypotheses of the study:

- H1: There is a significant relationship between Overconfidence bias and the investment decisions of investors in Nepal.
- H2: There is a significant relationship between Herding bias and the investment decision of investors in Nepal.
- H3: There is a significant relationship between Representativeness bias and the investment decision of investors in Nepal.
- H4: There is a significant relationship between Anchoring bias and the investment decision of investors in Nepal.
- H5: There is a significant relationship between Loss aversion bias and the investment decision of investors in Nepal.
- H6: There is a significant relationship between Confirmation bias and the investment decision of investors in Nepal.

Figure 1

Theoretical Framework



Source: Baker and Puttonen (2017) &Dhungana et al. (2022)

The model in the study is:

$ID = \beta_0 + \beta_1 OB + \beta_2 HB + \beta_3 RB + \beta_4 AB + \beta_5 LB + \beta_6 CB + e$

WhereID= Investment Decision, β_0 = Intercept term. β_1, β_2, β_3, β_4, β_5, and β_6 are the regression coefficients for Overconfidence bias, Herding bias, Representativeness bias, Anchoring bias, Loss-aversion bias, and Confirmation bias, respectively, and e = error term in the model.

IV. Results and Analysis

Table 1

Descriptive Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Overconfidence Bias	234	1.25	5.00	3.4476	.73624
Herding Bias	234	1.50	5.00	3.2041	.68222
Representativeness Bias	234	1.50	5.00	3.4712	.65058
Anchoring Bias	234	1.50	5.00	3.3878	.59412
Loss-aversion Bias	234	1.00	5.00	3.3162	.68074
Confirmation Bias	234	1.50	5.00	3.6474	.65320

In the above table, we can see, in relation to the Overconfidence bias, the average was 3.45 with a standard deviation of 0.74. For Herding bias, the average was 3.20 with a standard deviation of 0.68.

With respect to Representativeness bias, the average was 3.47 with a standard deviation of 0.65. For Anchoring bias, the average was 3.39, with a standard deviation of 0.59. Regarding Loss-aversion bias, the average was 3.32 with a standard deviation of 0.68. Finally, with respect to confirmation, the average was 3.65, along with a standard deviation of 0.65.

Tale 2

Biasedness classification

Biasness Level	Number
Highly Biased	56
Moderately Biased	94
Lowly Biased	76
Unbiased	8
Total	234

In the above table, we can observe that, out of 234 respondents, 56 falls under Highly Biased criteria, corresponds to 24%; 94 out of 234 respondents fall under Moderately Biased criteria, corresponding to 40%; 76 respondents fall under Lowly Biased criteria, which corresponds to 33%, and 8 respondents, i.e., 3% of total respondents fall under Unbiased criteria. We can conclude that most of the respondents exhibit some level of biasedness.

Table 3

Normality test

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.049	234	.200*	.992	234	.258
Standardized Residual	.049	234	.200*	.992	234	.258

The above table shows that the p-values (sig.) of the Unstandardized residual in both tests are greater than 0.05. Therefore, we can accept the null hypothesis that the distribution is normal.

Table 4

Multicollinearity test

Variables	Collinearity Tolerance	VIF
Overconfidence Bias	0.908	1.102
Herding Bias	0.727	1.376
Representativeness Bias	0.706	1.416
Anchoring Bias	0.655	1.526
Loss-aversion Bias	0.791	1.265
Confirmation Bias	0.856	1.168

The collinearity tolerance measures the presence of multicollinearity, and VIF measures the degree of multicollinearity. Here, the Variance Inflation Factor (VIF) values for all the independent variables are below 5, indicating weak multicollinearity.

Table 5

One-way ANOVA Test

Variables	Statistics	OB	HB	RB	AB	LB	CB
Gender	F-value	12.931	0.545	1.223	1.192	2.438	1.775
	P-value	0.0	0.461	0.270	0.276	0.120	0.184
Age	F-value	1.472	1.534	1.056	2.163	1.590	1.237
	P-value	0.212	0.193	0.379	0.074	0.178	0.296
Marital Status	F-value	0.851	0.618	0.058	0.497	5.333	3.007
	P-value	0.357	0.433	0.809	0.482	0.022	0.084
Education	F-value	0.363	2.003	1.346	2.834	1.656	0.591
	P-value	0.696	0.137	0.262	0.061	0.193	0.555
Occupation	F-value	2.229	1.444	3.002	1.777	3.657	0.606
	P-value	0.067	0.220	0.019	0.134	0.007	0.659
Income	F-value	0.549	1.700	1.505	0.356	2.950	1.893
	P-value	0.700	0.151	0.202	0.839	0.021	0.113
Experience	F-value	3.519	2.112	2.196	3.509	1.457	0.393
	P-value	0.031	0.123	0.114	0.032	0.235	0.675

The One-way ANOVA test results suggest that the overconfidence bias varies across male and female investors. Other cognitive biases do not have sufficient variation across gender groups. Regarding age groups, the cognitive biases did not have sufficient variations. Concerning marital status, loss-aversion bias significantly changed in married and unmarried investors. Other cognitive biases did not differ. The study found no significant change in cognitive biases regarding education level. This could be because most of the respondents in the study were Bachelor or Master & above qualified. Significant differences in representativeness bias and loss-aversion bias were observed between different occupational groups. The other cognitive biases did not show significant changes.

Regarding income level, loss aversion biases significantly changed over different income groups. However, other cognitive biases did not differ significantly with income level. The differences in overconfidence bias and anchoring bias were significant across investors with varied level of experience in the Nepali share market. The remaining cognitive biases did not change significantly with respect to experience in the share market.

Table 6

Pearson's correlation test

Variables	Investment	OB	HB	RB	AB	LB	CB
Investment	1						
OB	.337**	1					
HB	.587**	.109	1				
RB	.641**	.181**	.409**	1			
AB	.581**	.229**	.446**	.443**	1		
LB	.334**	.067	.334**	.345**	.375**	1	
CB	.425**	.240**	.142*	.267**	.286**	.216**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The relationship between Investment decisions and all cognitive biases is positive. A high correlation was found for Representativeness bias and Investment decision, Herding Bias and Investment Decision, and Anchoring Bias and Investment decision. A moderate correlation was seen between Overconfidence Bias and Investment decision, Loss-Aversion Bias and Investment decision, & Confirmation bias and Investment decision. The highest association was found between Representativeness bias and Investment decisions. The lowest association was found between Loss-aversion bias and Investment decision.

Table 7

Multiple Regression Analysis

Variables	Unstandardized Coefficients		Standardized Coefficients			Model Summary
	B	Std. Error	Beta	T	P-value	
(Constant)	.100	.177		.562	.575	R^2= 0.654
OB	.108	.030	.147	3.595	.000	Adjusted R^2= 0.645
HB	.252	.036	.317	6.930	.000	F-value= 71.588
RB	.291	.039	.349	7.522	.000	P-value=0.00
AB	.184	.044	.201	4.178	.000	
LB	-.017	.035	-.021	-.473	.637	
CB	.165	.035	.199	4.707	.000	

There is a positive relationship between each independent and dependent variable except for the loss-aversion bias. The relationship between each independent and dependent variable other than loss-aversion bias is statistically significant, as shown by the corresponding p-values. The highest beta for Representativeness bias indicates that 29.1% variation in investment decisions is explained by Representativeness bias and is followed by Herding bias, whose coefficient is 0.252. Similarly, the beta coefficients of Anchoring bias, Confirmation bias, and Overconfidence bias are 0.184, 0.165, and 0.108, respectively. In the model summary section of the table, the value of R2 is 0.654, which suggests that the independent variables explain a 65.4% variation in the dependent variable in the model. The F-value for the model is 71.588 and is significant, as shown by the p-value below 0.05, confirming that the relationship between dependent and independent variables is statistically significant and that the model is a good fit for the data.

Table 8

Hypothesis Testing

Independent variables	Dependent variable	P-values	Hypothesis support
Overconfidence Bias	Investment decision	0.00($p<0.05$)	H_1 accepted
Herding Bias	Investment decision	0.00($p<0.05$)	H_2 accepted
Representativeness Bias	Investment decision	0.00($p<0.05$)	H_3 accepted
Anchoring Bias	Investment decision	0.00($p<0.05$)	H_4 accepted
Loss-aversion Bias	Investment decision	0.637($p>0.05$)	H_5 rejected
Confirmation Bias	Investment decision	0.00($p<0.05$)	H_6 accepted

From the above table, we can see that p-values for all the relationships between the dependent and independent variables are less than 0.05, except for the loss-aversion bias. Based on this, Hypotheses H_1, H_2, H_3, H_4, and H_6 are accepted. Hypothesis H_5 is rejected. This test implies that Overconfidence bias, herding bias, Representativeness bias, Anchoring bias, and Confirmation Bias have a significant relationship between the Investment decisions of investors in Nepal, whereas, Loss-aversion bias and Investment decision do not have a significant relationship between them.

V. Discussion

In this study, six cognitive biases were studied, and their effect on the Investment decisions of Nepali investors was examined. 234 samples were finalized for the study. According to the classification criteria set, above 64% of the respondents were highly or moderately biased. This is a considerably high percentage and is a warning sign to investors in Nepal. Shefrin (2000) concluded that investors are susceptible to many kinds of errors, some of which can be fatal. He warns that psychological factors and biases can pose a major threat to investors' wealth.

Regarding cognitive biases, representativeness bias had the highest effect on investment decision-making of Nepali investors as suggested by β_3=0.291, p value<0.05. This is in line with the research by Irshad et al. (2016), which concluded that representativeness bias had a significant effect on the investment decision of investors in Pakistan. The second most affecting cognitive bias was the Herding bias. This bias accounted for a 25.2% change in the dependent variable.

The research by Dhungana et al. (2022) &Gyanwali and Neupane (2021) also found that herding bias had a statistically significant effect on the investment decision of Nepalese investors. Anchoring Bias had the third highest impact on investment decisions. This contradicts the research by Dhungana et al. (2022), which found that the effect of anchoring bias on investment decisions was statistically insignificant. However, the study by Dangol and Manandhar (2020) concluded that anchoring and adjustment factors significantly impacted the irrationality of investment decisions of Nepalese investors.

Both confirmation bias and overconfidence bias had a significant positive effect on the investment decisions of the respondents. However, studies on confirmation biases have been limited in Nepal. The study by Armansyah (2022) suggested that confirmation bias had a significant impact on the investment decisions of Indonesian investors. Most Nepalese research on behavioral finance has found a significant impact of overconfidence bias on investment decisions.

The effect of loss-aversion bias was insignificant, as suggested by the p-value, which is greater than 0.05. There have been mixed conclusions about the effect of loss-aversion bias in various studies. The final analysis of the research was hypothesis testing. Based on the p-values obtained in the multiple regression analysis, Hypotheses: H_1, H_2, H_3, H_4& H_6 were accepted, but H_5 was rejected.

VI. Conclusion and Implications

Consistent with numerous research in the field, Nepalese investors were also found to be influenced by cognitive biases. The biasedness level classification confirms the wary status about the rationality of Nepalese investors as most of them fell under the highly biased or moderately biased category. Five out of six cognitive biases in the study significantly impacted their investment decisions. Representativeness bias, Herding bias, and Anchoring bias were the three most affecting biases. Nepalese investors give too much weight to the stereotypes about good stocks. Rather than making informed decisions by analyzing all the aspects of investment, they tend to rely on their peers, social media, and the masses. The investors also rely too much on an anchor. This can lead to suboptimal decisions because the anchor may not be relevant or accurate, and the person may not consider other important information that could affect their decision. Investors in Nepal also tend to be overconfident. They are quick to assign the success of some of their investment decisions to their ability and strategy and may be prone

to taking unjustified risks. Furthermore, the significant effect of confirmation bias on investment decisions suggests that Nepalese investors tend to selectively look for information that matches their beliefs.

This research can help investors be aware of their biases in investment decisions. By recognizing and understanding their own cognitive biases, investors can make more rational and effective investment decisions that are better aligned with their goals and objectives. This study is also beneficial to the finance industry. By offering more open and easily accessible information on the risks and benefits of investments, the financial industry can build products and services that are more suited to investors' psychological and emotional needs. The study's outcome can also help regulatory authorities like SEBON by assisting them to set standards for financial literacy and education of investors and develop plans and policies for the same.

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