Journal of Emerging Technologies in Accounting, Auditing and Finance
ETAAF
Vol.3, No.4, Winter 2025

Modeling the Effects of Behavioral Biases and Personality Traits of Investor Types on Their Decision-Making under Capital Market Uncertainty

Maryam Mahmoudi Farahani
Department of Finance, Ar.C., Islamic Azad University, Arak, Iran.
Email: maryam.mahmoudifarahani@iau.ac.ir

Majid Zanjirdar
Department of Finance, Ar.C., Islamic Azad University, Arak, Iran.
(Corresponding Author)
Email: majid_zanjirdar@iau.ac.ir

Majid DavodiNasr
Department of Accounting, Ar.C., Islamic Azad University, Arak, Iran.
Email: mdavoudinasr@iau.ac.ir

Submit: 2025/09/20 Accept: 2026/02/04

Abstract

Objectives: This study aims to model the impact of behavioral biases and personality traits on individual and institutional investors' decision-making under conditions of uncertainty in the capital market.

Methodology/Design/Approach: The present study adopts a mixed-method approach. In the qualitative section, opinions of 17 experts (faculty members and market participants) were collected and analyzed through Interpretive Structural Modeling (ISM). In the quantitative section, data from 384 investors were gathered using a questionnaire in 2024 and analyzed via Structural Equation Modeling (SEM).

Findings: In the qualitative phase, the Delphi technique, ISM, and MICMAC software were used to identify and classify the dimensions and components. Results indicated that cognitive and emotional biases, cultural dimensions, personal characteristics, personality types, and demographic features significantly influenced investor decision-making. Cognitive biases, personal traits, personality types, and demographic features were identified as key foundational factors. In the quantitative phase, SEM analysis confirmed the significant positive impact of behavioral biases and personality traits on the decision-making of both individual and institutional investors under market uncertainty.

Conclusion: The results reveal a complex and multifaceted set of psychological, cognitive, emotional, demographic, cultural, and behavioral factors that hierarchically influence investor behavior.

Innovation: By presenting a structured framework of factors affecting investor decisions, this study enriches the behavioral finance literature and provides practical guidelines to improve investment behavior under uncertainty.

Keywords: Interpretive Structural Modeling (ISM), Behavioral Biases, Personality Traits, Investor Decision-Making, Capital Market Uncertainty..

1. Introduction

Many studies on investment decision-making indicate that there is insufficient knowledge regarding why individuals invest and how they make decisions. Therefore, investors need to understand the reasons behind their behavior to make informed choices that help them achieve their investment goals. This issue is particularly relevant in developing countries, especially Iran, where the stock market is inefficient, and any political or economic changes can quickly affect the stock exchange, causing volatility and preventing stock prices from reflecting their intrinsic value.

A central feature of investment is its inherent reliance on the future. Investors naturally aim to select investments that maximize expected returns based on the available financial capital, which requires forecasting the future of each option. Factors influencing investor decision-making relate both to investor characteristics and environmental factors. Environmental factors include laws and regulations, fluctuations in key economic variables such as inflation, exchange rates, and parallel market returns; additionally, political and economic instability in the market environment increases investment risk.

Prior studies also indicate that personality traits, investment knowledge, and environmental factors influence investor behavior. Moreover, government policies, whether fiscal or related to the investment culture of each country, also affect investment decisions. These factors at least partially govern market behavior and explain why investors may act irrationally (Asiayi Aghdam et al., 2021).

Interpretive Structural Modeling (ISM) is one of the system design methods, particularly for economic and social systems, where mathematics, computers, and expert participation are used to design large and complex systems. The structural-interpretive analytical method was proposed by Warfield (1974). This method is an interactive process in which a set of interconnected elements is structured into a systematic and comprehensive model. ISM helps organize complex relationships among system elements. In other words, ISM is an evolutionary learning process that interprets experts' opinions to understand relationships among concepts of a problem and creates a comprehensive structure of a complex set of concepts. It specifies the precedence and influence of elements on one another, as well as the direction and strength of relationships within a hierarchical structure.

Despite theoretical advancements in behavioral finance, there is a significant research gap in modeling the comprehensive effects of behavioral biases and personality traits on investor decision-making. Particularly, the use of advanced methods such as ISM and MICMAC analysis for examining complex interactions between these factors under capital market uncertainty has received limited attention.

Theories and prior research indicate that multiple studies have examined investor decision-making in financial markets. Over the past decades, financial theories have evolved into two main approaches: the neoclassical approach and the behavioral finance approach. The neoclassical approach, rooted in models such as the Efficient Market Hypothesis (EMH) and Capital Asset Pricing Model (CAPM), assumes market efficiency and rational investor behavior based on available information. This perspective emphasizes economic logic and describes investor behavior as predictable and optimal. Classical models such as Expected Utility Theory and Arbitrage Pricing Theory analyze investor behavior based on maximizing returns and minimizing risk. However, empirical observations in financial markets—such as unexplained volatility, deviations from intrinsic value, and irrational reactions to new information—show that investor decisions do not always align with rational models. These inefficiencies led to the emergence of behavioral finance, which emphasizes the role of psychological factors, cognitive, and emotional biases in decision-making (Kartini & Nada, 2021).

The behavioral finance approach, initiated by Kahneman and Tversky in the 1970s, demonstrates that investors are influenced by biases such as the disposition effect, loss aversion, overconfidence, and

herding behavior, leading to decisions that deviate from economic rationality. Prospect Theory, a cornerstone of behavioral finance, explains that investors evaluate gains and losses asymmetrically and exhibit stronger tendencies to avoid losses than to acquire gains. Additionally, heuristic biases, including anchoring, representativeness, and availability, represent mental shortcuts investors use under uncertainty, often resulting in systematic errors. Personality traits, such as risk aversion, independence, tolerance for ambiguity, and risk propensity, also play a significant role in shaping investor behavior. For example, investors with high ambiguity tolerance may perform better under uncertainty, whereas overconfident individuals may take excessive risks, resulting in substantial losses (Singh et al., 2024).

In emerging markets such as Iran's capital market, characterized by low efficiency, high price volatility, and sensitivity to political and economic factors, understanding the determinants of investor decision-making is particularly important. In such markets, government policies, exchange rate fluctuations, inflation, laws and regulations, and investment culture present additional challenges for individual and institutional investors. Studies show that under uncertainty, investors often make decisions influenced by cognitive biases, such as mental accounting and conservatism, as well as emotional biases, including loss aversion and excessive optimism (Kola, 2022). Framing effects, which determine how information presentation influences decisions, and anchoring, reflecting investors' reliance on initial reference points, are examples of these biases. Moreover, herding behavior, in which investors follow others' decisions regardless of fundamentals, is a key factor in volatile markets (Tsemen et al., 2024).

Investors' personality traits, based on Five-Factor or Myers-Briggs models, significantly affect decision-making. For instance, traditional investors may perceive financial opportunities differently from innovative individuals, influencing investment strategy selection. Psychological traits, including anxiety, narcissism, or innovation, are associated with trading styles and investment performance (Arisoy et al., 2024). Additionally, demographic factors such as age, gender, and education level influence investment decisions. Higher-educated investors may perform more precise analyses, while age affects risk tolerance. These factors gain greater importance in emerging markets characterized by information opacity and environmental instability.

The present study aims to fill the identified research gap and examine the effects of behavioral biases and personality traits of individual and institutional investors on decision-making under capital market uncertainty. This study employs a mixed-methods approach, including the Delphi method, ISM, MICMAC analysis, and Structural Equation Modeling (SEM), to develop a comprehensive framework for identifying key dimensions and components, analyzing relationships among them, and validating the model. In the first phase, effective factors were identified using Delphi and expert opinions. In the second phase, relationships among these factors were analyzed through ISM and MICMAC, and finally, model validation was performed using SEM.

The significance of this research lies in its contribution to understanding psychological and behavioral factors affecting decision-making and in providing a structural model offering practical guidance to policymakers, market managers, and investors. Considering the direct impact of investor decisions on market dynamics, economic stability, and capital attraction, the results can improve investment processes, reduce the effects of irrational biases, and strengthen informed decision-making in volatile markets. Furthermore, by localizing the model in Iran's capital market, the study identifies market-specific characteristics and provides contextually appropriate solutions.

2. Literature Review

Cognitive biases exert a significant influence on investors' decision-making and often lead to irrational choices. Mental accounting, in which investors

mentally categorize financial resources into separate accounts, causes decisions to be made based on artificial classifications rather than the overall portfolio return. The disposition effect drives investors to sell winning stocks prematurely and hold losing ones, thereby limiting potential profits. Conservatism, understood as resistance to changing beliefs in light of new information, prevents timely reactions to market changes. Representativeness heuristics, relying on simplistic patterns, guide investors toward unrealistic predictions based on limited evidence. Mental budgeting, by determining illogical budgets for investments, disrupts optimal risk management. One-dimensional analysis, by focusing on a single piece of information, ignores other key factors such as risk or economic conditions (Alaham, Johnson, & Lee, 2024).

Personality traits also play a vital role in investment decision-making. Change-averse individuals prefer low-risk investments such as bonds and avoid high-risk opportunities. Independent individuals, relying on personal analysis, are interested in complex investments but may face high risks due to limited experience. Confident individuals gravitate toward high-risk investments such as technology stocks, while anxious individuals act more conservatively and miss profitable opportunities. Followers, who mimic market trends or others' decisions, incur losses in volatile conditions. Introverted individuals lean toward long-term strategies with in-depth analysis, whereas extroverts are attracted to dynamic, high-risk markets (Jiang, Wang, & Smith, 2024).

Emotional biases—including overconfidence, regret, herding behavior, endowment effect, loss aversion, myopia, excessive optimism, representativeness, and risk aversion—amplify irrational decisions. Overconfidence leads to risky trades, while loss aversion results in holding losing assets. Herding behavior and the endowment effect can amplify bubbles or large sell-offs. Myopia and excessive optimism, by focusing on short-term gains and ignoring real risks, reduce returns (Shabri, Kumar, & Patel, 2024; Arisoy, Demir, & Kaya, 2024).

Individual and demographic characteristics also affect decision-making. Futures literacy, financial intelligence, and financial management skills enable more precise analysis and better risk management. Greater wealth increases risk tolerance. Younger individuals favor risky assets, while older individuals prefer safer investments. Women tend to act more conservatively, whereas men exhibit higher risk-taking. Higher education facilitates detailed analysis, and occupation and marital status influence risk tolerance (Falk, Schneider, & Thomas, 2024).

Salehi (2024), in a study titled Behavioral Finance Factors and Investment Decisions: The Mediating Role of Risk Perception, examined the topic. Results indicate that herding behavior, disposition effect, and blue-chip bias significantly positively influence risk perception. Overconfidence positively affects investment decision-making but not risk perception. Risk perception is significantly positively related to investment decisions. All four behavioral finance factors have significant indirect effects on investment decisions via risk perception. However, this study focused only on four behavioral factors, and other factors may also influence risk perception and investment decisions.

Khatabi and Gharghi (2024), in a study titled Identifying and Ranking Factors Affecting Investors' Performance in the Tehran Stock Exchange, found that, according to the DEMATEL technique, capital market regulation risk, economic indicators, and financial literacy are influential criteria. Ranking of sub-criteria based on impact revealed that investors' lack of anxiety and stress during trading, returns from parallel markets, absence of greed, and reliance on fundamental analysis were the top four factors affecting investor performance.

Darabi and Zohrabi (2024), in a study titled Effects of Risk Management on Firm Value and Investment Decisions in Iran's Capital Market, found that risk management significantly and directly affects firm value at a 95% confidence level, while investment decisions' effect on firm value was not significant. Additionally, the mediating role of investment

decisions between risk management and firm value was significant at the 0.05 level.

Zeinivand et al. (2023) examined behavioral biases and investment decisions of individual and institutional investors under uncertainty in the Tehran Stock Exchange. Results showed that behavioral biases differently affect investment decisions for these two groups, and the impact of each bias varies under market uncertainty. Predictive models were proposed for both investor types using their behavioral biases.

Mousavi (2022), in a study titled The Impact of Financial Behavior on Investment Decisions, explored the relationship between financial behavior and investment decisions. F-test results indicated that financial behavior significantly affects investment decisions.

Yazdanian and Saeedi (2022), in The Effect of Investors' Behavioral Biases on Their Investment Decisions in Stocks, Currencies, Fixed-Income Securities, and Bank Deposits, found that cognitive and emotional biases directly and significantly influence investors' preferences for various assets. Emotional biases mainly influenced riskier assets like stocks and currencies, while cognitive biases impacted low-risk assets such as fixed-income securities and bank deposits.

Shunmugasundaram et al. (2024), in The Impact of Behavioral Biases on Investment Decisions: A Serial Mediation Analysis, reported that behavioral biases affect investment decisions of life insurance policyholders.

Dhingra et al. (2024), in The Impact of Behavioral Factors on Investment Decisions and Investment Performance in the Croatian Stock Market, found that overconfidence, prospect theory elements, emotions, and personality dimensions (stability and flexibility) positively influenced investment decisions, whereas herding behavior negatively impacted them. Investment decisions favoring long-term investments positively affected satisfaction with investment performance.

Lindner et al. (2023) examined social motivations in investment decisions, showing that intrinsic motivation increases risk-taking. Investor behavior was mainly determined by reputational motivations and risk tolerance. Professionals showed stronger intrinsic motivation than non-professionals, though valid incentives could elicit similar behaviors in less-experienced individuals.

Samal and Mahapatra (2022) found that behavioral biases—regret aversion, herding, fear of missing out, overconfidence, and cognitive dissonance—significantly influence investment decisions.

3. Methodology

The present study is exploratory in terms of its objectives and employs a mixed-method approach, combining qualitative and quantitative elements. Based on data type and analysis style, it can be classified as a qualitative-quantitative study with documentary data collection. From a methodological perspective, the research is of a mixed and analytical-descriptive type.

In this study, to determine the decision-making patterns of individual and institutional investors under capital market uncertainty, based on behavioral biases and personality traits of accounting investors, the first phase focuses on identifying the dimensions of the investors' decision-making model through a review of past research, the Delphi method, questionnaire distribution, and aggregation of expert opinions. In the second phase, MICMAC analysis was used to evaluate interactions within the investor decision-making model. Finally, in the third phase, Structural Equation Modeling (SEM) was employed to examine the effects of variables.

The qualitative population consisted of university faculty members and active capital market participants. A snowball sampling technique was used to select 17 academic and professional experts to complete the questionnaire until theoretical saturation was reached. Expert selection criteria included faculty membership, relevant research experience, teaching or analysis in capital market subjects, and academic background in accounting or financial management.

The quantitative population and sample included individual investors (over 60 million active trading codes in 2023) and institutional investors (58 portfolio managers and 130 brokerage firms) in the Tehran Stock Exchange. Using the Cochran formula, a sample of 384 participants (individual and institutional investors) was selected as a convenience sample. Out of 390 distributed questionnaires, 384 were valid and used to measure behavioral biases and investor traits, resulting in a response rate of 98%.

To determine the sample size, the Cochran formula was applied as follows:

(1)

$$n = \frac{N \times z^2\ {}^{\alpha}/_{2} \times \delta^2}{(N-1)\varepsilon^2 + z^2\ {}^{\alpha}/_{2} \times \delta^2}$$

(2)

$$n = \frac{50000 \times 1.96^2\ .5/_{2} \times .5^2}{(50000-1).05^2 + 1.96^2\ .5 \times .5^2} = 384$$

Where:

- nnn = sample size
- NNN = population size
- Zα/2Z_{\alpha/2}Zα/2 = normal variable corresponding to the desired confidence level (for 95% confidence, Z=1.96Z = 1.96Z=1.96)
- σ\sigmaσ = population variance (assumed 0.5)
- ε\varepsilonε = permissible error (0.05)

Thus, the sample size obtained using the Cochran formula was 384.

Table 1. Descriptive Statistics of Demographic Factors

Category	Frequency	Percentage
Male	237	61.72%
Female	147	38.28%
Total	384	100.00%
Education	**Frequency**	**Percentage**
Bachelor's degree and below	284	73.96%
Master's degree and above	100	26.04%
Total	384	100.00%
Work experience	**Frequency**	**Percentage**
Less than 5 years	38.02%	146
Between 5 and 10 years	58.33%	224
More than 10 years	3.65%	14
Total	100.00%	384
Job position	**Frequency**	**Percentage**
Manager	120	31.25%
Expert	150	39.06%
Analyst	60	15.63%
Employee	54	14.06%

4. Research Questions

1) What are the components and dimensions influencing the decision-making of individual and institutional investors under capital market uncertainty, based on behavioral biases and personality traits?
2) How can the decision-making of individual and institutional investors under capital market uncertainty, considering behavioral biases and personality traits, be modeled using the Interpretive Structural Modeling (ISM) approach?

3) What is the extent of influence and susceptibility of the dimensions affecting the decision-making of individual and institutional investors under capital market uncertainty, based on behavioral biases and personality traits?
4) To what extent is the proposed model validated from the users' perspective?

5. Findings

To conduct the present study, a systematic process was designed based on the Meta-Integration (Fara-Tarkib) approach to identify the components and dimensions affecting the decision-making of individual and institutional investors under capital market uncertainty, with an emphasis on behavioral biases and personality traits. This research follows the seven-step model proposed by Sandelowski and Barroso (2007), which requires a thorough review and systematic integration of prior studies.

Implementation Steps of ISM in this Study

Step 1: Identification of Dimensions and Components
The first step involved formulating the research question. This question considered the study population (scientific sources including peer-reviewed articles examining the impact of behavioral biases and personality traits on investor decision-making), research objectives (identifying relevant elements, components, and indicators), methodology (reviewing sources, prioritizing factors, analyzing, and categorizing concepts), and time frame (sources published between 2005 and 2024). The main research question is:

"What are the dimensions and components affecting the decision-making of individual and institutional investors under capital market uncertainty, based on behavioral biases and personality traits?"

Next, a systematic literature review was conducted. This step included systematic searches in reputable national and international databases, scientific journals, and public sources of relevant organizations to identify valid and relevant documents. Key search terms such as "behavioral biases," "personality traits," and "investor behavior" were used individually or in combination. This process ensured the comprehensiveness and validity of sources, focusing on the specified time frame (Sandelowski & Barroso, 2007).

Table 2. Components Affecting Decision-Making of Individual and Institutional Investors under Capital Market Uncertainty Based on Behavioral Biases and Personality Traits

Code	Selected Component	Source	Journal	Reliability coefficient
Mental Accounting	Mental Accounting	Yazdanian & Saeidi (2022)	Scientific-Research Quarterly of Investment Knowledge	05/0
		Chandani, et al. (2020)	Journal of Data and Network Science	2/1
		Narenji Azar (2015)	Investment Knowledge	4/0
Disposition Effect / Reversed Disposition Effect	Disposition Effect	Yazdanian & Saeidi (2022)	Scientific-Research Quarterly of Investment Knowledge	05/0
		Jamshidi, & Ghalibaf Asl (2020)	Financial Research Journal	6/0
		Jamshidi, et al. (2019)	Financial Research Journal	6/0
Conservatism / Prudence	Conservatism	Gakhar, & Pragash (2017)	Journal of Behavioral and Experimental Finance	1
		Yazdanian & Saeidi (2022)	Scientific-Research Quarterly of Investment Knowledge	05/0
Representativeness Heuristic	Representativeness	Yazdanian & Saeidi (2022)	Scientific-Research Quarterly of Investment Knowledge	05/0

Code	Selected Component	Source	Journal	Reliability coefficient
Mental Budgeting Bias	Mental Budgeting Bias	Chandani, et al. (2020)	Journal of Data and Network Science	2/1
One-dimensional Analysis	One-dimensional Analysis	Zeinivand, et al. (2021)	Quarterly Journal of Financial Economics	7/0
Status Quo Bias / Resistance to Change	Status Quo Bias	Aghajani, et al. (2020)	Journal of Modern Psychological Research	3/0
Independent / Individualistic	Independent	Aghajani, et al. (2020)	Journal of Modern Psychological Research	3/0
Confident (or Anxious) / Doubtful / Worry-Prone	Confident (or Anxious)	Kashif Rashid, et al. (2021)	Economics and Business	8/0
Follower / Herd Investor	Follower / Herd Investor	Aghajani, et al. (2020)	Journal of Modern Psychological Research	3/0
Introverted (Extroverted)	Introverted (Extroverted)	Nazari Pour, & Zaki Zadeh (2023)	Financial and Behavioral Research in Accounting	
Overconfidence / Self-deception / Excessive Trust / Overestimation	Overconfidence	Yazdanian & Saeidi (2022)	Financial and Behavioral Research in Accounting	05/0
		Narenji Azar (2015)	Financial and Behavioral Research in Accounting	4/0
		Kashif Rashid, et al. (2021)	Journal of Data and Network Science	8/0
		Jamshidi, & Ghalibaf Asl (2020)	Organizational Culture Management	6/0
		Kashif Rashid, et al. (2021)	Journal of Behavioral and Experimental Finance	8/0
Regret Aversion / Avoidance of Regret / Regret Avoidance	Regret Aversion / Avoidance of Regret	Yazdanian & Saeidi (2022)	Financial and Behavioral Research in Accounting	05/0
		Chandani, et al. (2020)	Financial Research Journal	2/1
		Narenji Azar (2015)	Journal of Accounting and Finance in Emerging Economies	4/0
		Erikat, et al. (2019)	Journal of Accounting and Finance in Emerging Economies	4/0
Herding / Collective Behavior / Imitation / Herd Behavior / Following the Crowd	Herding / Collective Behavior	Narenji Azar (2015)	Journal of Accounting and Finance in Emerging Economies	4/0
		Erikat, et al. (2019)	Journal of Accounting and Finance in Emerging Economies	2/1
		Yazdanian & Saeidi (2022)	Financial and Behavioral Research in Accounting	05/0
		Kimeo (2016)	Journal of Behavioral and Experimental Finance	1
		Abadpour et al. (2017)	Organizational Culture Management	29/0
Endowment Effect	Endowment Effect	Yazdanian & Saeidi (2022)	Journal of Scientific Research in Investment Knowledge	05/0

Code	Selected Component	Source	Journal	Reliability coefficient
		Chandani et al. (2020)	Journal of Data and Network Science	2/1
Loss Aversion / Perceived Loss / Perceived Risk	Loss Aversion	Chandani, et al. (2020)	Journal of Data and Network Science	2/1
		Erikat et al. (2019)	Journal of Data and Network Science	2/1
		Erikat et al. (2019)	Journal of Behavioral and Experimental Finance	1
Myopia / Short-sightedness	Myopia / Short-sightedness	Zeinivand et al. (2021)	Journal of Financial Economics	7/0
High Confidence / Optimism / Over-optimism / Excessive Optimism	Excessive Optimism / Over-optimism	Kashif Rashid, et al. (2021)	Economics and Business	8/0
		Zeinivand, et al. (2021)	Journal of Financial Economics	7/0
Extrapolation Bias / Trend Generalization Bias	Extrapolation Bias / Trend Generalization Bias	Jamshidi, et al. (2019)	Financial Research	6/0
Fear of Loss / Risk Aversion / Financial Resilience	Risk Aversion	Kimeo (2016)	Journal of Behavioral and Experimental Finance	1
Investor Foresight Knowledge	Investor Foresight Knowledge	Fouladi, et al. (2021)	Financial and Behavioral Research in Accounting	23/1
Financial Intelligence / Financial Literacy / Investor Financial Perception /	Financial Intelligence	Fouladi, et al. (2021)	Financial and Behavioral Research in Accounting	23/1
Financial Management Experience / Financial Skills / Financial Literacy / Money and Savings Management	Financial Management Experience	Fouladi, et al. (2021)	Financial and Behavioral Research in Accounting	23/1
Wealth Level / Individual Investor Income	Wealth Level	Fouladi, et al. (2021)	Financial and Behavioral Research in Accounting	23/1
Age	Age	Fouladi, et al. (2021)	Financial and Behavioral Research in Accounting	23/1
		Tekjeh (2016)	Journal of Data and Network Science	2/1
		Abadpour, et al. (2017)	Organizational Culture Management	
		Gakhar, & Pragash (2017)	Journal of Behavioral and Experimental Finance	1
Gender	Gender	Fouladi, et al. (2021)	Financial and Behavioral Research in Accounting	23/1

Code	Selected Component	Source	Journal	Reliability coefficient
		Jamshidi, & Ghalibaf Asl (2018)	Financial Research	6/0
		Abadpour, et al. (2017)	Organizational Culture Management	29/0
		Gakhar, & Pragash (2017)	Journal of Accounting and Finance in Emerging Economies	23/3
		Tekjeh (2016)	Journal of Accounting and Finance in Emerging Economies	23/3
		Khan (2017)	Journal of Accounting and Finance in Emerging Economies	23/3
Education / Financial Expertise / Knowledge and Talent	Education	Tekjeh (2016)	Journal of Accounting and Finance in Emerging Economies	23/3
		Fouladi, et al. (2021)	Financial and Behavioral Research in Accounting	25/1
		Khan (2017)	Journal of Behavioral and Experimental Finance	1
		Abadpour, et al. (2017)	Organizational Culture Management	29/0
		Tekjeh (2016)	Journal of Behavioral and Experimental Finance	1
Geographic Work Location / Workplace / Level of Development of Work and Living Area	Workplace / Work Location	Gakhar, & Pragash (2017)	Journal of Behavioral and Experimental Finance	1
Marital Status	Marital Status	Gakhar, & Pragash (2017)	Journal of Accounting and Finance in Emerging Economies	1
Feminist Orientation	Feminist Orientation	Khan (2017)	Economics and Business	8/0
Uncertainty Avoidance / Ambiguity Aversion	Uncertainty Avoidance / Ambiguity Aversion	Khan (2017)	Economics and Business	8/0
Adventurous Personality / Recklessness / Sensation Seeking	Sensation Seeking	Jamshidi, & Ghalibaf Asl (2018)	Financial Research	6/0
Self-serving / Self-assessment / Self-attribution	Self-assessment	Jamshidi, & Ghalibaf Asl (2018)	Financial Research	6/0

Answer to Research Question 1: What are the components and dimensions influencing the decision-making of individual and institutional investors under conditions of capital market uncertainty, based on behavioral biases and personality traits?

In the present study, the components and dimensions affecting investor decision-making were first identified through a comprehensive review of the theoretical literature and relevant scholarly articles. Subsequently, these identified components and dimensions were

subjected to evaluation and validation by 17 professional and academic experts using the Delphi method. The Delphi technique is a structured approach designed to facilitate a systematic group communication process, enabling a collective body of experts to address complex problems. The primary objective of this method is to achieve a reliable consensus among experts' opinions through iterative rounds of focused questionnaires accompanied by controlled feedback, thereby ensuring rigor and validity in the elicitation of expert judgments.

Table 3.Average Points Factors Effective On Decision_Making Investors.

Row	Component	Average	low Very	Low	Medium	A lot	Too much
1	Change of direction	294 .4	0	1	2	4	10
2	Independent	176 .4	0	1	2	5	9
3	Confident (anxious)	118 .4	0	1	3	4	9
4	Follower	824 .3	0	2	3	5	7
5	Introvert (Extrovert)	824 .3	0	2	3	5	7
6	knowledge and Investors' foresight	412 .4	0	1	1	4	11
7	Financial intelligence	471 .4	0	1	1	3	12
8	Financial management skills	412 .4	0	1	1	4	11
9	Amount of wealth	000.4	0	1	3	5	8
10	Marital status	706 .3	0	2	4	5	6
11	Workplace	706.3	0	2	4	5	6
12	age	824.3	0	2	3	5	7
13	Nationality	706.3	0	2	4	5	6
14	Collections	176 .4	0	1	2	5	9
15	Mental accounting	471 .4	0	1	1	3	12
16	Dispositional effect	294 .4	0	1	2	4	10
17	Conservatism	412 .4	0	1	1	4	11
18	Representative testimony	176 .4	0	1	2	5	9
19	Mental budgeting bias	176 .4	0	1	2	5	9
20	One-dimensional analysis	000.4	0	1	3	5	8
21	Overconfidence	412 .4	0	1	1	4	11
22	Avoiding regret and regret	294 .4	0	1	2	4	10
23	Mass	176 .4	0	1	2	5	9
24	Effect of ownership	176 .4	0	1	2	5	9
25	Loss aversion	471 .4	0	1	1	3	12
26	Shortsightedness	176 .4	0	1	2	5	9
27	Excessive optimism	176 .4	0	1	2	5	9
28	Exhibitionism	000.4	0	1	3	5	8
29	Risk aversion	412 .4	0	1	1	4	11
30	Feminist tendencies	706 .3	0	2	4	5	6
31	Avoiding uncertainty	294 .4	0	1	2	4	10
32	Excitement	824 .3	0	2	3	5	7
33	Self-assessment	176 .4	0	1	2	5	9

At this stage, the mean scores were obtained by dividing the total score (calculated as the product of the number of respondents in Table 1 and the assigned weights—5 for "Very High," 4 for "High," 3 for "Moderate," 2 for "Low," and 1 for "Very Low") by the total number of respondents (17). Factors that achieved a score above the average threshold of 3 were considered, from the perspective of experts and professionals, as influential components in investors' decision-making. Since all items received scores above 3, the validity of the criteria was confirmed. Accordingly, through achieving group consensus among the experts, the dimensions and indicators

affecting investors' decision-making were finalized into seven dimensions, as presented in Table 4.

Table 4. Dimensions and components affecting the decision- making of real investors and Legal in Conditions Uncertainty Market Capital based on behavioral biases and Capital's personality traits Makers

Component	Dimensions	Category
Change of direction	Personality Types (C1)	Personality traits : Real investors and Legal
Independent		
Confident (anxious)		
Follow me		
Introvert (Extrovert)		
Investors' futures knowledge	Individual characteristics of investors (C_2)	
Financial intelligence		
Financial management skills		
Amount of wealth		
Marital status	Demographic characteristics of investors (C_3)	
Workplace		
Age		
Gender		
Education		
Mental accounting	Cognitive biases (C_4)	Behavioral biases: Real investors and Legal
Dispositional effect		
Conservatism		
Representative testimony		
Mental budgeting bias		
One-dimensional analysis		
Overconfidence	Emotional biases (C_5)	
Avoiding regret and regret		
Mass		
Effect of ownership		
Loss aversion	Cultural dimensions of investors (C_6)	
Shortsightedness		
Excessive optimism		
Exhibitionism		
Risk aversion		
Feminist tendencies	Investor Behavioral Components (C_7)	
Avoiding uncertainty		
Thrill-seeking		
Self-assessment		

Answer to Research Question 2

In light of the Interpretive Structural Modeling (ISM) approach, how is the decision-making model of individual and institutional investors under conditions of capital market uncertainty—based on behavioral biases and personality traits—designed?

Step Two: Formation of the Structural Self-Interaction Matrix (SSIM)

After identifying the main components, the next step involves incorporating these components into the structural matrix of interrelationships among the variables. Accordingly, the relationships between dimensions and indicators, based on the evaluations of 17 experts, are presented in Table 5.

Table 5. Matrix Self-InteractiveStructural Dimensions Decision-making Investors True and Legal In Conditions Uncertainty Market Capital On Basis Bias Behavioral and Features Personality Investors

Investor Behavioral Components	Cultural dimensions of investors	Emotional biases	Cognitive biases	Demographic characteristics of investors	Individual characteristics of investors	Personality types	i / j
V	A	V	X	V	X		Personality types
O	O	V	A	V			Individual characteristics of investors
V	V	V	A				Demographic characteristics of investors
V	O	V					Cognitive biases
V	V						Emotional biases
V							Cultural dimensions of investors
							Investor Behavioral Components -

Step Three: Formation of the Initial Reachability Matrix (IRM)

At this stage, the Structural Self-Interaction Matrix (SSIM) is converted into a binary (0–1) matrix. In this matrix, only the numbers 0 and 1 are included. To derive the Initial Reachability Matrix, in each row of the SSIM, the symbols are replaced as follows: the symbols V and X are substituted with the value 1, while the symbols O and A are substituted with the value 0. After converting all rows, the resulting output constitutes the Initial Reachability Matrix.

Accordingly, the transformation rules are as follows:

- If the entry (i, j) is denoted by V, then cell (i, j) takes the value 1 and its reciprocal (j, i) is assigned 0.
- If the entry (i, j) is denoted by A, then cell (i, j) takes the value 0 and its reciprocal (j, i) is assigned 1.
- If the entry (i, j) is denoted by X, then both cell (i, j) and its reciprocal (j, i) are assigned the value 1.
- If the entry (i, j) is denoted by O, then both cell (i, j) and its reciprocal (j, i) are assigned the value 0.

The Structural Self-Interaction Matrix (SSIM) is thereby transformed into a binary (0–1) matrix, resulting in the Initial Reachability Matrix, which is presented in Table 6.

Step Four: Formation of the Final Reachability Matrix

After forming the initial reachability matrix, its internal consistency must be established. For example, if variable (1) leads to variable (2), and variable (2) leads to variable (3), then variable (1) must also lead to variable (3). If such a condition is not satisfied in the reachability matrix, the matrix should be revised and the omitted relationships replaced, which are shown as *1.

Various methods have been proposed to make the matrix consistent. In this research, consistency in the reachability matrix was achieved by applying mathematical rules, in such a way that the reachability matrix is raised to the power of k+1k+1k+1, where k≥1k \geq 1k≥1. The exponentiation of the matrix must, of course, be performed according to Boolean rules. According to this rule: 1=1×11 = 1 \times 11=1×1 and 1=1+11 = 1 + 11=1+1 (Azar et al., 2009).

Therefore, after adjusting the initial reachability matrix, which had been developed based on experts' opinions, the Final Reachability Matrix (FRM) of the dimensions affecting investors' decision-making is presented in Table 7, and the final reachability matrix

of the indicators affecting investors' decision-making is also presented in Table 7.

Table 6. Matrix Availability Primary Dimensions Effectiveon Decision-making Investors True and Legal inConditions Uncertainty Market CapitalonBasis Bias Behavioral and Features Personality Investors

Investor Behavioral Components	Cultural dimensions of investors	Emotional biases	Cognitive biases	Demographic characteristics of investors	Individual characteristics of investors	Personality types	i / j
1	0	1	1	1	1	1	Personality types
0	0	1	0	1	1	1	Individual characteristics of investors
1	1	1	0	1	0	0	Demographic characteristics of investors
1	0	1	1	1	1	1	Cognitive biases
1	1	1	0	0	0	0	Emotional biases
1	1	0	0	0	0	1	Cultural dimensions of investors
1	0	0	0	0	0	0	Investor Behavioral Components

Table 7. :Availability Matrix Final dimensions of decision-makingfor investors

Power of influence	Investor Behavioral Components	Cultural dimensions of investors	Emotional biases	Cognitive biases	Demographic characteristics of investors	Individual characteristics of investors	Personality types	i / j
7	1	*1	1	1	1	1	1	Personality types
6	*1	*1	1	0	1	1	1	Individual characteristics of investors
4	1	1	1	0	1	0	0	Demographic characteristics of investors
7	1	*1	1	1	1	1	1	Cognitive biases
3	1	1	1	0	0	0	0	Emotional biases
3	1	1	0	0	0	0	1	Cultural dimensions of investors
1	1	0	0	0	0	0	0	Investor Behavioral Components
	7	5	5	2	4	3	4	The power of dependency

Step Five: Determining the Relationships and Leveling among Dimensions

To determine the level and priority of variables, the reachability set and the antecedent set for each variable are identified. The reachability set of a variable includes the variables that can be reached through that variable, while the antecedent set includes the variables through which the given variable can be reached. Thus, we have:

- Reachability set (influencing or outputs): Includes the criterion itself and the criteria that are influenced by it.
- Antecedent set (influenced or inputs): Includes the criterion itself and the criteria that influence it.

This process is conducted using the reachability matrix. After determining the reachability and

antecedent sets for each variable, the common elements between the two sets are identified. Based on this, the leveling of variables is carried out, and this continues until the levels of all variables are determined.

In such a way that the factors whose input set and intersection set are aligned, and which have the least driving power (influence), are placed at the highest level of the Interpretive Structural Modeling (ISM) hierarchy. Accordingly, in this study, the levels of dimensions and indicators influencing investors' decision-making were obtained. For the sake of brevity, the final results of these stages are presented in Table 8.

Table 8.Determination Level Dimensions Decision-making model Investors

Level	Collection Common	Input set	Output set	Dimensions
First	7	7 , 6 , 5 , 4 , 3 , 2 , 1	7	Investor Behavioral Components
Second	6, 1	1 , 2 , 3 , 4 , 5 , 6	6, 1	Cultural dimensions of investors
Third	5	1 ,2 ,3 ,4 ,5	5	Emotional biases
Fourth	3	1 ,2 ,3 ,4	3	Demographic characteristics of investors
Fifth	4, 2, 1	6, 4, 2, 1	1 ,2 ,4	Personality types
Fifth	1 ,2	4, 2, 1	1 ,2	Individual characteristics of investors
Sixth	4	4	4	Cognitive biases

Step Six: Drawing the Final Model

After determining the relationships and levels of the variables, they can be illustrated in the form of a model. For this purpose, the variables are first arranged from top to bottom according to their levels. Based on the established hierarchy, a diagram entitled "The Decision-Making Model of Individual and Institutional Investors under Capital Market Uncertainty, Considering Behavioral Biases and Investors' Personality Traits" is drawn.

In this way, the seventh dimension (investors' behavioral components), which has been identified as the first level, is placed at the top level of the diagram, and accordingly, other dimensions are positioned at their respective levels. These diagrams are presented in Figure 1.

Step Seven: Analyzing Driving Power and Dependence (MICMAC Analysis)

Answer to Research Question Three:

- What is the level of influence and dependence of the dimensions affecting the decision-making of individual and institutional investors under capital market uncertainty, based on behavioral biases and investors' personality traits?

Based on the obtained values of driving power and dependence for each dimension, they are categorized into four clusters: autonomous, dependent, linkage, and independent. Accordingly, the driving–dependence matrix for mental accounting is plotted as shown in Figure 2.

According to Figure 2, it can be observed that the first cluster includes criteria with weak driving power and low dependence; these variables are almost disconnected from the system due to their weak links with other components. In the present study, no dimensions were assigned to this first cluster, i.e., the autonomous cluster.

Dependent variables are placed in the second cluster, which have low driving power but high dependence. In this study, the dimensions of emotional biases, cultural dimensions of investors, and behavioral components of investors were categorized as dependent. This indicates that changes in other decision-making indicators of individual and

institutional investors under market uncertainty will lead to changes in these indicators.

The third cluster consists of linkage variables, which have both high driving power and high dependence. These indicators are non-static, as any change in them can have a significant impact on the system. In this study, none of the decision-making indicators of investors fell into this cluster based on the calculated driving power and dependence.

The fourth cluster includes independent variables, characterized by high driving power and low dependence. Cognitive biases, individual characteristics of investors, personality types, and demographic features of investors belong to this cluster, serving as fundamental dimensions with a significant effect on other indicators. Among the seven dimensions determining investor decision-making under market uncertainty, cognitive biases, individual characteristics, personality types, and demographic features were identified as the most influential and, consequently, the most fundamental.

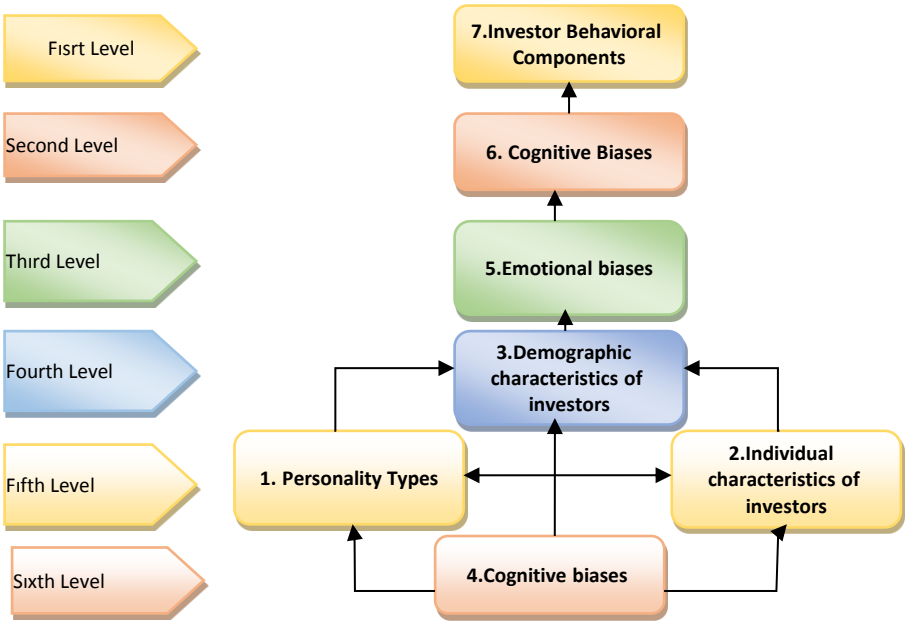

Figure 1. Final Model of Dimensions Affecting Decision-Making of Individual and Institutional Investors under Capital Market Uncertainty Based on Behavioral Biases and Investor Personality Traits

Table 9. Driving Power–Dependence of the Dimensions of Decision-Making for Individual and Institutional Investors

Investor Behavioral Components	Cultural dimensions of investors	Emotional biases	Cognitive biases	Demographic characteristics of investors	Individual characteristics of investors	Personality types	Dimensions
1	3	3	7	4	6	7	Influence
7	5	5	2	4	3	4	Dependency

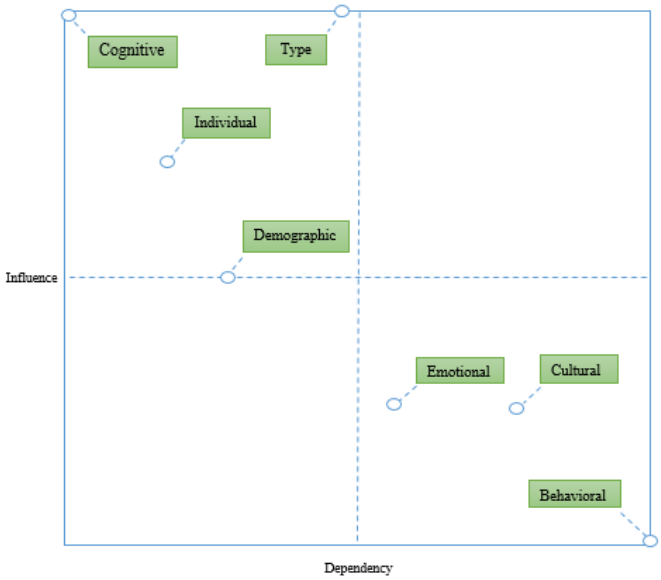

Figure 2. Power and Degree of Influence–Dependence Matrix

Structural Equation Modeling (SEM) Analysis of the Exploratory Research Model

Response to Research Question Four: To what extent is the proposed research model valid from the users' perspective?

In this study, Structural Equation Modeling (SEM) was employed to quantitatively examine the derived model. SEM is a statistical technique that combines methods such as multivariate regression, factor analysis, and path analysis, focusing on latent variables defined by observed indicators. This approach allows for the inference of causal relationships among unobservable variables while accounting for measurement errors and assessing both the correlation and the strength of influence among variables. SEM, also known as latent variable analysis or causal modeling, quantifies the relationships between independent and dependent variables, and unlike regression, which only indicates empirical correlation, SEM explains causal correlations.

Within SEM, variables are evaluated using significance coefficients (t-statistics outside the ±1.96 range) and structural coefficients (reflecting the effect of independent variables on dependent variables), and hypotheses are accepted or rejected based on these coefficients.

Before fitting the structural model, it is necessary to examine whether the 13 observed variables (including questionnaire items) adequately represent the three latent constructs: behavioral biases of individual and institutional investors, personality traits of individual and institutional investors, and decision-making of individual and institutional investors. The overall fit of the measurement model is assessed using Confirmatory Factor Analysis (CFA).

The figure below presents the measurement model for this research, in which both observed and latent variables are labeled according to their respective constructs.

Figure 3. Factor Analysis Model

After running the above model, the software suggested several modifications that improved the model's fit. These recommended adjustments involved freeing the covariances between certain error terms. The measurement model, along with these modifications, is presented in the following diagram.

In the above figure, the numbers displayed on the paths represent standardized coefficients. Standardized coefficients are the model's weights, allowing for comparison across different variables. The following table presents the factor analysis of the items and variables.

Factor loadings are calculated by assessing the correlation of each indicator with its respective construct. Loadings above 0.3 indicate that the factor loading is at an acceptable level and the model is considered valid. Table 10 presents the factor loadings of the model. These results demonstrate the significance of all variables included in the model and confirm the meaningful impact of behavioral biases and personality traits of individual and institutional investors in the exploratory model. At this stage, the structural model of the research is fitted to address the seventh research question, as illustrated in the figure below.

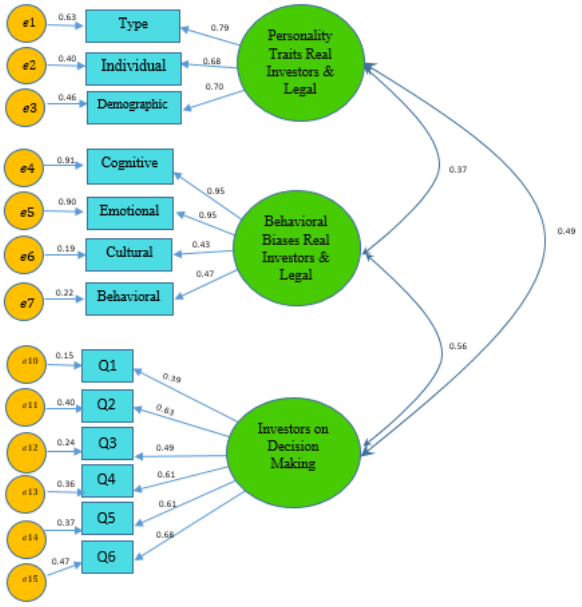

Figure 4. Factor Analysis Model with Standardized Coefficients

Table 10.Results Analysis Factor

Capital Decision Making Makers	Personality traits Capital Makers	Behavioral biases Capital Makers	Component
		0.95	Cognitive biases
		0.95	Emotional biases
		0.43	Cultural dimensions of investors
		0.47	Investor Behavioral Components
	0.79		Personality types
	0.68		Individual characteristics of investors
	0.70		Demographic characteristics of investors
0.39			(Q1) Decision to buy in conditions of uncertainty caused by an uptrend with no resistance ahead
0.63			(Q2)Deciding to sell in the face of uncertainty caused by an .uptrend with no resistance ahead
0.49			(Q3)Holding the share and waiting for a new signal in conditions .of uncertainty caused by an uptrend with no resistance ahead
0.61			(Q4)Deciding to buy in conditions of uncertainty caused by a .downtrend with no resistance ahead
0.61			(Q5)Deciding to sell in the face of uncertainty caused by a .downtrend with no resistance ahead
0.68			Q6) (Holding the share and waiting for a new signal in conditions (of uncertainty caused by a downtrend with no resistance ahead

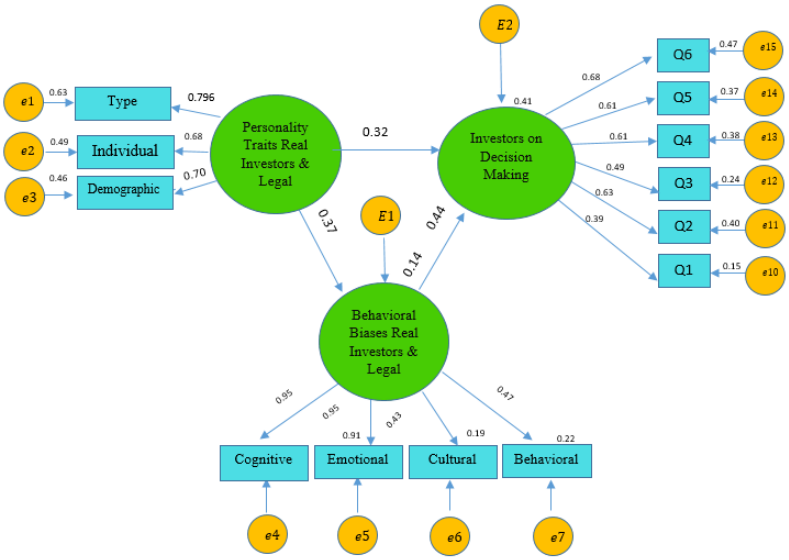

Figure 5. Structural Model of the Study

Table 11 presents the fit indices of the above model. If the values of the fit indices fall within the acceptable range, it indicates that the model is suitable for the collected data.

As observed from the above table, all indices fall within the acceptable range. Therefore, the suitability of the structural analysis model for the collected data is confirmed. Based on the results of the research's structural model, the findings of the path analysis for the research questions are presented.

To examine the ninth research question, the significance of the simultaneous relationships between variables must be assessed. For a mediating role of a variable in the relationship between two other variables to be significant, the relationships among the variables must be simultaneously significant. In other words, if the mediating role of variable YYY in the relationship between ZZZ and XXX is considered, the simultaneous significance of the relationship between YYY and XXX as well as between ZZZ and YYY must be confirmed.

Table 11.Model fit indices

RMSEA	NFI	CFI	TLI	IFI	GFI	CMIN /df	Indicators Fitness Pattern
0.044	964.0	979.0	975.0	979.0	933.0	401.2	Pattern Original
Smaller From 0. 05	More From 0/9	More From 0/9	More From 0/9	More From 0/9	More From 9/0	1 to 5	Acceptable level

Table 11 presents the path coefficients among the research variables. The analysis indicates a significant relationship between investors' personality traits and their behavioral biases under conditions of market uncertainty.

There is a significant relationship between investors' personality traits and their behavioral biases under conditions of market uncertainty.

There is a significant relationship between investors' personality traits and their decision-making under conditions of market uncertainty.

There is a significant relationship between investors' behavioral biases and their decision-making under conditions of market uncertainty.

Based on the results of Table 12, it can be stated that the effect of investors' personality traits on their behavioral biases is 0.371 (positive), with a significance level of 0.000, which is less than 0.05. Therefore, at a 95% confidence level, investors' personality traits have a significant positive impact on their behavioral biases. This implies that as investors' personality traits increase, their behavioral biases also increase.

Furthermore, the effect of investors' personality traits on their decision-making is 0.323 (positive) with a significance of 0.000, which is less than 0.05. Thus, at a 95% confidence level, investors' personality traits have a significant positive effect on their decision-making, meaning that as investors' personality traits increase, their decision-making also improves.

Additionally, the effect of investors' behavioral biases on their decision-making is 0.443 (positive) with a significance of 0.000, which is less than 0.05. Hence, at a 95% confidence level, investors' behavioral biases have a significant positive effect on decision-making, indicating that as behavioral biases increase, investors' decision-making also increases.

Table 12.Analysis Route Between Variables Model

p-value	Statisticst	Deviation Criteria	Coefficient Standard Done	Route
0.000	5.23	0.056	371.0	Behavioral biases , Capital Makers ⟵ ,Personality traits , Investors
0.000	701.4	0.064	323.0	Capital Decision Makers ⟵ ,Personality traits , Investors
0.000	685.5	0.091	443.0	Behavioral**Biases**Capital Decision Making Makers ⟵ Investors

6. Conclusion

This study aimed to identify and analyze the factors influencing the decision-making of individual and institutional investors under capital market uncertainty, based on behavioral biases and personality traits. The findings reveal a complex, multidimensional set of psychological, cognitive, emotional, demographic, cultural, and behavioral factors that hierarchically influence investor behavior. Theoretically, by employing Delphi techniques, Interpretive Structural Modeling (ISM), and Structural Equation Modeling (SEM), this research provides a comprehensive framework to understand the dynamics of decision-making in volatile markets.

The results confirmed that cognitive biases, such as mental accounting and the disposition effect, play a fundamental role in shaping investment decisions due to their profound impact on judgment and risk assessment processes. This aligns with previous studies in behavioral finance emphasizing the significance of cognitive biases in deviations from rational decision-making. Similarly, personality traits, including resistance to change and independence, were identified as key factors that can influence investors' tendencies to maintain the status quo or take on new risks. These findings underscore the pivotal role of

individual psychology in financial behavior, indicating that personality traits influence decision-making not only directly but also indirectly by amplifying behavioral biases.

The fuzzy analysis of dimensions indicated that cognitive biases and personality traits, as fundamental factors, exert their influence through intermediary dimensions such as emotional biases and cultural factors, ultimately affecting final investment behaviors. This hierarchical structure illustrates that decision-making under uncertainty results from dynamic interactions between internal factors (e.g., mental biases and psychological traits) and external factors (e.g., culture and demographic characteristics). Notably, emotional biases, such as loss aversion and overconfidence, were identified as dependent factors, influenced by fundamental dimensions and playing a crucial role in amplifying or moderating investment behaviors. These findings highlight the importance of integrating behavioral finance and psychology in analyzing investor behavior, showing that purely economic approaches are insufficient for understanding decision-making in financial markets.

Practically, the results have important implications for policymakers, capital market managers, and financial advisors. Considering the prominent roles of education and age in ranking influential factors, targeted training programs to increase investor awareness of behavioral biases and enhance financial management skills can improve rational decision-making. Additionally, designing advisory strategies that account for investors' personality traits and demographics can enhance the effectiveness of interventions. For instance, investors resistant to change may require more guidance to overcome reluctance toward new decisions, while highly educated individuals may benefit from more advanced analyses. Attention to cultural factors, such as uncertainty avoidance, in culturally diverse markets can also lead to the development of more inclusive financial policies.

The validity of the proposed model, confirmed through SEM analysis, demonstrates the methodological robustness of this study. Good model fit and significant relationships among personality traits, behavioral biases, and investor decision-making enhance the generalizability of the findings. However, limitations, such as focusing on a specific sample of experts and investors, may challenge the applicability of results to other markets. Future research is recommended to employ broader sampling and consider environmental variables, such as economic policies and technological developments. Exploring the effects of behavioral interventions, such as bias-reduction training programs, could also provide practical solutions for improving investor decision-making.

In summary, this study contributes to the literature on behavioral finance by providing a comprehensive, hierarchical framework of factors affecting investor decision-making, offering practical guidance for enhancing investment behavior under uncertainty. The emphasis on the central role of cognitive biases and personality traits, alongside cultural and emotional factors, indicates the need for a multidisciplinary approach to analyzing and managing financial behaviors. These findings can serve as a basis for financial policymaking and the design of educational interventions to promote more sustainable and rational decision-making in capital markets.

The results align with previous studies by Salehi (2024), Zeinivand et al. (2023), Yazdaniyan & Saeedi (2022), Shonmugasundaram et al. (2024), Dingra et al. (2024), and Samal & Mahapatra (2022) regarding the first research question, confirming behavioral biases (e.g., herding, overconfidence, regret aversion) and personality traits as key determinants of investment decisions. However, Salehi (2024) focused only on four biases, which may limit comprehensiveness. Khatabi & Gharghi (2024) emphasized economic indicators, financial literacy, and regulatory risk, giving less attention to behavioral biases, thus partially aligning with the research questions. Darabi & Zahrabi (2024) introduced risk management as an indirect factor influencing investment decisions, complementary but distinct from the focus on

behavioral biases. Regarding the second research question (ISM modeling), Zeinivand et al. (2023) presented predictive models for decision-making, directly aligning with this question, whereas other studies did not employ ISM, highlighting a gap. For the third question (influence and dependency of dimensions), Khatabi & Gharghi (2024) ranked factors using DEMATEL, directly aligned with this study, while others investigated influences sporadically without analyzing interrelationships. For the fourth question (model validity), none of the prior studies explicitly evaluated the model from the users' perspective, revealing a gap or inconsistency. Overall, prior studies align with this research in identifying components and effects but provide limited coverage in ISM modeling and model validation.

Based on these results, it is recommended that capital market researchers examine the effects of each identified component individually using rigorous methods, confirming their validity for policymakers. This can help design policies to reduce the impact of behavioral biases and strengthen rational decision-making, ultimately contributing to market stability and reduced volatility.

For investors, it is advised to focus on current market conditions and stock prices rather than predictions based on unreliable information. Even with access to valid data, investors should consider their psychological state, risk tolerance, and avoid overly risky positions. Adhering to capital management principles, setting stop-loss and take-profit levels, and following trading systems, even after consecutive successes, is crucial to prevent overconfidence, cultural bias, or undue pride. Investors should also rely on historical stock trends, accurate benchmarking, and expert opinions when making buy and sell decisions.

To enhance investor knowledge and awareness, regulatory authorities are encouraged to set entry requirements, such as short, practical training courses covering both fundamental and technical analysis, as well as behavioral finance topics, enabling investors to recognize and manage their biases. Investment advisory firms can provide targeted services by assessing clients' behavioral biases and risk tolerance, improving capital allocation efficiency, and investment performance.

Finally, given the impact of irrational factors such as value systems, beliefs, and cultural assumptions on decision-making, market participants should periodically review their decisions, analyze historical transaction data, and identify cognitive and emotional errors to improve decision quality. This self-assessment, combined with updated information and supplementary research, can reduce behavioral biases and promote more rational decision-making. Implementing these recommendations requires collaboration among researchers, policymakers, and market participants to integrate behavioral finance knowledge with educational tools, creating a more stable investment environment.

For future research, it is suggested to:

- Develop a framework for factors affecting individual and institutional investor decision-making using meta-analysis.
- Rank the factors influencing investor decision-making using the Analytic Hierarchy Process (AHP) and Grey System Theory.
- Investigate additional financial and non-financial drivers affecting investor decision-making.
- Examine the level of interaction among components to assess their influence and dependency using DEMATEL.
- Predict investor decision-making using other data mining algorithms, such as Genetic Algorithm, K-Means Clustering, Bagging, AdaBoost, and Naive Bayes.
- Explore the causes of each behavioral bias and factors that mitigate their impact on investor decision-making.

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