



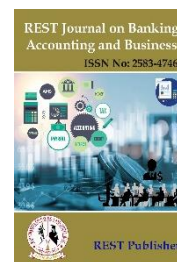
**REST Journal on Banking, Accounting and Business**

**Vol: 2(2), June 2023**

**REST Publisher; ISSN: 2583 4746 (Online)**

**Website: <http://restpublisher.com/book-series/jbab/>**

**DOI: <https://doi.org/10.46632/jbab/2/2/21>**



## **An analysis of Risk Tolerance of Individual Investor using Gray Relational Analysis Method**

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**Abstract:** Risk tolerance refers to an individual investor's inclination towards embracing fluctuations in investment values in pursuit of higher income. It reflects their capacity to endure such fluctuations and financial goals, time horizon and emotional comfort various including status influenced by factors. Personal preferences and investment choices with circumstances as it helps to regulate, informed investment decisions one's risk tolerance in taking understanding is important. financial situation, investment objectives, knowledge of the financial market, factors like experience, and emotional intelligence contribute to determining one's risk tolerance. Investors' risk tolerance is often assessed through questionnaires or evaluations conducted by financial advisors, which consider factors like attitudes towards risk, investment goals, time horizon, and financial situation. Based on the assessment, investors may be categorized into different risk profiles such as conservative, moderate, or aggressive, with corresponding investment strategies suggested accordingly. It's essential for investors to honestly evaluate and be realistic about their risk tolerance, as overestimating it may lead to excessive risk-taking and potential losses during market downturns, while underestimating it may result in overly conservative investment choices. Regular reviews of risk tolerance are recommended, especially in light of significant life events or market fluctuations. The concept of risk-return trade-off highlights that higher returns are typically associated with higher levels of risk, implying that investors expecting higher returns must be prepared to accept greater potential losses. However, risk tolerance isn't solely determined by financial factors; emotional elements such as fear, anxiety, and market sentiment also influence an investor's tolerance for risk and their behaviour during periods of volatility. Therefore, a comprehensive understanding of risk tolerance encompasses both financial considerations and emotional factors. the GRA (Grey Relational Analysis) approach at its inception, focusing on the concept of the gray gadget. This technique is particularly effective for selection problems involving multiple attributes within a component. The current literature highlights its applicability in addressing problems associated with multiple factors and variables, especially when dealing with complex relationships. The GRA approach is well-suited for resolving issues related to fixing problems, and various types of GRA techniques have been proposed in the field. The introduction of the GRA approach is both straightforward and environmentally friendly, making it a practical choice for addressing complex problems involving multiple variables. Investment Objectives, Time Horizon, Financial Situation, Knowledge and Experience and Liquidity Needs. Risk Assessment Questionnaires, Investment Experience and Knowledge, Financial Situation, Investment Goals and Emotional Attitude Towards Risk. the Rank of GRA for Risk Tolerance of Individual Investors. Liquidity Needs is got the first rank whereas the Low Risk Tolerance is having the Lowest rank.

**Keywords:** Investment Objectives, Time Horizon, Financial Situation, Knowledge and Experience and Liquidity Needs.

### **1. INTRODUCTION**

Investor risk tolerance and investment management has garnered significant attention from both in recent years' managers and researchers. This increased focus on making investment decisions concept of important models and led to growth. Modern Decision Making in Investment Management for models to function effectively at least four keys as inputs depending on the factors among these factors are Goals, Financial Stability, Time (Investor's Horizon) and Risk Tolerance Level [1]. Risk tolerance of individual investors and increasing understanding of scale importance, quantity plays an important role in the analysis. Financial sustainability, timing and factors such

as investment objectives can be measured directly or may be collected from investors, risk tolerance level is very complex - Population, Psychological, Financial and Behavioural and influenced by environmental factors, are relatively objective and unlike the first three input factors unchanging, risk tolerance level can vary significantly among investors and is subject to multiple influencing factors [2]. Investor objectives, such as education, retirement planning, estate transfers, and financial stability, provide a framework for investment decisions. The investor horizon indicates the timeframe within which the investor can utilize their investments before needing them. This timeframe can be adjusted based on the investor's objectives. Financial stability reflects the current and future financial circumstances of the investor, including income, assets, and liabilities [3]. Risk tolerance of individuals to evaluate and consider for investment managers is an important responsibility when devising investment plans to ensure their effectiveness and reliability. However, research indicates that this responsibility is often overlooked, leading to common neglect. Instead, investment managers may rely on general heuristics to categorize customers without giving due consideration to individual characteristics, which can be highly risky. While these heuristics may seem convenient for formulating investment plans, they can pose significant dangers as they overlook the unique needs and risk tolerances of investors. Therefore, reliance solely on such heuristics should be questioned, especially considering the evidence from studies monitoring investment manager performance [4]. For instance, Rail (1995) reported that despite the average mutual fund returning 12.5% annually over a five-year period until mid-1994, investors in these funds experienced a negative real return of 2.2%. Similarly, Quinn (1997) found that investors Since 1984 in Mutual Funds during the 12-year period up to 1996 average 10% over funds under-earned. These findings reveal investors' risk tolerance. Basically investors may fail to classify correctly, leading to erroneous conclusions regarding investment choices such as mutual funds or stocks [5]. Investors' risk tolerance levels in investment receive insufficient attention, impacting their decision-making process. Kenyan fund managers and investment advisors often overlook individual risk preferences and fail to adequately consider factors influencing portfolio construction. Additionally, they rarely evaluate psychological variables such as financial literacy, home ownership, marital status, and income when assessing risk tolerance. Studies in developed countries, like Davy (2002), highlight the use of specific tools by investment advisors to gauge risk tolerance, yet such tools are seldom employed by Kenyan advisors. Consequently, individual investors, who predominantly favour stock market investments, have limited access to licensed investment advisors recommended by the Capital Markets Authority (CMA) [6]. The reluctance of advisors to cater to individual investors stems from their preference for institutional clients who offer regular income through consultancy fees. Consequently, advisory services provided to individual investors may lack objectivity, as advisors prioritize attracting clients for account custody and earning commissions or brokerage fees. This approach overlooks the importance of evaluating an investor's financial characteristics, particularly their risk tolerance and financial status, which can be categorized into home ownership and income status [7]. Uzak University Risk of individual investors Finance on Endurance literacy and Population regarding the influence of factors a study was conducted. study to examine these relationships Multivariate regression analysis used. First, credibility of the questionnaires was assessed, followed by a descriptive analysis of the participants' demographic characteristics. Subsequently, the empirical analysis included the presentation of financial literacy levels among participants [8]. Investments are intended to generate profits by entrusting property or funds for future gain. Investment involves committing resources or funds with the expectation of receiving benefits in the future. Investors engage in various forms of investment, aiming to enhance their welfare, spanning from employees and entrepreneurs to retirees. These investments can take diverse forms such as savings accounts, bank deposits, expensive purchases, metals, stocks, bonds, mutual funds, real estate, or even purchasing additional properties. However, before committing to any investment, investors must assess different options and levels of risk associated with each. Decision-making in investments entails facing uncertainties regarding expected outcomes, including the possibility of non-compliance or loss [9]. Investors not only consider potential returns but also evaluate the risks involved, which vary based on individual financial risk tolerance (FRT) levels. FRT represents an investor's willingness to endure negative changes or declines in the value or expectations of investments. Managing money is a daily aspect of personal finance, involving actions like saving, keeping financial records, and analysing balance sheets and cash flows. This process aims to effectively handle personal economic resources for long-term prosperity [10]. The purpose is to enhance profitability and overall well-being, though poor management can lead to decreased welfare or even bankruptcy. Financial advisors play a crucial role in optimizing investments and helping clients understand the impact of financial risk tolerance (FRT) on investment decisions and service quality. However, assessing FRT is complex, as it involves Gender, age, marital status, education, such as occupation and income various factors. Despite the challenges, policy makers and investment managers risk investors to reduce their risk tolerance based on levels and to categorize it is important to understand FRT [11]. Investors across different age brackets exhibit notable differences in their investment preferences, as evidenced by research. Young investors, typically aged 26 to 35, tend to favour mutual funds, while middle-aged investors, spanning from 36 to 45, show a predilection towards debentures and securities (Mittal and Vyas, 2007). Studies by Wallach et al. and Kogan (1961) pioneered the exploration Age and risk tolerance, the relationship between older people usually having their own compared

to younger peer's low risk tolerance expression. This trend is often attributed to factors such as limited time for older individuals to recover from investment losses and biological changes associated with aging conducted thorough investigations into Age and risk tolerance. The relationship exhibits a non-linear pattern, there is risk tolerance increase in previous years of acquisition, it will decrease after that. However, the age and risk tolerance relationship remains subject to debate, with studies presenting conflicting findings [12]. study on the interplay between risk tolerance and age, measuring risk tolerance by assessing the proportion of risky assets in an individual's portfolio. Their findings suggested that risk tolerance tends to increase with age, but the evidence is limited and may not fully account for other sociodemographic variables. It's important to note that while age may play a role in shaping risk tolerance, other socioeconomic factors and personal values also significantly influence an individual's investment decisions. Extroverts are known for their sociability, warmth, and amiability. They tend to follow their instincts rather than strict logic, often acting on impulse due to their responsiveness to external stimuli. In contrast to introverts, they find risks enticing and are more inclined to take them, especially in decision-making regarding investments and financial matters. While they may seek advice from financial advisors, ultimately, they rely on their own preferences to make choices. Their generally optimistic outlook on life often leads them to perceive risks less severely and to possibly overlook market conditions [13]. Typically, investors aim to adjust their portfolios upon arrival to either mitigate or amplify risks and returns. A diversified portfolio typically includes a mix of stocks, with the specific ratio of stocks to other assets depending on the investor's risk tolerance level. When assessing the performance of various investment avenues, stocks are often favoured for their historically higher returns compared to other options. However, over time, stocks can be perceived as high-risk investments. Many investors, regardless of risk, enter the stock market with the expectation of generating significant income [14]. Nevertheless, without a clear understanding of their risk tolerance, investors may struggle to determine the optimal investment plan that aligns with their financial goals. Evaluating risk tolerance is crucial for allocating assets within an investment portfolio to achieve long-term objectives. A rational assessment of financial risk tolerance allows investors to make informed decisions, balancing potential earnings with the level of risk they are willing to undertake. For instance, individuals with low risk tolerance may fail to meet long-term investment targets due to their reluctance to invest in stocks, resulting in missed opportunities [15].

## 2. MATERIALS AND METHOD

**Investment Objectives:** Your investment goals represent the outcomes you aim to accomplish. These may involve accumulating wealth, planning for retirement, purchasing a home, funding education, or any other financial aspirations you may have.

**Financial objectives encompass:** This refers to the period over which you intend to utilize your investments. It is crucial as it dictates the level of risk you can undertake. Short-term goals typically lean towards more conservative investment approaches, while longer time horizons may permit more aggressive strategies.

**Low Tolerance for Risk:** Investors with a low tolerance for risk prioritize safeguarding their capital over seeking higher returns. These individuals typically favour investments with minimal volatility and a strong emphasis on capital protection. They are inclined towards assets such as government bonds, Certificates of Deposit (CDs), and top-tier corporate bonds, which offer a level of predictability and security that is preferred over more volatile options like equities or alternative investments. Government bonds, backed by the government's credit, provide a secure investment avenue with steady income streams. CDs offer guaranteed returns and fixed interest rates, making them particularly appealing to risk-averse investors seeking stability.

**Knowledge and Experience:** Your familiarity with investment principles and your past experiences in the market are pivotal in shaping your investment strategy. Novice investors may opt for simpler options or seek professional guidance, whereas seasoned investors might delve into more complex strategies or manage their portfolios more intricately.

**Liquidity Requirements:** This refers to how easily we can access our funds. If we anticipate needing quick access to funds for upcoming expenses or emergencies, we may prioritize investments with high liquidity. Conversely, if we have a longer time horizon and can afford to tie up our funds for a while, we might consider less liquid investments that offer higher potential returns.

**Risk Assessment Questionnaires:** Risk assessment questionnaires are tools utilized by companies to systematically evaluate potential risks in their operations, projects, or initiatives. These questionnaires gather information across various organizational functions, processes, and environmental aspects to identify vulnerable areas and assess threats. By analysing these risks, organizations can determine the potential impact and design strategies to mitigate them.

**Investment Experience and Knowledge:** In the realm of investment, experience and knowledge play crucial roles in designing effective investment strategies and ensuring informed decision-making. Detailed questionnaires are employed to assess an individual's familiarity with investment concepts, products, and strategies, including risk and return principles, stocks, bonds, mutual funds, and other investment products. Additionally, these questionnaires evaluate an individual's investment objectives, risk tolerance, and past investment experiences, providing insights into their financial capacity and risk appetite.

**Financial Situation:** Assessing one's financial situation involves evaluating income, expenses, assets, and liabilities to understand their current financial status comprehensively. This assessment sheds light on an individual's overall financial health and their ability to engage in investment activities. Understanding sources of income, such as salary, dividends, or rental income, helps gauge earning potential, while analyzing expenses, including fixed costs and discretionary spending, provides clarity on financial obligations.

**Investment Goals and Time Horizon:** Furthermore, determining investment objectives and time horizon is critical in formulating an effective investment strategy aligned with an individual's aspirations and financial goals. These objectives range from wealth accumulation for retirement to funding education or achieving other financial milestones. Clear and specific investment goals enable financial advisors to define desired outcomes and tailor investment approaches accordingly.

**Emotional Attitude Towards Risk:** Emotional attitudes toward risk vary widely among individuals, influenced by personal experiences, personality traits, and cultural backgrounds. While some individuals are thrill-seekers, viewing risk as an opportunity for growth and adventure, others approach risk with caution and anxiety, preferring to avoid potential losses. Understanding these emotional attitudes toward risk is essential in crafting investment strategies that align with an individual's risk tolerance and preferences.

**Method:** the GRA (Grey Relational Analysis) approach at its inception, focusing on the concept of the gray gadget. This technique is particularly effective for selection problems involving multiple attributes within a component. The current literature highlights its applicability in addressing problems associated with multiple factors and variables, especially when dealing with complex relationships. The GRA approach is well-suited for resolving issues related to fixing problems, and various types of GRA techniques have been proposed in the field. The introduction of the GRA approach is both straightforward and environmentally friendly, making it a practical choice for addressing complex problems involving multiple variables [16]. Gray Relational Analysis (GRA) serves as a valuable tool for addressing problems in Multi-Criteria Decision Making (MCTM). Originally introduced by Deng, GRA has proven effective in troubleshooting various MCTM issues. It functions as an evaluative model, employing a method for analysing records that indicates relationships through a geometric approach. Categorized as a gray communication evaluation technique, GRA aims to study communication between the collection and variation series, making it a versatile method for understanding and evaluating complex relationships [17]. Derived from the concept of gray systems, GRA represents a quantitative method for detecting correlations among different levels of information utilization. The fundamental idea behind GRA lies in evaluating the intimacy of communication through the analysis of series curves. It places significant importance on the combination of series magnitudes, which are inversely determined. GRA is particularly well-suited for assessing problems in communication that involve two factors and varying levels of complexity between variables. It proves effective in addressing a range of issues, including adjudication in various Multi-Criteria Decision Making (MCTM) scenarios and labor selection [18]. Gray Correlation Analysis (GRA) and simulation offer a suitable approach for determining optimal regulatory alternatives. Both methods serve as the gold standard in yielding parameters at various levels, such as a 10 $\mu$ m particle size, 5% reinforcement, 8mm diameter device, 710 rpm speed, 20mm/min. feed pressure of 139.48N, cross-feed force of 63.92N, thrust force of 42.6N, temperature of 68.96oC, and ground hardness of 0.198 $\mu$ m. Significance is attributed to the effects of these parameters on response parameters, as each variable's impact is assessed throughout the entire process [29]. Gray Correlation Analysis (GRA) version, each unit is assessed by comparing indicators related to one-dimensional vibrational statistics with those of neighboring entities. Upon obtaining the one-dimensional Local Binary Pattern (1D-LBP) signals, statistical solutions are computed based on these indicators. These processes, well-documented in the literature, are classified using programs designed for GRA. Notably, the 1D-LBP technique has undergone recent modifications in response to vibration alerts, marking its first application in various types of vibrational signals within the GRA framework [20]. The GRA method is employed by decision-makers as it incorporates a fuzzy set approach, taking into account information for addressing decision-making problems. Multiple standards play a crucial role in achieving success in decision-making tasks but can be challenging due to their inherent uncertainty. Consequently, the GRA method is a common tool for job evaluation, dealer selection, factory location, and various manufacturing structures, where numerous criteria are decisive amidst uncertainty [21]. The primary purpose of GRA is to elucidate the comparative ranking of alternatives based on their performance. In this method, known

as Gray Relative Analysis, a super target sequence is established in accordance with specific scenarios. Subsequently, each alternative in the rows undergoes evaluation using the Carey correlation coefficient against the satisfying target collection. Finally, the gray correlation is computed by applying coefficients, revealing the correct target sequence and determining the size of gray contact for each variant sequence [22]. The Distribution Network Integrated GRA (DNI-GRA) for the planning of hydropower technology is proposed for reconstruction. A novel method utilizing Particle Reinforced Cord Electric GRA is introduced for discharge tooling, providing a prototype fabric for enhancement. The assessment of the impact of various factors such as Fuel Charges, Gross Domestic Product, motor types, and travel distance in vehicle kilometers is suggested through the implementation of GRA with box lines. Taiwan utilizes the Fuzzy-GRA technique for estimating economic performance, while an integrated GRA approach is proposed for evaluating management capabilities in environmental knowledge [23]. Gray Correlation Analysis (GRA) is frequently utilized in Asia and serves as a version for outcome evaluation, particularly on an absolute basis. It focuses on determining the similarity among rows or the degree of difference in dating measurements. GRA primarily aims to examine influencing factors through its purpose and frameworks [24]. Gray Relational Analysis (GRA) is The Facts Appraisal technique, also known as the geometric method, assesses the relationship between arrays of a specific type, as proposed in the GRA technique. The primary objective of GRA is to gauge the level of similarity among interelements based on the degree of their relationship. Studies have applied GRA to evaluate the impact of environmental factors, such as the erosion of used oil pipes in gas wells. Policy implications have been identified through the application of GRA factors, considering overall performance characteristics. In the United States, the Electro Discharge Machining Method has utilized GRA, and GRA has been employed for assessing expatriate assignments, including scenarios involving added water in Beijing [25]. A composite approach for resource security assessment involves the use of GRA and related techniques. Jodi has mentioned the use of GRA in phrases for a given product image, determining the optimal settings for sweetness based on the corresponding components. Furthermore, GRA has been introduced in the context of Brand New Faith Activities, proposing a system for struggle reform. In the field of Electrocardiogram (ECG) analysis, GRA is applied as a Heart Rate Discriminator, utilizing different ECGs and proposing a technique to obtain the degree of frequency components in beats. Additionally, a GRA prediction-integrated approach has been proposed for round releases [26]. The organization known as GRA (Reference/Aspiration Level optional) involves the comparison of various factors and elements through substitution, illustrating relationships. Within the GRA model, the calculation concepts and processes are briefly examined. GRA, based on the color gadget principle, is a selection technique developed by Deng. It is inherently gray in color, with black symbolizing incomplete information containing statistics. The white gadget, on the other hand, represents complete truths. The gray relationship within GRA pertains to incomplete facts and connections between rows, serving as an indicator of size. This allows for the individual measurement of element spacing. In cases where tests are ambiguous or the execution of test techniques is precisely impossible, a gray scale in statistical regression is employed to rectify defects [27].

### 3. RESULTS AND DISCUSSION

**TABLE 1.** Risk Tolerance of Individual Investor

	<b>Risk Assessment Questionnaires</b>	<b>Investment Experience and Knowledge</b>	<b>Financial Situation</b>	<b>Investment Goals</b>	<b>Emotional Attitude Towards Risk</b>
Investment Objectives	31.08	139.53	29.15	22.05	36.05
Time Horizon	29.12	142.97	33.69	27.30	6.00
Low Risk Tolerance	24.08	122.58	29.18	23.10	45.36
Knowledge and Experience	23.17	128.28	24.60	17.59	34.00
Liquidity Needs	33.33	186.41	27.96	18.89	45.00

Table 1 shows the Risk Tolerance of Individual Investors for Grey relational analysis Investment Objectives, Time Horizon, Financial Situation, Knowledge and Experience and Liquidity Needs. Risk Assessment Questionnaires, Investment Experience and Knowledge, Financial Situation, Investment Goals and Emotional Attitude Towards Risk. Investment Objectives 31.08 is showing the Highest Value for Risk Assessment Questionnaires and Knowledge and Experience 23.17 is showing the lowest value. 142.97 Time Horizon is showing the Highest Value for Investment Experience and Knowledge 122.58 Low Risk Tolerance is showing the lowest value. 33.69 Financial Situation is showing the Highest Value for Financial Situation and 24.60 Knowledge and Experience is

showing the lowest value. 27.30 Time Horizon is showing the Highest Value for Investment Goals 17.59 Knowledge and Experience is showing the lowest value. 45.36 Low Risk Tolerance is showing the Highest Value for Emotional Attitude Towards Risk and Adaptation 6.00 Time Horizon is showing the lowest value.

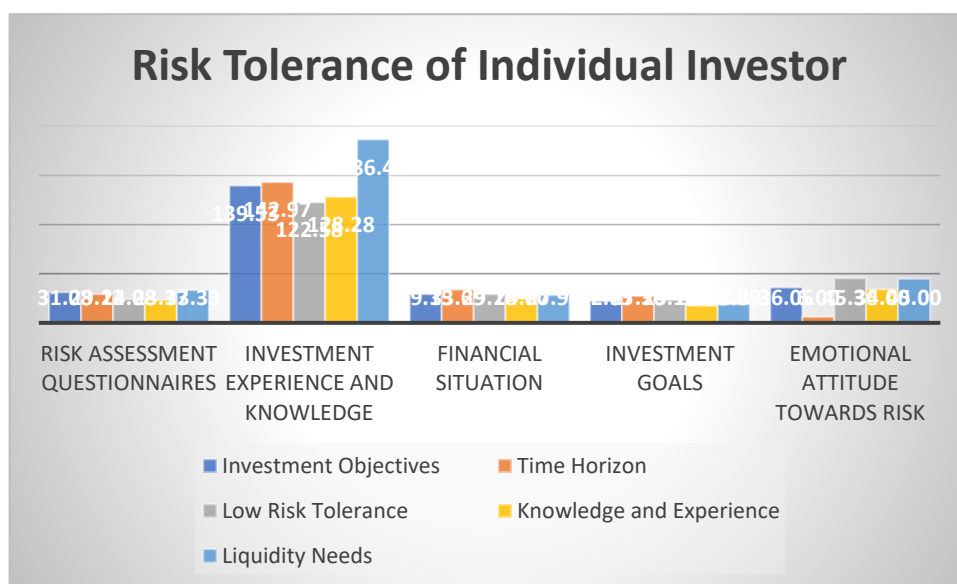


FIGURE 1. Risk Tolerance of Individual Investor

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TABLE 2. Normalized Data

	Risk Assessment Questionnaires	Investment Experience and Knowledge	Financial Situation	Investment Goals	Emotional Attitude Towards Risk
Investment Objectives	0.7785	0.2655	0.2655	0.5407	0.2365
Time Horizon	0.5856	0.3194	0.3194	0.0000	1.0000
Low Risk Tolerance	0.0896	0.0000	0.0000	0.4325	0.0000
Knowledge and Experience	0.0000	0.0893	0.0893	1.0000	0.2886
Liquidity Needs	1.0000	1.0000	1.0000	0.8661	0.0091

Table 2 shows the Normalized data for Risk Tolerance of Individual Investor for Grey relational analysis Investment Objectives, Time Horizon, Financial Situation, Knowledge and Experience and Liquidity Needs. Risk Assessment Questionnaires, Investment Experience and Knowledge, Financial Situation, Investment Goals and Emotional Attitude Towards Risk it is also the Normalized value.

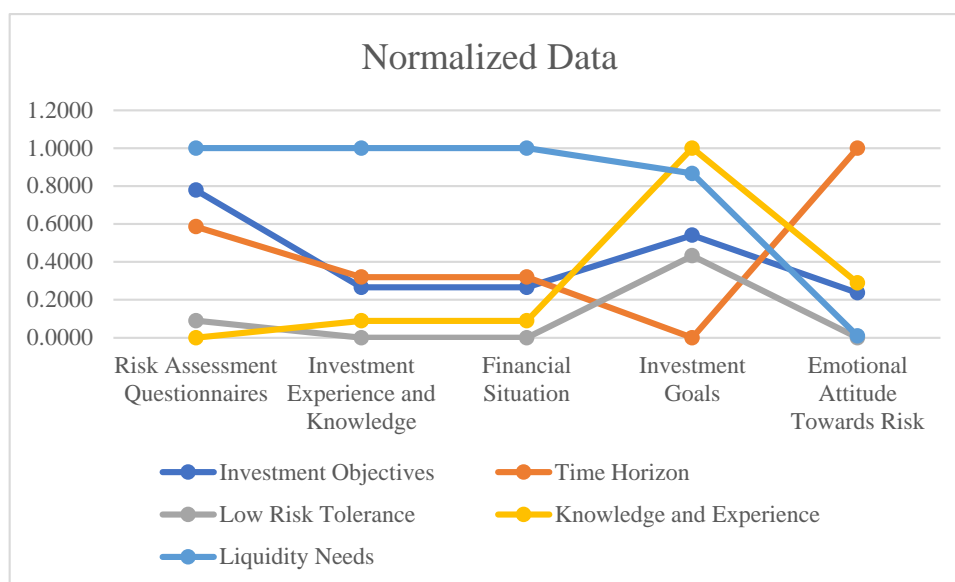


FIGURE 2. Normalized Data

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TABLE 3. Deviation sequence

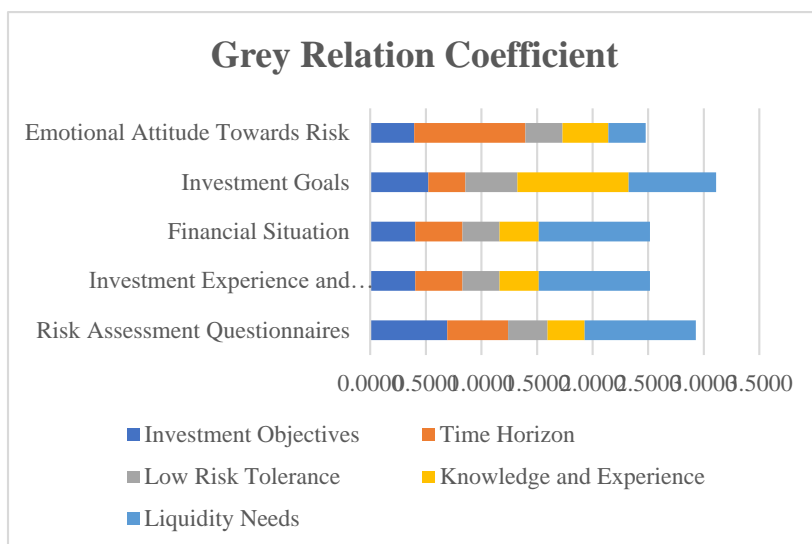
	Risk Assessment Questionnaires	Investment Experience and Knowledge	Financial Situation	Investment Goals	Emotional Attitude Towards Risk
Investment Objectives	0.2215	0.7345	0.7345	0.4593	0.7635
Time Horizon	0.4144	0.6806	0.6806	1.0000	0.0000
Low Risk Tolerance	0.9104	1.0000	1.0000	0.5675	1.0000
Knowledge and Experience	1.0000	0.9107	0.9107	0.0000	0.7114
Liquidity Needs	0.0000	0.0000	0.0000	0.1339	0.9909

Table 3 shows the Deviation sequence for Risk Tolerance of Individual Investor for Grey relational analysis Investment Objectives, Time Horizon, Financial Situation, Knowledge and Experience and Liquidity Needs. Risk Assessment Questionnaires, Investment Experience and Knowledge, Financial Situation, Investment Goals and Emotional Attitude Towards Risk it is also the Maximum or Deviation sequence value.

TABLE 4. Grey Relation Coefficient

Risk Assessment Questionnaires	Investment Experience and Knowledge	Financial Situation	Investment Goals	Emotional Attitude Towards Risk
0.6930	0.4050	0.4050	0.5212	0.3957
0.5468	0.4235	0.4235	0.3333	1.0000
0.3545	0.3333	0.3333	0.4684	0.3333
0.3333	0.3544	0.3544	1.0000	0.4128
1.0000	1.0000	1.0000	0.7888	0.3354

Table 4 shows the Grey relation coefficient for Risk Tolerance of Individual Investor for Grey relational analysis Investment Objectives, Time Horizon, Financial Situation, Knowledge and Experience and Liquidity Needs. Risk Assessment Questionnaires, Investment Experience and Knowledge, Financial Situation, Investment Goals and Emotional Attitude Towards Risk it is also Calculated the Maximum and minimum Value.



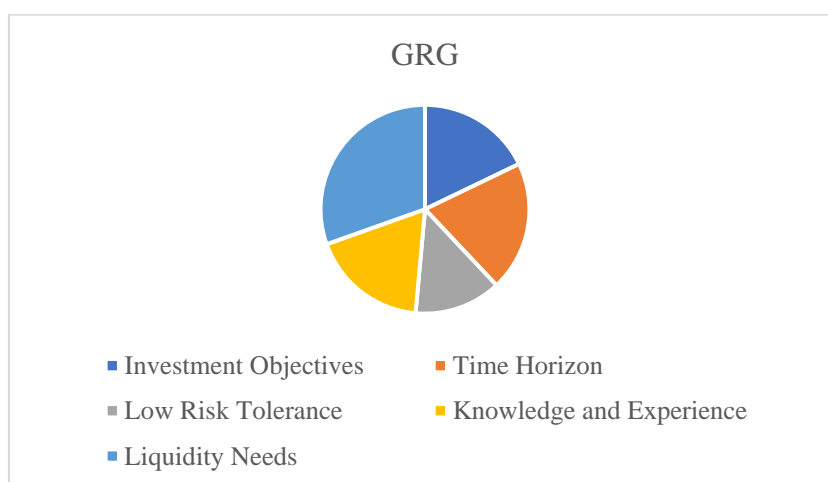
**FIGURE 3.** Grey Relation Coefficient

Figure 3 shows the Grey relation coefficient for Risk Tolerance of Individual Investor for Grey relational analysis Investment Objectives, Time Horizon, Financial Situation, Knowledge and Experience and Liquidity Needs. Risk Assessment Questionnaires, Investment Experience and Knowledge, Financial Situation, Investment Goals and Emotional Attitude Towards Risk it is also Calculated the Maximum and minimum Value.

**TABLE 5.** Result of final GRG Rank

	GRG	Rank
Investment Objectives	0.4840	4
Time Horizon	0.5454	2
Low Risk Tolerance	0.3646	5
Knowledge and Experience	0.4910	3
Liquidity Needs	0.8248	1

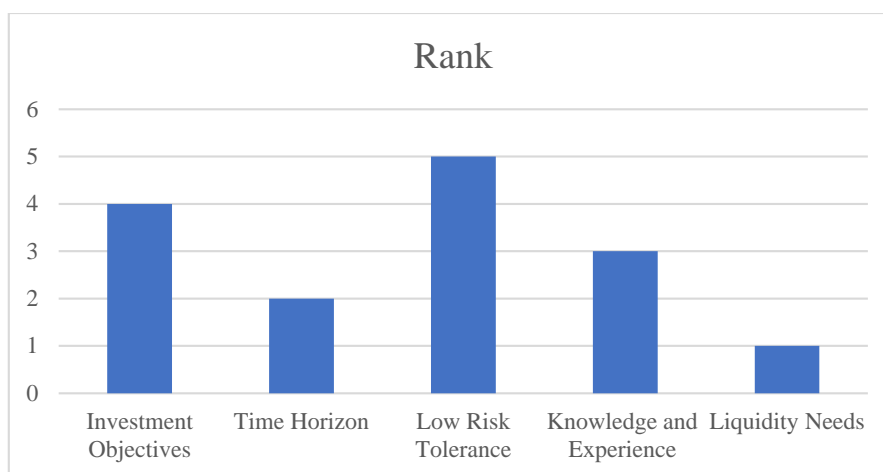
Table 5 shows the Result of final GRG Rank of GRA for Risk Tolerance of Individual Investor. GRG Rank Liquidity Needs is showing the highest value for GRG Rank and Low Risk Tolerance is showing the lowest value.



**FIGURE 4.** GRG

Figure 4 shows the Result of final GRG Rank of GRA for Risk Tolerance of Individual Investor. GRG Rank Liquidity Needs is showing the highest value for GRG Rank and Low Risk Tolerance is showing the lowest value.





**FIGURE 5.** Shown the Rank

Figure 5 shows the Rank of GRA for Risk Tolerance of Individual Investor. Liquidity Needs is got the first rank whereas is the Low Risk Tolerance is having the Lowest rank.

### 3. CONCLUSION

Risk tolerance refers to an individual investor's inclination towards embracing fluctuations in investment values in pursuit of higher income. It reflects their capacity to endure such fluctuations and financial goals, time horizon and emotional comfort various including status influenced by factors. Personal preferences and investment choices with circumstances as it helps to regulate, informed investment decisions one's risk tolerance in taking understanding is important. financial situation, investment objectives, knowledge of the financial market, factors like experience, and emotional intelligence contribute to determining one's risk tolerance. Investors' risk tolerance is often assessed through questionnaires or evaluations conducted by financial advisors, which consider factors like attitudes towards risk, investment goals, time horizon, and financial situation. Based on the assessment, investors may be categorized into different risk profiles such as conservative, moderate, or aggressive, with corresponding investment strategies suggested accordingly. It's essential for investors to honestly evaluate and be realistic about their risk tolerance, as overestimating it may lead to excessive risk-taking and potential losses during market downturns, while underestimating it may result in overly conservative investment choices. Regular reviews of risk tolerance are recommended, especially in light of significant life events or market fluctuations. Investor objectives, such as education, retirement planning, estate transfers, and financial stability, provide a framework for investment decisions. The investor horizon indicates the timeframe within which the investor can utilize their investments before needing them. This timeframe can be adjusted based on the investor's objectives. Financial stability reflects the current and future financial circumstances of the investor, including income, assets, and liabilities. Risk tolerance of individuals to evaluate and consider for investment managers is an important responsibility when devising investment plans to ensure their effectiveness and reliability. Your investment goals represent the outcomes you aim to accomplish. These may involve accumulating wealth, planning for retirement, purchasing a home, funding education, or any other financial aspirations you may have the GRA (Grey Relational Analysis) approach at its inception, focusing on the concept of the gray gadget. This technique is particularly effective for selection problems involving multiple attributes within a component. The current literature highlights its applicability in addressing problems associated with multiple factors and variables, especially when dealing with complex relationships. The GRA approach is well-suited for resolving issues related to fixing problems, and various types of GRA techniques have been proposed in the field. The introduction of the GRA approach is both straightforward and environmentally friendly, making it a practical choice for addressing complex problems involving multiple variables. Investment Objectives, Time Horizon, Financial Situation, Knowledge and Experience and Liquidity Needs. Risk Assessment Questionnaires, Investment Experience and Knowledge, Financial Situation, Investment Goals and Emotional Attitude Towards Risk. the Rank of GRA for Risk Tolerance of Individual Investors. Liquidity Needs is got the first rank whereas the Low Risk Tolerance is having the Lowest rank.

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