



**COGNITIVE BIAS AND RISK PREFERENCES
ANALYSIS OF PONZI SCHEME INVESTORS**

Master Thesis

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MASTER THESIS

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ABSTRACT

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Every person on earth has to make a decision for the next step of his live. Motivation means influencing the employee to perform his / her duty in the expected quality and quantity. Today, it is possible to see this behavior in organizations such as various companies or institutions. The motivation of each individual varies depending on various situations and cultural heritage. In addition, this metamorphosis is significantly due to a wide variety of different needs of individuals. The attitude towards risk has been a topic that has attracted the attention of both academics and practitioners for centuries. Despite its importance in the financial service industry, there are many unanswered questions regarding financial risk perception. Therefore, the current study is conducted firstly to understand the cognitive bias of the Ponzi scheme investor. Secondly, to analyse the risk preference of the Ponzi scheme investors. Further, the study attempted to explain the role played by cognitive bias and risk preferences in Ponzi scheme, the various concepts of risk preferences in Ponzi scheme, the motivations behind Ponzi scheme investors' behavior, the different Ponzi schemes and investment scams, and the different factors that expose investors to Ponzi scams. Various other factors related to the Ponzi scheme investor are covered during conducted the present study.

Keywords: Cognitive Bias, Risk Preferences, Ponzi Scheme Investors.

ÖZET

PONZİ ŞEMASI YATIRIMCILARININ BİLİŞSEL YANLILIK VE RİSK TERCİHİ ANALİZİ

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Dünyadaki her insan hayatının bir sonraki adımı için bir karar vermek zorundadır. Motivasyon, çalışanın görevini beklenen nitelik ve nicelikte yerine getirmesini etkilemek demektir. Günümüzde bu davranışı çeşitli şirket veya kurumlar gibi organizasyonlarda görmek mümkündür. Her bireyin motivasyonu çeşitli durumlara ve kültürel mirasa bağlı olarak değişir. Ayrıca, bu metamorfoz, önemli ölçüde bireylerin çok çeşitli farklı ihtiyaçlarından kaynaklanmaktadır. Riske karşı tutum yüzyıllardır hem akademisyenlerin hem de uygulamacıların ilgisini çeken bir konu olmuştur. Finansal hizmet sektöründeki önemine rağmen, finansal risk algısına ilişkin cevaplanmamış birçok soru bulunmaktadır. Bu nedenle, mevcut çalışma öncelikle Ponzi şeması yatırımcısının bilişsel önyargısını anlamak için yapılmıştır. İkinci olarak, Ponzi şeması yatırımcılarının risk tercihlerini analiz etmektir. Ayrıca, çalışma Ponzi şemasında bilişsel önyargı ve risk tercihlerinin oynadığı rolü, Ponzi şemasındaki çeşitli risk tercihi kavramlarını, Ponzi şeması yatırımcılarının davranışlarının arkasındaki motivasyonları, farklı Ponzi şemaları ve yatırım dolandırıcılıklarını ve yatırımcıları Ponzi dolandırıcılığına maruz bırakan farklı faktörler açıklamaya çalışmıştır. Ponzi şeması yatırımcısı ile ilgili diğer çeşitli faktörler, bu çalışma yürütülürken ele alınmıştır.

Anahtar Kelimeler: Bilişsel Önyargı, Risk Tercihleri, Ponzi Şeması Yatırımcıları.

DEDICATIONS

Praise and Glory be given to Almighty God, who made it possible for me to see this long-awaited day. Thank's Lord for this grace, it wasn't easy but by your grace we did it.

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INDEX OF ICONS AND ABBREVIATIONS

AIDS	: Acquired Immunodeficiency Syndrome
ANOVA	: Analysis of Variance
CMSA	: Capital Market and Services Act
EUT	: Expected Utility Theory
HYIP	: High-Yield Investment Program
LISS	: Longitudinal Internet studies for the Social Sciences
MGM	: Member-Get-Member (Member a Get a Member)
MLM	: Multi-Level Marketing
US	: United States
USA	: United States of America

1. INTRODUCTION

Human beings have had to make and implement a decision at every moment of their life since their existence. Every person on earth has to make a decision for the next step. The main characteristics of these decisions are that they create a movement in the future and that many living things are affected by this movement. People need to make a decision for every step they take in the future. The size of the domain of these steps determines the number of filters the individuals pass their thinking through before making a decision. Longer or more detailed thinking is needed before turning the ideas that are found important into behaviors. The characteristics of the decisions that have been important since the first man is constantly changing and blending with the requirements of the age. At the same time, the factors that push people to make decisions are also affected by this change over time. The decision-making mechanism consists of the satisfactory elimination of the individual's concerns about the future and taking action. These can be named as motive or its synonym motivation and have a general appearance. Motivation means influencing the employee to perform his / her duty in the expected quality and quantity (Başaran, 1984). Since ancient times, people who have formed a community have had sought ways to gain more than others. The need to survive have had developed the individual's survival motives. Realizing that they have increased their chances of survival by forming communities, people have had managed to keep this possibility constant by keeping the motivation of each other alive within these groups. This behavior has changed shape with the requirements of time over time. Today, it is possible to see this behavior in organizations such as various companies or institutions. With the development of trade, employers have had sought ways to increase the efficiency of the employees. As a result of this quest, some implications have been drawn. The motivation of each individual varies depending on various situations and cultural heritage. In addition, this metamorphosis is significantly due to a wide variety of different needs of individuals.

Over time, one or more individuals have been trying to generalize ways to motivate others, and some methods are have had turned into systems. However, an important point is to know how and under what conditions people are motivated. In addition, it is necessary to determine the beneficial and disadvantageous aspects of these motivation

techniques well (Ergül, 2005). These systems, which we can call as Motivation Strategies, include opportunities for some people to reach their interests easily over others. These can be defined as persuading others to gain and gaining an unfair advantage from individuals through fraudulent behaviors. The fraudulent act must affect the will of the victim and cause him to deceive. As stated before, the acts constituting the fraud crime differ (Soyaslan, p. 417). Thus, fraudulent activities occurred.

By providing their investors with the right motivations, fraudsters turn investors into their victims and gain an advantage over their superiors. They can do this by taking advantage of the socio-cultural characteristics of the victims, managing the risk perceptions of the investors, breaking their prejudices and using their cognitive tendencies. When talking about this system in which investors turn into victims, the characteristics of the investor should also be mentioned. Investors are people with the goal of increasing their savings by using another investment tool. They expect earnings by accepting certain risks for their investments. When investors' risk acceptance mechanisms are examined, some common steps can be taken. First of all, they want to test whether the people who come with investment offers are reliable. For this, they listen to their experiences and intuitions. Apart from this, there are behaviors they perform reflexively without realizing it. The explanation behind their reflexive realization is that there are not many approaches they can show statistically anyway. Classical economics' definition of investor is based on personas who always turn to rational choices. Traditional finance theories accepted investors as individuals who can successfully solve complex optimization problems and make rational decisions without experiencing biases under the influence of their emotions in order to maximize their benefits (Sefil et al, 2011). This is one of the most important issues that traditional finance ignores. Therefore, traditional financial methods are not sufficient resources for analysing market anomalies. When investor biases are broken and issues regarding financial risk tolerances are exceeded, it is obvious that investors become victims of a fraud crime. In other words, when the behavior of the investors exceeding the limits, it becomes a huge danger for them.

These people, who are called fraudsters, go over the weaknesses of investors and make them act more greedy and more ambitious. The techniques they develop usually

involve using the cognitive tendencies of investors, managing financial risk perceptions, removing biases and providing appropriate motivations.

There are many reasons that lead people to scams. These can often seem hopeless, but when examined at the right depth, there may be more than one cause. It can be said that the common point of many is impatience.

The attitude towards risk has been a topic that has attracted the attention of both academics and practitioners for centuries. However, studies were started at the last stage of the studies to understand and research the financial risk perceptions of individual investors (Grable and Lytton, 1999a: 164).

Financial Risk Perception is an important factor influencing the decision of the investor to combine his / her investment to create the best portfolio by examining the relationship between investment and return. This situation reinforces the idea that financial advisors should know their investors very well and make investment proposals within ethical rules, considering the characteristics and financial conditions of their customers.

Despite its importance in the financial service industry, there are many unanswered questions regarding financial risk perception. These questions are generally about how financial risk perception can be measured most accurately and how which factors affect financial risk perception. "Which factors affect individuals' perception of financial risk?" Academic research has been carried out for the last 30 years to answer the question. However, the contradictory and inconsistent nature of the research results shows that not much progress has been made on this subject and new studies are needed (Venter, 2006: 2).

Risk can be defined as the possibility of harm. It is useful to make a more comprehensive definition when defining Financial Risk. Financial Risk, Risk can be expressed as the probability of unexpected events in the future. In terms of financial investments, the risk is the probability of deviation of expected return from actual return (Korkmaz and Ceylan, 2007: 472). Although the risk is one of the most fundamental components of investment, it is one of the most avoided issues.

Although the attitude of each investor to risk changes, three behaviors are observed against risk. These are analysed as risk aversion (Risk-Averse), risk-seeking (Risk Seeker) and indifference to risk. It is not difficult to predict that risk-averse investors will not want to face any risk. They prefer the least risky option among the options. It can be said that people who seek risk are less focused on return in the investment-return relationship and their main search is excitement. However, in this case, thinking that he is not interested in return at all can be considered as indifference. The size of the amount earned against risk is another issue that encourages the risk-loving investor type.

Investors who are indifferent to risk, on the other hand, know the risks of the instrument they choose considering the market conditions, and they do not tend to engage in any external behavior. In fact, on a large scale, it would not be wrong to say that investors who engage in every investment behavior avoid risk. In fact, it would not be wrong to mention that every investor who exhibits investment behavior on a large scale is also avoiding risk because it is not possible to encounter a single investor on earth who invests to lose. Assuming the existence of an investor who believes that he will lose pushes the boundaries of logic. Therefore, the main factor in investment behavior is not the Risk asset, but the size of the Risk asset. In the Ponzi Fraud, which we will explain later, Charles Ponzi encouraged individual investors to make investments by taking advantage of their demographic and socioeconomic characteristics.

The decision-making strategy to be followed before a financial investment decision is made must include some variables. These are the investor's objective, the time the investor wants his money to hold, the investor's financial condition, and the investor's attitude towards risk. The investor should determine the appropriate investment instrument by taking these variables into consideration. The approaches used by investors who do not know what Financial Risk Tolerance is to measure it can be grouped under three groups (Ardehali et al., 2005: 494). These are Objective Criteria, Intuitive Evaluation and Subjective Evaluation. Objective Criteria for the investor can be defined as the follow-up of the risks it has accepted under the investments it has made before, the composition of these investments, etc. Although there is a widespread view that there are demographic and socioeconomic factors affecting the Investor's Perception of Financial Risk, there are still debates on the extent of the impact of these features. These

characteristics appear as gender, age, marital status and number of children, income level and net assets, education level, financial knowledge level.

However, the investor can be persuaded to invest through cognitive processes. The shortcuts created by the human mind in the decision-making process cause false inferences and create some disorders that prevent individuals from rational behavior. These disorders, which are very difficult to eliminate, are called cognitive tendencies (Sefil & Çilingiroğlu, 2011). Kahneman and Tversky had played an important role in the discovery of these processes. One of the most important components is Loss Aversion. Individuals choose the one with the emphasis on "gain" out of two events that have equal results. Cognitive processes can be listed as Framing, Mental Accounting, Uncertainty Avoidance, Conservatism, Representation, Accessibility, Overconfidence, Verification, and Scientific Dissonance.

When all mentioned are combined, the Ponzi Order emerges. The Ponzi Layout was conceived and implemented by Charles Ponzi. It is the latest product of the fraud adventure that started with the departure of Charles Ponzi, a broke and unlucky man, to America. Ponzi has been jailed from time to time for petty fraud. Then he took the life-changing step, thinking that postage stamps could make a profit by using the sales price differences between countries. Ponzi's idea seemed both legal and possible, but there was not enough capital to get into this business.

He also started out by borrowing money from his closest relatives. Although he found relatively support from his close circle, he could not persuade foreign investors to trust his idea. Later, although it is not a financially successful system, its way of persuading investors gives many outputs for behavioral finance. Ponzi has taken advantage of their socioeconomic status by choosing new investors from immigrants like him. After collecting some investment, he promised to pay \$ 150 for every \$ 100 after 90 days. By paying interest to the first investors at the end of 45 days, it enabled the first generation to attract the second generation to the system. Since the system survives when newcomers pay the interest of its predecessors, the system is doomed to collapse when the new generation does not arrive. Ultimately, although Ponzi made \$ 9 million in profit from this system, it had \$ 14 million in interest to its investors. Although he made a profit of 9 million, he spent most of it on luxury shopping, lost about 2 million in gambling, and

although he still has a loan of \$ 330 thousand in time deposit accounts in banks, there was only \$ 30 postage stamp left from Ponzi.

Steps of the Ponzi system:

1. There is an investment instrument that looks like legal.
2. When investing in this instrument, it is promised that higher interest is paid than existing institutions.
3. A portion of the money from the first investor is distributed back to the first investors at the end of the first maturity.
4. The system, which is successful at the end of the first maturity, spreads through the existing participations through word of mouth and new generation participants are obtained.
5. Since the system is based on earning previous participants with the return of the last participant, it is doomed to collapse when it cannot attract more participants.

One of the critical mistakes Ponzi makes is that he tries to combat negative perception in the public eye by working with William McMaster. William McMaster's complaints to the authorities about Ponzi sparked the fuse. The same system has been implemented by people such as Amtel, Banker Kastelli and Bernard Madoff in the last 10 years.

2. THEORETICAL FRAMEWORK

2.1. Decision Making Under Uncertainty, Probability and Experimental Psychology

Decision and Decision Making has been explored by many scientists and philosophers by ages. Although opinions on the subject can be found in ancient times, it can be said that the compilation and development of it as a study began with the work of Edwards published in 1954, called the Psychological Bulletin. With this study, the psychology branch had the chance to come to terms with the definitions of economics such as risk, decision-making under risk, earnings or game theory.

With the work of Edwards, many experiments have been done about choosing and making choices. Reflexively, when looking at the subject from above, the subject can usually be examined from two different perspectives. As can be guessed, these are preferences built on the maximum benefit and preferences that display risk-taking behavior.

The first ideas built on maximum utility came from Jeremy Bentham and James Mill. Bentham and Mill examined these works in 3 types. These are those who are prepared for their actions and the consequences that may arise from these movements by acquiring the necessary knowledge, who are infinitely sensitive to the change of conditions, and who still try to see maximum benefit despite having the awareness that their knowledge is insufficient. Of course, these ideas and types, which are compatible with the neoclassical understanding of finance, were found to be impractical as a result of experimental psychology studies by Thurstone, Luce and Restle. These changes on Bentham and Mill's work showed that the decisions were re-valued with a large parameter of variability.

Another study on Risk and Risky Choice was carried out with the proposition that decisions taken under uncertainty are ready for the results by the individual who made the decision. In this scenario, making a choice in a risky situation can be associated with maximum benefit. Of course, the quality of the highest utility definition is directly proportional to the involvement of uncertainty for the individual. While the individual maximizes his earnings, he decides by taking into account the benefit he is expecting.

In other words, while maximum benefit is obtained in the first idea, in the second idea, with the inclusion of uncertainty in the scenario, maximum benefit has left its place to the expected utility. So, in the second idea, the benefit expected by the individual can be increased by manipulative ways. This incident provides many insights into gambling and its impact on individual psychology.

In the early 60's, all these ideas came together to form Simon's work in 1956. Although Simon's conclusion did not make a great contribution, at least he managed to put the situation in the literature. Simon explained that the policy of increasing the earnings of the individual was initially the expected gain and then that this goal could be manipulated, thus explaining the reason for the combination of these two theories, limited rationality.

If this situation is to be explained simply, if the satisfaction points are found while the individual is trying to increase his earnings and the satisfaction hunger is revealed, the individual continues his movement even in a situation where he cannot adapt. This non-rational movement was described by Simon as limited rationality. Simon's study showed that decision-making is related to the individual's perception, consciousness, and learning.

It was seen in all the experiments conducted with these theories that the “Utility Maximization Theory¹” is insufficient in terms of the diversity of the results. Based on the results, the findings revealed the scope of “Decision-Making Tree²”. Considering the individual's own decision-making mechanism, it is seen that Decision Making Tree gives an idea about the individual's decision-making process on a small scale. Therefore, the reason why “Utility Maximization Theory” has been replaced by “Decision Making Tree” at this point is not because it contains an erroneous opinion but because its scale is not more specific. In other words, Utility Maximization Theory provides a very good basis for studies on making risky and risk-free choices. Although these studies provide valuable empirical data for individuals, institutions and societies, they have not yet reached a sufficient level.

¹ Utility Maximization Theory is a notion that individuals and/or companies invest in order to have more than satisfactory returns. (e.g., when making any economic decision, individuals often tend to invest in goods/services which will bring them more gain.)

² A Decision Making Tree is a specific type of flow chart used to visualize the decision-making process by mapping out different courses of action, as well as their potential outcomes.

One of the most important stages in the decision-making process is undoubtedly the stage of encountering the problem. The moment of encountering the problem consists of sub-processes recorded by the individual by the problem. Parameters such as the examination of alternatives, the evaluation of possible results, the effect of environmental factors on the decision, the effect of uncertainties are tried to be controlled by the individual. Decision Making Theory should be considered in the light of parameters such as the paths followed by the individual regarding the decision-making process, namely the decision-making models, the simple and complex situations of the individual's decision-making behavior, and the stage of encountering the problem. Some of these models include sequential steps, and identifying these steps is of paramount importance to the values and expectations of the decision maker. Therefore, understanding how the individual integrates these values and expectations into their decisions will be useful for the rest of the thesis.

Other processes that do not have specific steps go through some processes depending on the mental structure of the individual, and this process works completely differently. The relationship between the preferences and vital activities of people in different universes is examined, taking into account the individual's own universe. When the processes are started to be considered, first of all, the stage of encountering the problem is encountered. The same problem can be defined in a completely different way by different individuals. This is again related to the inner world of the individual. Then the individual continues by listing the possible moves he can make. He reinterprets the possible moves he lists according to the characteristics of the universe he is a part of and rehearses the possible results in his mind. In this way, they form the causes, effects and average expectations of the results.

The decision-makers' stage of defining the problem includes all the options, consequences and uncertainties that arise. Although defining the problem is the biggest problem for individuals, it is not that difficult for people who are investigating this process. In many experiments, participants were given all components of the problem and the researchers tried to observe how these components were included in the definition and evaluation of the problem.

Gettys and colleagues conducted a research program on the process of identifying the problems faced by individuals, or the precise identification of poorly defined problems.

Gettys and his colleagues presented an example of a car failure to experiment participants, asking their participants to identify why the problem stems. They examined the distribution of the root cause of the failure over these estimates. In another phase of the experiment, some predictions that could be the cause of the failure were given to the participants and the missing ones were asked to be identified. Participants thought that the list given to them was complete and it was unnecessary to add. Gettys and others ultimately suggested using reference lists to facilitate the process of uncovering the problem.

Participants are very unsuccessful in predicting real causes. At the same time, they cannot detect shortcomings in lists created by others. Fischhoff, Slovic, and Lichtenstein (1978) asked participants to evaluate the list of predictions created by the researchers, explaining why a car might not work. Some subjects were given stripped-down versions of some reasons from this list of predictions. The other part was given a full list and asked to determine how much impact each estimate could have in the tool not working. It was observed that the knowledgeable participants did not have very different ideas from those who had less knowledge about the automobile. The result was almost irrational.

Pitz, Sachs, and Heerboth (1980) prepared personal problems with which they aimed to create serious dilemmas in the participants. They observed that the participants were more indifferent to solving these problems than the researchers predicted. The result of the experiment was evaluated by creating a hierarchical decision tree for all the actions suggested for the participants. While the main ideas formed the branches of the tree, variations of these ideas created branches and smaller branches. Considering that the participants were inadequate to create a decision tree, it was concluded that this situation can be primed.

Gettys, Manning, and Casey also studied the quality of creating action. A separate group of participants tried to estimate the usefulness of the action plans previously produced. This experiment was done to calculate the disadvantages of not being able to produce an action plan. As a result of the researches, he determined that the action plans produced were created with great seriousness, apart from their superiority in number. In addition, in their later work, Pliske, Gettys, Manning, and Casey (1982) concluded that they could not increase the quantity and quality of the movements produced in this study by providing financial incentives.

In experiments performed outside the laboratory, it has been observed that not understanding the action plan makes it difficult to make a decision. This shows, for example, that tropical climate participants do not have knowledge of measures or insurances that could reduce avalanche risk.

In the course of our daily life, we frequently encounter situations of uncertainty and in these situations, we are expected to make “healthy” decisions. Among the situations where decision-making behavior occurs; This includes making predictions about the future, choosing the "best" among two or more alternatives, or reasoning based on limited and / or biased information. The accuracy or applicability of decision-making processes is measured by the compliance of these decisions with statistical models. Similarly, problem solving behavior is defined as a cognitive search for the correct result in cases where the result is uncertain, according to Martinez (1998), and problem solving is an important skill to be a passport to reach the future.

When examined in terms of the history of psychology, social judgment and decision-making studies in the 1960s saw humans as an intuitive statistician and tried to develop individual decision-making models. Since the 1970s, mistakes made during the decision-making process, shortcuts and biases have gained importance (Todorov, 1997).

Studies in neuropsychology in recent years also question whether the decision-making processes and skills have a neurological aspect. Especially in risky decision-making situations, the assumptions regarding the effect of somatic feedback on human neurological structure have been tested, but no relationship has been found (North and O’Carroll, 2001). At least for now, we might think that decision-making mechanisms are too complex to be explained by neurons alone. In other words, processes such as social judgment, decision-making, and problem solving and other cognitive processes that trigger behaviors still remain psychological. Although there is no evidence pointing to any difference in performance measures based on the solving times or accuracy of the problems, it was observed that the left frontal cortex of the brain was more effective when solving probability problems, and the right rear part of the brain when deductive inferences were made (Osherson, Perani, Cappa, Schnur, Grassi, and Fazio., 1998). In other words, different parts of the brain work in different problem structures, but this difference does not give information about whether the problems are solved better or not.

Despite the prevalence and importance of decision-making processes in our lives, when we look at the social judgment and decision-making literature, it is seen that there is not a single theoretical model that can answer all questions (Goldstein & Hogarth, 1997). Perhaps even more interesting, it is understood that people do not have a model of their own regarding how they reach their own decisions. In other words, individuals often do not have information about how they reach their own decision, they are aware of the result, but they do not have any comments on the mechanism (Johnson-Laird & Shafir, 1993).

2.2. Models Related to Decision Making Processes

Although it is related to the method of measuring the accuracy or applicability of decision-making processes with the degree of conformity to psychometric models (Gigerenzer & Murray, 1987), statistical approaches still continue to be a criterion for the accuracy of decision-making processes in studies up to now (Goldstein & Hogart, 1997; Connolly, Arkes and Hammond, 2000). Especially, the rationality of micro-economic models that examine the economic behavior of consumers and the criticisms directed to these models have attracted attention not only among economists but also among social psychologists. Below, the aforementioned economic decision-making models, their criticism of these models and their effects on decision-making in general are summarized.

2.2.1. Economic decision-making models

The most important decision-making models that form the basis of rational choice theory and microeconomics in general, which states that people try to maximize their gains and minimize their losses in their economic choices, is the “Expected Utility Theory (EUT)” (Taylor, 1998). Although the foundations of the expected utility theory were laid by Nicolas Bernoulli in the early 18th century, von Neumann and Morgenstern used this theory in explaining rational decision-making in 1947 (Plous, 1993; von Neumann and Morgenstern, 1947). Expected utility theory is a rational decision-making model that determines which features people should use while making decisions and makes predictions about it. According to this model, rational decision-making process has 6 features.

- 1 Ordering of alternatives: This feature is quite simple. If they are not completely equal to each other, the alternatives encountered in the decision-making process should be placed in a preference order by the person.
- 2 Dominance: Individuals in decision-making behavior should choose the most dominant and effective alternative strategies. If a strategy is more straightforward than others, it should be the strategy to choose.
- 3 Cancellation: If the mathematical results of the two risk-taking decision options are exactly the same, that is, if the amount of risk loaded by the individual is equal in both conditions, the results should not be considered in the evaluation of these alternatives. In other words, commonalities between alternatives should be excluded from decision making.
- 4 Transitivity: If the person who makes the decision prefers A to B and B to C, then he should prefer option A to C at the same time.
- 5 Continuity: In any game of chance, if the option with the highest payoff has a good enough probability of winning, this option should be preferred to a certain (100% winning probability) but moderate outcome.
- 6 Invariance: The way alternatives are presented should not have an effect on the selection.

Von Neuman and Morgenstern (1947) pointed out that if the above-listed features are not followed, the benefit to be obtained as a result of the decisions will not reach the highest level and therefore will not be rational.

An important part of the criticism is especially related to the content of this concept of rationality. According to Edwards (1954), although they have very comprehensive theories, economists have made very few empirical studies in decision making and in the light of these studies, economic decision-making theories have shown that people are (1) fully informed, (2) unlimitedly sensitive (to differences). and (3) concluded that they deem rational when making their decision. In addition, Edwards points out that even prudent observations show that man is not the economist-human, as the economists say. The criticism here is more concerned with the validity problem of economic theories not being tested empirically, rather than being theoretical.

The question of how well the human mind fits rational models lies at the basis of the criticisms of rationality, which were voiced loudly by Herbert Simon (cited in Augier, 2001), who received the Nobel Prize in economics. According to Simon (1997), rationality is not a mathematical but a psychological concept, and the perspective needs to be further psychological in order to understand economic behavior. Because the rational choice theory used by economists is inherently wrong. According to this theory, people's economic behavior aims to maximize earnings while minimizing losses. More importantly, this mathematical theory is sufficient to explain microeconomic behavior (eg consumer behavior). Thinking of cognitive structure as a power that has no limits or as a very broad and infallible power and conceptualizing decision-making models in accordance with this approach does not seem very appropriate to explain adaptive human behavior (Simon, 1997; Gigerenzer & Todd, 1999; Schwartz, 1998).

Psychology-based decision-making theories, such as the prospect theory¹ developed by Kahneman and Tversky (1979), state that the forms of presentation, comparison points, loss or gain emphasis in decision-making problems are as important as the problems themselves. When the psychological meanings of the options encountered in making decisions in uncertainty situations combine with people who attribute these meanings to the options and have limited cognitive systems, patterns that are often unrealistic emerge. For example, individuals who invest in the stock market behave conservatively in their decision-making behavior and feel overconfidence about their own choices (DeBondt, 1998).

The biggest innovation brought by the theory of appearance is that it puts the concept of value instead of utility. The utility mentioned in expected utility theory is the utility reached as a result of a rational (and mostly statistical) calculation. However, the value that the appearance theory attaches importance to is not a rational but a psychological concept. Kahneman and Tversky (1979) state that the psychological value of a loss of \$ 500 is more than the psychological value of a \$ 500 gain. As can be seen in Figure 1.2, the value fields of the two options with equal mathematical distances (± 500) are different from each other. This difference arising from the fact that the value function graph is in the form of S explains why the invariance principle predicted by the expected utility theory is not seen in the results of the research. Although the options have equal distances from the starting point, the concepts of "loss" and "gain" differ in appearances and, in the

case of loss, the value of alternatives is much greater for the decision maker. It can be said that because of the appearance of such a difference, people will perceive the options as more "valuable" when it comes to "loss" than when it comes to "gain" and therefore make more risky decisions in cases of "loss".

2.2.2. Common sense and scientific method in decision making processes

According to some attributional theorists (eg Heider, 1958; Kelley, 1967) people act as naive scientists when they have to make decisions about any event or behavior. In other words, people observe, make inferences, and ultimately make a judgment, like a psychologist studying behavior. Unlike orthodox economic theories, investment professionals also have to assume the role of amateur psychologists, because the application of mathematical decision-making methods is hardly possible in the flow of real life. According to Slovic (1972), the economist, psychologist, engineer, or anyone on the street should ignore formal statistical information, formulas, and theories in order to make a decision and instead take the role of an intuitive statistician. The most important difference between heuristic statistics and formal statistics is that a formal method is not used in the first. For example, even if confidence increases both intuitively and formally in case of increase in available data, the degree of accuracy of human decision using heuristic statistics does not change. In other words, it is understood that the incoming information is important, it is tried to be used, but this information does not have a positive effect on the accuracy of the decision. It is necessary to use both statistical approaches simultaneously to determine the source of causation and to make the "correct" decision.

Concepts such as causality and analysis of variance (ANOVA) constitute the backbone of attributional theories. Some researchers even state that the important thing is not the loading but the covariance. Beate, Dudolph, and Forsterling (1998), for example, argue that covariance is informative enough, and that when individuals test the relationship between any two events, they keep one event constant and see if the other has changed, as researchers do. According to them, it is this covariance knowledge that affects decision-making mechanisms.

However, in studies in which scientific and statistical models are accepted as correct and human decision-making processes are compared with these models, it has been revealed that individuals do not act like scientists at all, but rather make many biases and use heuristics. and Tversky, 1982). In other words, it is observed that people do not use their cognitive capacities to the full and prefer short and shortcuts while making decisions. This cognitive miser approach (Fiske & Taylor, 1991) and statistical models were investigated under different conditions and it was concluded that individuals generally behave stingy when using their cognitive systems.

Peterson and Beach (1967) stated that the formal statistical theory used to explain decision-making behavior in their normative model is divided into 3 parts: (1) the heuristic-descriptive statistics we use to describe the data in our environment, (2) the person uses to make inferences about his environment. heuristic - interpretive statistics; and (3) heuristic - predictive statistics from which predictions about the future are made. These heuristic processes and normative statistical processes used in individual decision-making mechanisms are similar to each other, but it has been observed that individuals cannot use all the data they have and are conservative in their decisions in intuitive decision-making behavior.

There are at least two important reasons why such errors are investigated by psychologists: (1) systematic errors provide information about the nature and quantity of the process that is operating in decision-making behavior, and (2) if we have information about the causes of these errors or the factors affecting them. will pave the way for new and more effective training programs that can teach us more rational decision-making processes. In addition, as Tversky and Kahneman pointed out, "The difference between behavior and normative models is too common to ignore, too systematic and too fundamental to be resolved by stretching the normative models that cannot be described as random error" (1986, p. 522).

Although cognitive shortcuts and errors are perceived as different from optimum answers, it is not surprising that individuals use such methods when making decisions. Given that countless information is simultaneously processed by the organism, it seems unlikely that our mental capacity can process so much information at the same time and with the same accuracy. Instead, it is preferred to make decisions in a short time by using

schemas, stereotypes and at the risk of cognitive error. Although this behavior pattern is not always erroneous, it has been revealed that it can lead to systematic errors as a way of thinking and these are quite common (Connolly, Arkes, & Hammond, 2000; Goldstein & Hogarth, 1997).

It is worth emphasizing that the mistakes made and decision-making processes far from optimum do not have negative effects as expected. From an evolutionary point of view, if mistakes had adversely affected our daily lives, either we could not survive or the decision-making mechanisms we use would have to change evolutionarily. However, the fact that cognitive errors are so common and that we can still survive shows that the systematic errors mentioned are not fatal. However, Larrick, Nisbett, and Morgan (1993) found that university students and university lecturers who act in accordance with normative models are more successful in their own lives, especially despite the huge differences between economic normative models and ordinary consumer behavior. In other words, there is a positive linear relationship between acting in accordance with normative models and success. In addition, individuals who use these models in their real lives are more successful and economically higher than others (Larrick, Nisbett, & Morgan, 1993).

There are two important facts demonstrated by these results, (1) normative models are far from being theoretical, they can only be models that can be applied to real life, and (2) not complying with these models may provide us an advantage compared to those who do not show the pattern of behavior required by the models, even if they do not affect individuals negatively. Therefore, it is important not only to use heuristic decision-making methods, but also to learn (and teach) formal techniques.

Peterson and Lunsford (1998) investigated the effect of knowledge load on the cognitive system using the six thinking hats technique, previously developed by Edward de Bono (de Bono, 1985; de Bono, 1992). In the absence of any training on decision making methods, the fact that the subjects have to process many informations at the same time has a negative effect especially on group decision-making processes. In order to prevent this, only a certain aspect of the problem to be decided in each specific time interval is considered in order within the framework of the parallel thinking logic proposed by Bono (1985, 1992) and the final decision is made after all steps are fulfilled.

De Bono (1985) expresses these steps with different coloured hats: (1) First row is the white hat. During the decision-making process represented by this hat, only facts are listed, personal comments and emotional evaluations are avoided; (2) then comes the red hat, where the important thing is to express positive and negative feelings about the phenomenon or problem to be decided; In this way, the emotion-situation, which normally affects people's decision-making processes and often decreases performance (Kaufman, 1999), is handled independently and it is prevented from affecting other steps of decision-making behavior. (3) The purpose of the third-row black hat is to review the negativities. At this stage, the individual or group enumerates the negative situations with a certain logical reality and then (4) suggests ideas about possible solutions to these negativities - if any - with the yellow hat application. (5) The purpose of the green hat, which is the penultimate application, is to produce creative solutions for the future, to look at the problem from different angles and to develop a positive perspective. (6) The role of the last blue hat in decision-making processes is actually just refereeing. Particularly during group decision-making, the aim of the participant "wearing" the blue hat is stated as to ensure that the others act in accordance with the rules.

De Bono says the order can be changed for different problems. Peterson and Lunsford (1998) showed that this technique for systematically improving the parallel thinking system is more effective both quantitatively and qualitatively than other techniques (eg brainstorming). The subjects who use this technique both reach the results faster and are more successful than the subjects who do not apply this technique in terms of creating alternative solutions.

There are also those who do not agree with the views that the human cognitive structure has limits and makes mistakes due to these limits. Cosmides and Tooby (1996) ask us to consider the simple question: "If even a bird has the ability to calculate probability, why should the human brain be so limited?". The answer given by Cosmides and Tooby and Gigerenzer et al (Gigerenzer, 1991; Gigerenzer, 1996; Gigerenzer, Hoffrage, & Kleinbölting, 1991; Gigerenzer & Todd, 1999; Hertwig & Gigerenzer, 1999; Gigerenzer, 2001) means that limitations are included in research. It is not in the cognitive structures of the subject subjects, but in the question structures used. How these problems are presented to the subjects is as important as what decision-making problems are.

In general, the shortcuts used have both positive and negative features. Among the contributions of the use of shortcuts to the decision-making process are (1) its applicability and generalizability, (2) its adaptability, (3) its rapidity, and (4) its openness to communication. Some of its negative features are (1) low analytical consistency, (2) requiring time and cognitive capacity, and (3) being too abstract in terms of communication (Wilson, 1995). Although this study mostly targets probability-based problems and the shortcuts used in them, general information about the shortcuts frequently mentioned in the psychology literature is given below.

2.3.Easy Accessibility Shortcut (Availability Heuristic)

The easy-access shortcut is to look at the ease of occurrence of examples related to that event in order to determine the probability or frequency of any phenomenon (Tversky & Kahneman, 1974). In other words, the probability of occurrence of more easily remembered events is perceived higher than the probability of occurrence of events that are more difficult to remember. For example, Tversky and Kahneman (1973) asked subjects the following question: "In a typical English document, which one might be most common, words with the first letter K or words with the third letter K?" 105 out of 152 subjects (69.07%) stated that the number of words starting with K was higher. But in reality, there are about twice as many words with the third letter K than those with the first letter K. The reason the subjects made mistakes is that words starting with K come to mind more easily.

Tversky and Kahneman (1982a) mention that the use of the easy accessibility shortcut can be very common. For example, a clinical psychologist who has to give as much as to whether a patient who says he is tired of living is at risk of suicide, the first thing to do is to remember what patients in similar situations have done in the past. For a clinician trying to remember the conditions of patients in the past, even a single sample may be sufficient. How similar the first example that comes to mind is to the patient who is currently in the treatment process will be important for the decision to be made. If there are too many similarities, it will be expected to repeat whatever happened before. If more than one example is remembered, it will be necessary to list all of the past examples remembered according to similarities.

This behavior pattern is not very different from what Popper (1935) called the confirmatory approach years ago. Popper (1935) states that when comparing social sciences and natural sciences, social sciences and social scientists use a more affirmative approach, while those dealing with natural sciences adopt a falsification approach that is more methodically correct. According to Popper, remembering the white swans we have seen before to test the proposition "All swans are white" would be of no use to science, nor does the new white swan observations do much to test the proposition. The important thing - if any - is to look for black swans. Because the thousands of white swan examples only bring the proposition closer to the truth (versimilitude), but a single black swan contains more information because it falsifies the proposition. What Tversky and Kahneman (1982a) said is that people take the more affirmative path in decision-making situations and look for the "white swan".

The vividness of the example is one of the features that lead to more remembering of similar examples. In the case of a clinical psychologist, a former patient with similar characteristics who committed suicide would be more likely to be remembered than a patient with similar characteristics but did not commit suicide.

It can be seen as an important advantage that the easy accessibility shortcut shortens the time spent in the decision-making process, but because of the easier recall of live samples (1) problems with high frequencies can be overlooked and / or (2) cases with relatively low frequencies can be given more importance than necessary. For example, Kristiansen (1983) states that Americans do not take the necessary preventive measures because they think that diseases such as stomach cancer are less common in society. The reason why diseases such as AIDS are more "popular" compared to others is that the visual and print media cover such diseases more frequently in their publications and thus make them easier to remember.

After the attacks on the US cities of New York and Washington on September 11, 2001, the majority of American citizens stated that they were concerned that any of their relatives or themselves would be exposed to terrorist attacks compared to previous years. The Washington Post (2001, September 11) announced the results of their opinion poll on its website immediately after the incident. According to these results, the rate of those who feared a terrorist attack was 9% in 1993, 21% in 1997, and this number increased to 47% on the day of the attack. From a psychological point of view, it is not surprising that

this concern was high because the magnitude and vitality of the event naturally affected people negatively, but what is interesting is that the number of deaths from other causes of death in the USA is much higher, despite the approximately 6,000 people who died on September 11 (Ruby, 2002). In 2000, the number of traffic accidents in the USA was 42,000, and the total number of murder victims was 15,500. Despite this difference in numbers, for example, people deciding to cancel their flights and travel by road is a typical example of an easily accessible shortcut.

2.4.Overconfidence

Overconfidence is an important source of cognitive error. Plous (1993) attributes the reason why the Japanese attack on Pearl Harbor during World War II (December 7, 1941) was so effective was the overconfidence of the US government and military in them. Similar evaluations were made by American newspapers regarding the attacks on New York and Washington on September 11, 2001. The Christian Science Monitor (2001), for example, used the following meaningful phrase in its September 13 editorial: “But I thought we were safe” - “But I thought we were safe”. In the article, it is stated that the most important reason for the attackers to get on the planes comfortably and neutralize the pilots is the excessive trust of the American people and their officials.

2.5.Representativeness Heuristic

If any sample reflects important characteristics of the universe, we can say that it represents the universe for that sample. When this statistical terminology is applied to our daily lives, evaluations that appear as characteristic features can lead to systematic errors, especially in probability calculations. In other words, when making decisions - even if they have statistical data - they prefer to look at what features are apparently representative. For example, Tversky and Kahneman (1982b) asked the subjects the following question.

Linda is 31 years old, single, talkative and highly intelligent. He graduated from the department of philosophy. As a student he was closely involved with discrimination and social justice issues and also participated in anti-nuclear power demonstrations. Please select the most likely option from the following.

- a) Linda is a banker.
- b) Linda is a banker and active in feminist shows.

90% of the subjects marked option b. In terms of probability theory, this is the wrong answer, because b indicates the intersection set and the intersection set is always smaller than the original set. In other words, if "Linda" is a banker and active in feminist shows, she already has the distinction of being a banker. From the point of view of probability theory, the probability that "Linda" is a banker will be more likely than she is a banker and a feminist [$P(A) > P(A) \cap P(B)$]. The reason why the subjects made the above error is the judgment that the characteristics of "Linda" represent a feminist person, and the fact that someone with these characteristics is only a banker seems to be inadequate for the subjects. In a similar example, the subjects were asked the following question about Wimbledon tennis champion Bjorn Borg.

Suppose that Bjorn Borg appeared in the 1981 Wimbledon tennis championship finals. Which of the following is more likely than the others?

- a) Borg will win the final match.
- b) Borg will lose the first set.
- c) Borg will lose the first set but win the match.

Option c in the answers contains common probability. It was found that 72% of the subjects did not take into account the fact that the common probability is lower than a single probability and made mistakes. Although the probability of a or b among the options is higher than the probability of a and b together specified in option c, it is a typical common probability error.

Another problem asked by Tversky and Kahneman (1982b) to the subjects is as follows:

Which of the following is more likely to occur in 1981 than the others?

- a) Reagan will cut off federal support to local governments.
- b) Reagan will provide federal support to unmarried mothers.
- c) Reagan will provide federal support to unmarried mothers and cut off support to local governments.

Although it contains a very clear common probability information and the options a or b are more accurate in terms of probability theory, 68% of the subjects preferred the c option. In summary, the subjects could not use the conjoint probability knowledge in all these questions. Teigen, Martinussen, and Lund (1996) argue that the common probability error cannot be corrected by the types of questions or their approximation to reality because people make mistakes because they do not know about the probability rules, but because they want the choice to be correct.

It is a known statistical rule that samples with a high number of observations should be preferred to smaller samples in order to obtain more accurate information about the parameters of a phase. However, in a study by Tversky and Kahneman (1971), it was seen that the subjects did not have accurate information about the relationship between sample size and rate of deviation from the universe. People also seem to rely on small sample numbers (law of small numbers). Tversky and Kahneman posed the following question to their subjects to demonstrate this:

There are two operating hospitals in a town. In the large hospital, approximately 45 babies are born a day, and in the small one, approximately 15 babies are born a day. As you know, about 50% of babies born are male. However, actual percentages differ from day to day. Sometimes it may be more than 50 percent and sometimes less.

Within a one-year period, each hospital kept a record of the days when more than 60 percent of male baby births were.

In which hospital do you think the number of such days is higher?

- a) The larger hospital (21)
- b) The smaller hospital (21)
- c) Almost equal (53)

Numbers in parentheses indicate the percentile order of responses given by the subjects. Statistically, the answer should be the smaller hospital because there is a greater likelihood of deviation from a 50% baseline rate in a small hospital sample. However, 74% of the subjects gave the wrong answer to this question.

Kunda and Nisbett (1986) point out that people do not fully understand the law of large numbers, they know that larger samples are more useful when making predictions,

but they cannot apply this rule to the problems they encounter. Regardless of the reason, the information that statistically larger samples are safer cannot be used by the subjects. According to Kleiter (1991), subjects have difficulty in understanding the basic ratio concept. Regardless of how the question is asked, the subjects participating in the research cannot distinguish between the relevant information that will lead them to the right decision and the irrelevant information that surrounds this information but does not contribute to decision-making. In fact, it is possible to explain this skill deficiency with reference to the signal recognition literature; There are two types of information available to subjects; The first is the basic ratios (signal) that will facilitate their response and are directly related to the problem, the second is other information (noise) that is outside of the basic ratios but does not carry any causal information. In basic ratio problems, subjects may fail to separate the signal from noise in signal + noise presentation.

In another study, Kahneman and Tversky (1973) gave subjects the characteristics of an imaginary person and told them that this person was randomly identified from a group of 30 engineers and 70 lawyers who were successful in their jobs:

A group of psychologists interviewed 30 engineers and 70 lawyers who were successful in their business life and administered personality tests to them. In the light of this information, descriptions taken from 30 engineers and 70 lawyers were written as one paragraph each. Two of the 100 possible depictions are given below. For each description, indicate what percentage probability the person in question would be an engineer.

Jack is 45 years old. He is married with four children. He is generally conservative, careful and ambitious. He has no interest in political and social matters and spends most of his free time repairing the house and solving nautical and mathematical riddles.

What do you think is the probability that Jack is an engineer? % _____

Dick is 30 years old. He is married and has no children. He is a person with high skill and motivation and is expected to be quite successful in his field. He is highly loved by his colleagues.

What do you think Dick is likely to be an engineer? % _____

While Jack represents an engineer in terms of personality traits and preferences, Dick's features do not contain information about being a lawyer or an engineer. As expected, although the proportion of engineers in the universe is only 30%, the subjects stated that Jack's probability of being an engineer is higher than the base rate (median = 50%). In the description of Dick's profession, the basic proportions were taken into account by the subjects. This shows that the subjects do not have a problem of perceiving the basic proportions, but they have a tendency to make different decisions by using different clues (representationalism) in different situations, and these decisions can be statistically incorrect. According to Bar - Hillel (1974), errors in representativeness can be caused by two types of bias: (1) looking for features that affect representativeness rather than numerical parameters that will change probability in the sample, and (2) ignoring the importance of information about probability, where both are specified. placing more weight on properties believed to be. In the case of "Jack", it is a cognitive bias that the subjects ignored the mathematical probability theory and instead used the described features of "Jack".

Ajzen (1977) argues that descriptions should contain causal information in order to use basic proportions while making judgments, and that this causality does not exist in the problems asked to the subjects by Kahneman and Tversky (1973). In particular, we found that the other attributes given for "Jack" (lack of interest in political and social issues, solving mathematical problems in his spare time, etc.) contain more information than basic rates because these descriptions are unexpected features in a lawyer person, in the case of "Dick" the subjects' knowledge of causality He states that they use the given percentage values because they cannot use a personality trait that can give them. According to Ajzen, if there is no other information, subjects only use statistical information when making decisions; otherwise, non-statistical information becomes important, although it depends on the quality of the information (Christensen - Szalanski & Beach, 1982; Carroll & Siegler, 1977; Smith, 1989 and Ginosar and Trope, 1980).

Gigerenzer, Hell and Blank (1988) argue that it is not very correct to define the error in the decision made by the subjects for "Jack" as base rate fallacy, but instead, the concept of base rate neglect should be used. Because the basic ratio error reflects the situations where basic ratios must be used but not used, and according to Gigerenzer et al., There is no such condition in the engineer-lawyer problem. More importantly,

Gigerenzer, Hell, and Blank (1988) defined the central problem with regard to the representativeness shortcut as not the existence of these and similar shortcuts, but the investigation of when and why. For them, the use of basic ratios is mostly related to how the subjects understand and mentally represent the problem presented to them.

So, it is not just the problem itself that matters, but how it is presented. For example, Zukier and Pepitone (1984) gave the subjects the problems used by Kahneman and Tversky in one of two conditions: One group of the subjects received the information that the questions were prepared by the Scientific Thought Research Center, while the other group received the information that the same questions were prepared by the Vocational Counseling Center. As expected, it was observed that subjects in the first group paid more attention to baseline rates compared to the second group.

The form of the work done on decision making and problem solving also affects the quality of the decisions made by the subjects. For example, in the case of uncertainty (lottery), when measuring risk behavior (the money offered for betting), it was found that the amount of money offered by university students in the experimental environment was much lower than the amount recommended when the same study was conducted online (Shavit, Sonsino, & Benzion, 2001). Although the researchers think that the reason for this is that the internet environment contains more visual noise, the fact that the study conducted on the internet was spread over 24 hours and therefore the participants had more "thinking" time compared to the experimental group, it could be thought that the risk undertaken was not positively affected, but negatively.

In the light of evaluations of normative and descriptive models, it is suggested that the answers that are incorrect in terms of some models (e.g. Bayes probability model) give more correct answers for the use of basic ratios when different models (e.g. additive models), but despite these differences, the important rule is that people cannot adequately use basic proportions when making decisions (Novemsky & Kronzon, 1999). Even more interestingly, when people face similar problems, they cannot use the strategy they use to solve one problem for the other problem. For example, when deciding which of the two alternatives they should choose, they consider only the positive aspects of the alternatives, but when asked which one should not be chosen among the same alternatives, this time, they try to compare the negative features (Shafir, Simonson, & Tversky, 1993).

2.6.Framing

The frame effect is used to show how much the words "loss" or "gain" affect individuals' choices when presenting questions with the same mathematical results. In this study, the following question was asked to the subjects to measure the frame effect.

- If the following options were offered to you, which one would you prefer?

- a. Earnings of 125 million TL to be precise. 96
- b. 25% probability to win 500 million TL, 75% probability to win nothing.

- If the following options were offered to you, which one would you prefer?

- a. Definitely a loss of 375 million TL.
- b. 75 percent probability to lose 500 million TL, 25 percent probability to lose nothing.

Previous studies show that when it comes to "gain", people prefer a definite gain, but even though the numerical rate does not change, they prefer to take a risk in case of a "loss". The results of this study conducted with Turkish students reveal a similar picture. While 57.7% of the subjects chose the "absolute gain" in case of gain ($n = 64$), the rate of those who marked the definite option in case of loss was only 25.2% ($n = 28$). Considering the percentages of those who mark the risky option, the rate of those who take risk in case of gain is 42.3% ($n = 47$), while the rate of those who prefer risk in case of loss is 74.8% ($n = 83$).

The framework effect shows a preference (risk taking) beyond just a probability problem, and at least this study did not reveal any link between this preference and critical thinking. Students with high critical thinking scores did not show a different preference pattern than those with low critical thinking scores. This indifference applies to both gain and loss.

2.7.Effects of the Way Information is Given

Representative shortcut, as explained earlier, is the decision-making behavior in which representative features come to the fore rather than basic ratios. The following problem was posed to measure this shortcut. A group of psychologists interviewed 30 engineers and 70 lawyers who were successful in their business life and administered

personality tests to them. Based on this information, below are two of the 100 possible descriptions of individuals in a group of 30 engineers and 70 lawyers. For each description, indicate what percentage probability the person in question would be an engineer.

a. Ali is 45 years old. He is married with four children. He is generally conservative, careful and ambitious. He has no interest in political and social issues and spends most of his free time doing home repairs and solving nautical and mathematical riddles. What do you think Ali is likely to be an engineer? % _____

b. Ahmet is 30 years old. He is married and has no children. He is a person with high skill and motivation and is expected to be quite successful in his field. He is highly loved by his colleagues. What do you think is likely that Ahmet is an engineer?

The probability that each of "Ali" and "Ahmet" will be engineers is 30% _____ because both were selected from a sample of 100 people, 30 of whom were engineers. But the responses of the subjects are quite different. The average probability of "Ali" calculated from the responses of the subjects to be an engineer is 77.27% (s.k. = 19.41%).

This result can be seen as an indication that the subjects care more about personality traits than basic proportions. Only 3 people wrote the correct answer, 30%, 2 of these 3 people were from the group with a high critical thinking score, but the low number of them makes a solid comparison difficult. 98 In the case of "Ahmet" sample, the same subjects stated the probability of "Ahmet" being an engineer closer to the basic rates (average = 41.34%, s.k. = 20.10%). While 32 (80%) of the total 40 correct answers come from the group with a high critical thinking score, 8 (20%) come from the group with a low critical thinking score. This difference is statistically significant ($X^2 = 14.4$, $df = 1$, $p < .05$). As a result, it can be said that subjects with high critical thinking scores are more careful about using these rates in cases where information other than basic ratio information is not meaningful. Given information such as personality traits in between, their effect is so strong that very few subjects can give the correct answer, but even in this case, it seems possible to say that those with higher critical thinking scores are more likely to use basic ratios.

2.8.Chance and Utility

The question of chance and expected benefit was asked to measure the subjects' behavior conservatism. If your friend wanted to buy a National Lottery Ticket that you bought for 5 million TL just half an hour ago by paying 10 million TL from you, what would your answer be?

- a. I would sell it for 10 million TL
- b. I would never sell it.

Regardless of the critical thinking pattern, 80 (53%) of the 151 subjects who answered this question stated that they preferred to sell the National Lottery ticket for 10 million TL, which they bought for 5 million TL, while the remaining 71 (47%) 99 stated that they would never sell. Naturally, what makes sense in terms of the expected utility theory is that the ticket is sold for 10 million TL, but about half of the subjects do not want to risk - although very low - the probability of winning a bonus for their ticket.

Who Uses Shortcuts?

In general, even small changes in the presentation of problems appear to have an aspect that increases (using descriptions) or decreases (using basic ratios) the impact on the shortcut of representativeness. Despite investigating the effects of the conditions, the way the problem is presented, and even the environment, there is no comprehensive study on who is more likely to make these mistakes. The only thing known is that gender and expertise do not have much of an effect in reducing errors. In terms of the accuracy of their decisions, the general result of studies on the performance of experts (behavioral decision making) and the mechanisms (cognitive sciences) they use to reach decisions (cognitive sciences) can be summarized as that experts know the paths to “right” decisions but fall short of using them (Camerer & Johnson, 1991). More importantly, there is no difference between experts and naïve people in terms of accuracy of decisions.

From a cultural perspective, it has been observed that the language, beliefs and experience used at least affect primary school children's knowledge of probability; On the other hand, no significant effect of devotion to religious feelings was found (Amir & Williams, 1999). When looking at individual differences, it is understood that motivational priorities affect decision-making processes. In particular, it has been found

that individuals with high need for cognition (nCog) are in a more comprehensive study during decision-making, whereas those with low cognition need tend to make much faster decisions (Bailey, 1997). Although it is not surprising that people with high cognitive needs want to get more information in situations of uncertainty, it stands out as an important deficiency, except that the decision-making process works, for example, the degree of accuracy or wrongness of the decisions made has not been investigated. The fact that individuals with higher cognition needs have been doing research for longer does not mean that they always make the right decision; In fact, using too much time in emergency decision-making situations can have harmful consequences. Therefore, it is not the average time spent by individuals to be investigated in decision-making stages, but whether the decision made is wrong or right.

When it comes to the effect of cognitive processes on decision-making behavior, it is possible to say that the role of metacognition skills in this process is very important. The main thing in metacognitive skills is not only to monitor their own cognitive processes, but also to control this process and change it when necessary. Because the ultimate goal of the cognitive system is to adapt to the real world. It has been found that the metacognitive skills of people who have high decision-making skills and who have to make decisions under time pressure are also high as expected (Cohen, Freeman, & Wolf, 1996).

Huitt (1992) states that decision making and problem-solving skills go through four stages: (1) understanding the situation (problem) at the input stage, determining the evaluation criteria and collecting information; (2) developing, evaluating and testing alternatives, if not available, in the operational phase; (3) communicating the result in the output stage and (4) re-evaluating and changing the process if necessary in the review stage. The important thing is that these processes can be done properly, and Huitt (1992) states that there are two ways to do this: critical thinking and two-way thinking.

Gigerenzer (1996) and Kühberger (1998) are of the opinion that whether shortcuts or, more broadly, all cognitive biases are actually done or not will add something new to decision-making studies. According to them, there are cognitive errors according to this or that model and no satisfactory information has yet been reached about how the errors or shortcuts work; Creating models about when and how to get rid of these mistakes should be the aim of future studies. The most important aim of this study is to seek an

answer to this question and to evaluate social judgment and decision-making processes in terms of individual differences. Because, independent of the models used, it is extremely important to develop decision-making and problem-solving skills in uncertain situations (Vranas, 2000).

Contrary to what has been done before, the important individuals in this study are not those who made mistakes or took shortcuts; On the contrary, even though it is still being debated which statistical norm to use, the differences of those who gave correct answers to the problems presented to them within the framework of probability / statistics rules were investigated. Individual differences between the wrong responders and those who give the correct answers may provide clues for answering the questions and problems presented by Gigerenzer (1996). Considering the impact of processes such as the need to know and metacognition, the critical thinking structure, which is considered to be more comprehensive (Facione, Facione, & Giancarlo, 1998) and discussed below, is the individual characteristic of this study.

2.9.Decision Making Progress

Although decision-making processes have been studied by many different disciplines for a long time, studies in experimental psychology have a short history. The first comprehensive study on decision making and decision-making processes is Edwards' work published in the Psychological Bulletin (Edwards, 1954). This work can be considered as the basis for behavioral finance of experimental psychology. Behavioral Finance, on the other hand, has replaced neoclassical finance as a discipline that includes risky and risk-free choices, the concept of benefit, game theory and other concepts, as will be mentioned in the later stages of the study. Neoclassical Finance and the aforementioned concepts will be described in detail later.

Edwards deals with controlled experimental environments where experiments about preference and decision-making processes can be tested. In this study, the researcher will benefit from two similar publications in this field. The first of these will be about Risk Free Elections by Jeremy Bentham and James Mill. This study basically involves the idea of escalating the utility concept to the highest level. In this study, decision makers have been formed in such a way that they are well educated about the possible obstacles they will encounter, as well as to see the difference between alternatives very well. Besides,

these decision makers are assumed to be at the highest logic level. Decision makers build all their decisions on the concept of utility and it is assumed that they strive to benefit. The publication of this thought has reached a very interesting point with Thurston (1927), Luce (1959) and Restle's (1961) solids on inconsistency.

The second publication is about risk-taking choices and coping with uncertainty. The principle of utility is of course still a valid factor, but the main focus is on the concept of uncertainty and expected utility. The expected benefit is a concept that has been studied or mentioned in many studies. In both experiments and experiments, participants always tended to maintain the expected benefit or keep it at the highest level.

Simon's studies between 1955 and 1960 made a deep contribution to the decision-making and decision-making processes (1956). Simon argued that the decision-making process was in fact set out in a limited rational manner. Simon asserted that the decision maker is not always the main goal of maximizing utility, it is sufficient to achieve a goal satisfying the decision maker and supported it with his studies. Simon's work includes learning perception, cognition and decision-making structures. Although many studies combining these two studies were carried out later, the slow progress is striking, as the studies in this area are always repeated by reworking.

2.9.1. Problem structuring

The decision-making process of the decision maker may have occurred in all kinds of ways depending on the internal structure of the decision maker. This process depends on the characteristics of the decision maker as well as external structures such as options, possible outcomes or uncertainties. This means that the decision maker needs to define the problem as a combination of internal and external factors in order to make a decision. While the process of describing the problem is important for the decision maker, it is not so important for those who research decision making and decision-making processes. The researcher made this decision based on the use of predetermined problems in many experiments. Predetermined problems in experiments and the use of well-defined elements by researchers also provide researchers an advantage in focusing on how participants connect and use these elements. In their experiment, Gettys, Manning, Mehle, and Fisher (1980) asked participants to state all possible reasons for a car not working.

This study failed, with participants providing lists of non-essential causes and the root cause simultaneously.

Later, Fischhoff, Slovic, and Lichtenstein (1978) repeated the same experiment with a list of possible causes by the researchers themselves, and in which the order of importance of these reasons was specified by the researchers themselves. Participants were selected from both car mechanics and other professions. Since almost most of the participants gave the same answer (lack of hypothesis), this experiment did not achieve its purpose either. After successive studies by Pitz, Sachs and Heerboth (1980), Gettys, Manning and Casey (1981), Pliske, Gettys, Manning, and Casey (1982), it was concluded that the experiments on this subject were "over-controlled" in the laboratory environment and removed the ambiguities. has been reached.

2.9.2. Uncertainty

In many decisions made during life, individuals have had to deal with and manage many uncertainties. (Kahneman, Slovic, Tversky, 1982). In this study, two titles are examined within the scope of the concept of uncertainty. The first heading in which the concept of uncertainty is examined deals with the concept of uncertainty as the limit of the frequency it will see. The second title, on the other hand, mentions that the concept of uncertainty has a completely subjective scope and complies with the principles of the belief systems of individuals. The second title was defended by Finetti (1937/1980) and Savage (1954). This subjectivistic, or Bayesian approach, was introduced to psychologists in 1963 by Edwards, Lindman, and Savage.

While these two approaches have been discussed over the years throughout mathematicians and statisticians, the implications of these concepts in experimental psychology are rather limited. In their experiment, the researchers revealed two different types of decision-making problems. While some of the participants were given the basic definition of probability in which probability is widely accepted, the remaining participants were left alone with a series of small subjectivistic events on which the Bayes Theorem is based and the probabilities can be addressed subjectively (Slovic, Lichtenstein, 1971).

Looking at the results, it was seen that both titles were handled as a common method for the participants. That is, some of the participants tended to make a rough calculation, referring to frequentist theories, but made a more or less subjectivistic comment. However, the rest of the participants did not make a different interpretation and calculated probability by dividing the probabilities more or less in half. This segment of the participant also referred to both concept scopes.

2.9.3. Eliciting probabilities

During daily conversations, people use some adverbs to express themselves. These could be words like possibly, or impossible, and these words add probability information to sentences. As such, people made considerable efforts to calculate numerical data corresponding to the meanings added by these words (Lichtenstein, Newman, 1967).

If numerical probabilities are set forth, it will be seen that many approaches are possible. These degrees of probability are scaled at fractions 0 and 1. Although the fraction of the probabilities given orally cannot be predicted, it is obvious that they are within this range. Within the scope of mathematical logic, the number 0 denotes the ideal error and 1 denotes the axioms. The need to rank these alleged probabilities through words has revealed the Proper Scoring Rules technique. This technique provides a measure of the circle confidence interval to the event and its probability evaluated. The suitability of a score sheet can arise only if and only when the estimated grade is optimized to the specified grade (Shuford, Albert & Messengill, 1966). This measurement method is only applicable for claims that can yield two results. There may also be situations where these claims come together and form a series. These series can appear in daily life in the form of wheels of probability that are the subject of entertainment programs. They are not only used in entertainment programs. Estimates made using this tool can even be used by professional analysts (Spetzler & Stael von Holstein, 1975).

2.9.4. Evaluating probabilities

Many experiments have been conducted on how individuals evaluate probabilities while making decisions, and a lot of information has been obtained about the processes of evaluating probabilities. In these experiments, it was tried to learn the ways individuals

evaluate one or more events, determine the amount of uncertainty and uncertainty, and overcome integrated or conditional problems.

2.9.5. Frequency-based probabilities

As seen in the studies conducted by Shuford in 1961 and by Robinson in 1964, individuals succeed in ordering the number of probabilities or the number of probabilities quite well. For example, if one of the two momentarily flashing lights is on more frequently than the other, the participant is quite good at predicting that the next light will be from this lamp. This behavior implies a limit of relative probability.

Although this situation confronts individuals as a theory, individuals do not choose this behavior with a learned calculation method. When individuals encounter problems, they start scanning their memories instantly. In such a situation, Tversky and Kahneman (1973) demonstrated that the evaluation of frequency and probability by individuals is related to which examples come to mind. This situation was named as "Availability Heuristic" by the researchers. The researcher thinks that the statement that this concept is a valid concept is useful for understanding the rest of the research. It is claimed to be a valid concept because frequently repetitive events occur more to individuals' minds. Of course, the validity state depends on many small parameters such as familiarity, recency, emotional response to experience, reliability of information, and these parameters can cause biases.

2.9.6. Probability as confidence

Some events may seem unique to individuals or show little resemblance to another event. In this case, the individual has difficulty in classifying these events according to their frequency of occurrence. In other words, such events are perceived by individuals as if they do not have a correct answer. In such cases, the probability calculation is given within a confidence interval. This confidence interval is called calibration. A well-calibrated probability calculation has a non-wide confidence interval. Many studies have been done within the scope of the definition of calibration.

2.9.7. Overconfidence

Self-confidence of the individual is more effective than all manipulations on the individual (Fischhoff, 1982) (Lichtenstein et al., 1982). Within the scope of the experiment, the researchers selected and tested those who had more or less command over the test kit of the participants they chose. As a result of the experiment, it was revealed that people gained a lot of self-confidence while examining their knowledge. This situation can be explained under three headings in cognitive psychology.

- Fischhoff, in his study in 1977, showed that people are extremely loyal to their own experiences, and even in cases where these experiences are faint or some parts have been forgotten over time, sometimes mistakes can be included in the memory as if they were real. Although it has appeared incompletely, individuals make decisions confidently by relying on these experiences.
- He made a series of inferences in Pitz's 1974 study. According to these implications, an uncertainty that arises in the earlier stages of an experience does not reappear later during the recall of the experience.
- The study of Koriat, Lichtenstein and Fischhoff completed in 1980 showed that people only test their memory for things that will prove their guess.

These three inferences validate Slovic's work on "anchoring and adjustment heuristic" in 1972 (for a review; Slovic, 1972). In his study, Slovic mentions that people make their predictions "adjust" by selecting "anchor" and increasing or decreasing it while calculating probability.

2.9.8. Hindsight bias

"Hindsight Bias" emerges as the counterpart of the concept of retrospective judgment in experimental studies and a different form of overconfidence. Fischhoff's (1975; 1982b) studies show that specifying the outcome of an event increases the estimated probability amount. Moreover, it is so effective that people ignore the impact of outcome information. To put it simply, if the individual is told what will happen as a result, the individual begins to perceive events in a more predictable way than they actually are. Slovic and Fischhoff have shown that when participants in an experiment learn what will happen as a result of

the experiment, they tend to believe they already know everything that might be over (Slovic and Fischhoff, 1977).

2.10. Judging Probability by Representativeness

Representativeness Heuristic occurs in situations where individuals are confused by the similarity of two or more events and are closer to making mistakes. Generally, one of these two events is derived or developed from the other. It has been revealed that individuals generally make a decision based on two judgments. The first judgment is that the basic features of the events are the same; The second judgment is that the other events have another striking feature. When these two conditions are met, individuals have a tendency to choose the possibility and event to be distorted by entering into a statistical thinking structure - this is not a conscious behavior (Kahneman & Tversky, 1972). Kahneman and Tversky defined this situation as Representativeness Heuristic.

2.11. Combining Probabilities

This part of the study has been formed by the combination of studies that have been revealed about how the individual brings together or changes the possibilities created. How individuals process information while making decisions is one of the main curiosities of the experimental psychology discipline. After the individual has predicted a probability, it is a major task to investigate how the individual will change his initial probability estimate when he or she encounters updated information about the event.

2.12. Conservatism

In studies conducted within the scope of investigating the reaction of individuals to updated information, it was found that individuals avoid risk. So much so that this situation was discussed in Edwards' study in 1968. The experiment was carried out with two bags, 8 blue chips and 4 full red chips and 8 red chips and 4 blue chips. At the beginning of the experiment, the researcher chooses one of the bags by flipping a coin. What is requested from the participant is that the researcher generates possibilities as to from which bag the selection was made. The participant updates the probability value it produces after each receipt. Results are collected from both participants and optimal probability is calculated through the Bayesian Paradigm. At the end of the experiment, it

is seen that the probabilities generated by the participants are much lower than those calculated through the Bayesian Paradigm. That is, participants avoided increasing or decreasing probability estimates by avoiding risk, whether or not their estimates were supported after each receipt (Edwards, 1966). The researcher is of the opinion that this result relies on the participants' predictions but avoids the opposite and avoids too much risk.

2.13. The Base-Rate Fallacy

Base rate neglect or base rate fallacy occurs as an individual underestimates or neglects basic rates in the process of defining knowledge (Tversky and Kahneman, 1974). It is expressed as the individual ignoring the probabilities regarding outcomes, rather than evaluating the probabilities on the basis of representational heuristics. Tversky and Kahneman explained the basic proportion illusion that individuals that he is based on representational heuristics, which is the tendency to evaluate the probabilities of something, based on how much it resembles something (Hayta, 2014) rather than using the probabilities of something in the decision-making process; essentially a reflection of the characteristic of the individuals object A to object B They express it as an evaluation of the probability that it is happening. The researchers found that in a situation where individuals are asked to determine the probabilities of a particular outcome, if new or additional information is provided on the situation in question, the previous possibilities regarding this situation are not included. However, if no specific information was given in such a situation, individuals would rely more on previous possibilities. For example, an individual randomly selected from a sample of 100 people, consisting of 30 engineers and 70 lawyers, "has no interest in politics and politics. In a situation where characteristics were given, such as "devoting a large part of their time to mathematical puzzles", the participants responded by showing a tendency to perceive the information they learned later as a basic ratio, which could possibly be neutral, ignoring the 30-70% ratio known to be certain at the beginning. Therefore, it is understood that individuals who show basic proportion error do not make inferences according to Bayes Rule as suggested by the Expected Utility Theory (EUT).

2.14. Conjunction Problems

Conjunction Fallacy usually comes up during probability evaluation. In situations where the story of the incident triggers bias, individuals tend to make false predictions despite being aware of their bias. Kahneman and Tversky gave their participants four incidents of what could happen in the next Wimbledon Tournament during a time when Bjorn Borg was in shape and asked them to rank them from the most likely to the most impossible. These four events are defined as (a) Bjorn Borg wins the match, (b) Bjorn Borg loses the first set, (c) Bjorn Borg loses the first set and wins the match, (d) Borg wins the first set and loses the match. When options B and C are examined, the probability of option B is higher than that of C, but the participants position the probability C above the probability B.

2.15. Actor-Observer Bias

The Actor-Observer Bias is defined on the basis of a person's inclination to justify his own mistakes. For example, a gambler behaves more moderately when judging himself than when judging another person. When the individual plays himself, he thinks that he has more logical reasons than others.

While investigating this Cognitive Bias type, an experimental study based on a card game was carried out. This experiment includes 9 winners and 1 losing card. Each time the participants draw a card, they win a prize depending on whether the card is a winner or a loser. Participants are divided into two groups. While one group makes active decisions, the other group conveys their thoughts while watching another. It was noted that both groups took risks. However, the difference between the groups is that people who are actively involved in the game display riskier behaviors. Participants on the observation side won more prizes by making more logical decisions (Fernandez-Duque & Wifall, 2007).

This shows that logical choices such as individuals' probability of winning their choices, missing information, reward size or potential loss are the same for both actor and observer segments, but they do not have equal coefficients in practice. One of the differences this study reveals is the difference between rational choice and experimental choice. Logical selection requires a demanding process and more calculations are

involved. It is examined how small the price / performance ratio is for the best option. However, when it is started to be experienced, this situation becomes dependent on emotional orientations, intuitions, and the quality of the emotions experienced in past experiences.

For this reason, while individuals make more rational decisions in situations where they are not involved, their decisions are affected in different ways while they experience the event. As seen in the experiment, each card drawn gains a place in the memory as a separate experience. Therefore, an increasing tendency to take risks is observed as the amount of reward earned for the person who draws this card increases. On the other hand, observers who are not motivated by earnings make more rational decisions on behalf of individuals who experience.

2.16. Anchoring Bias

It is a type of Cognitive Bias that is defined by the fact that the first market data individuals see are always basic data and tend to believe that it is real. It is one of the most basic examples of Cognitive Bias and is a process that an individual often experiences in his daily life. It is quite common in economic markets. The individual suffers this defect when the first price of a discounted product and the discounted price are given at the same time. The first non-discounted price is unconsciously labelled as essential and real data for the individual. With the emotional impact of the amount of earnings on the decision-making process, the buyer is pushed towards the buying behavior.

Any information given after a basic information will be sufficient to direct the individual to the desired behavior. Individuals generally accept this initial information without questioning its accuracy. This defect actually comes into play when the individual makes purchases that do not need it. For example, while the individual does not need a membership for a period of 1 year, he / she can purchase a membership for this period because the membership prices are given mutually.

The belief that the crossed-out prices in the shop windows reflect the value of the product is complete. When working with the “Optimism Bias³” phenomenon, which will be mentioned in the later stages of the study, the individual will tend to complete the purchasing process even if it is against him. It is a method frequently used by politicians to guide the decision-maker. While making a statement about the service provided, it presents two data before and after to the voter. Voters, on the other hand, tend to no longer question the quality of the service provided before, and their decisions begin to follow a positive course in the face of the statements of political people.

For example, let us imagine that an imaginary politician shares with the public the information that the road from A to B with an arrangement they made on the road from A to B decreases from 6 hours to 4 hours. A voter who does not know the time between city A and city B will accept without question the accuracy of the initial information. But the logical process to follow is by testing this information.

2.17. Attentional Bias

Attentional Bias phenomenon has been defined on the basis of situations in which many things can distract the individual. While an individual is in the decision-making process, they may be exposed to influences that distract them from rational decisions. In this case, he can desire and apply things that he does not want within the logic.

For example, let's create a scenario where the individual is not able to keep up with their work and responsibilities despite having a busy working day and the end of work. In this scenario, while returning home, the individual will encounter a product that will alert their satisfaction points and have fun. In this case, the individual who is expected to make a decision will tend to purchase this product, although it exceeds the time required to complete the tasks and responsibilities by purchasing this product rather than the logical choice.

³ The Optimism Bias also called the illusion of invulnerability is defined as the fact that a person has a totally false belief that the probability of experiencing negative events is lower while the probability of experiencing positive events is higher than those of our peers.

2.17.1. Individual effects of attentional bias

It is known that the perception of individuals has an exhaustible amount. Individuals have very limited time to spend with full focus on the subject. The individual feels the need to spend a lot of time on the event and evaluate the possibilities and information in order to make a rational decision, but when the Attentional Bias occurs, they usually tend to focus on one possibility or information. In this case, the individual is attached to this single possibility or knowledge. He worries about this single possibility and tends to reject antitheses or information because of commitment.

2.17.2. Systemic effects of attentional bias

Attentional Bias phenomenon creates very important effects for institutions. Especially in institutions where uncertainties are intense, such as many security institutions, exposure to these effects creates a much more intense effect. A study by Nieuwenhuys, Savelsbergh and Oudejans investigated the relevance of the high anxiety level of the police force to the frequency of firing in exercises. It was concluded that police officers with high anxiety levels interpreted information about the threat with a narrow perspective.

In this case, although the effect of racial profiling or prejudice concepts is very large, it is also closely related to Attentional Bias of the Cognitive Bias phenomenon. For example, the relationship of young men in society, especially those with dark skin tones, with crime is biased too much. This profile is so widespread that every individual and even the security forces making up the society fall into this error. When these individuals encounter such common profiles, they tend to over-analyse even normal movements and even label them as criminals.

Another situation encountered with Attentional Bias is substance addiction. As a result of a study conducted by Field and Cox in 2008, it was revealed that individuals with substance addiction tend to focus more on stimuli about their addiction. In addition, a study that monitors the treatment processes of heroin addicts' states that individuals who frequently experience this brain deformation before treatment may relapse within a period of 3 months.

Why does Attentional Bias Occur?

As the researcher stated earlier, individuals' ability to focus is rather limited. When an individual begins to convince himself about a subject, the amount of subject he can focus on begins to decrease. There are various cognitive and evolutionary explanations as to why certain events attract our attention to such an extent and reduce our total attention.

Evolutional Advantages

Although Attentional Bias may lead individuals to make mistakes under uncertainty, in prehistoric times this may have had positive effects on the survival of the individual. To give an example, the human brain works in such a way that it is more interested in food than non-food items. When the hunger factor is present, it creates Attentional Bias (Lawrence et al., 2010)

In the emergence of the Attentional Bias phenomenon, individuals often collect information to legitimize their own prejudices. As the researcher mentioned in the previous parts of the study, while individuals envision past experiences in their memories, they are only concerned with their memories that will confirm their opinions.

The way the human brain works in this way is about developing some basic processes or shortcuts to speed up the decision-making process. All data given about an event are tried to be included in decision-making processes by individuals, but this situation often results in error. For example, it can very quickly be associated with basketball when a tall man is seen, or with volleyball when a tall woman is seen.

The algorithms that contain these biases are the mechanisms that our brains create to order the countless pieces of information that they need to process every day. Therefore, this situation creates a positive environment for the occurrence of Attentional Bias phenomenon. Individuals have the ability to accept information that fits these shortcuts and to reject information that does not. This situation is effective for individuals with depression to focus only on negative situations about their lives and the world (Disner et al., 2016). On the other hand, people who have not experienced depression show an optimistic attitude.

How to avoid Attentional Bias?

Attentional Bias is a condition of the brain that occurs outside of consciousness. Therefore, avoiding this brain deformation often cannot occur. This is the processes that the brain automates and the possibilities for individuals to be aware are limited.

There are also cases where individuals with Attentional Bias can be trained for the opposite. For example, people who are optimistic can be trained to focus on negativity. However, an important issue that arises in this situation is whether the individual will be able to balance between these two poles. This time, too, a tendency to focus on pessimistic events can be seen. As a result, there are no definite findings showing that Attentional Bias case can be avoided.

Instead, a process can be planned so that some Cognitive Bias types are not triggered. Thus, individuals or institutions are least affected by this situation. As an example, individuals who make a healthy diet decision should make their shopping lists in advance. In this way, they will not be exposed to stimulation by unhealthy foods that will not shop spontaneously and limit their attention.

In addition, activities that will strengthen the willpower such as meditation also show the feature of increasing the mind control of the individual. In an experiment, neutral and emotional facial shapes were shown to participants who meditated and those who did not, and their eye movements were followed. It has been observed that the time when meditators look at their angry and frightened facial expressions is very little. In addition to the fact that the state of looking at angry and frightened facial expressions occurs in people who do not meditate every time as Attentional Bias, this situation occurs only for happy faces for those who do meditation (Pavlov et al., 2014). With this experiment, it was seen that people who maintain attention-focusing activities for a long time to reduce the attentional bias effect can direct this situation (Wu et al., 2019).

How it Started?

The mindfulness bias became apparent in a test created by a psychologist named John Ridley Stroop. Stroop conducted an experiment in 1935 in which participants showed words written in ink of various colors. Each word consists of 3 separate classes. Participants were asked to ignore the color of the word and read it. When the name and

ink color were incompatible, the participants named the colors more slowly. This event has passed into the literature as the Stroop Experiment (De Angelis & Ricciardelli, 2017).

An emotional version of the Stroop mission also came out in 1980. In this version, they were asked to read the color aloud, rather than read the colored words. Among the emotional variations of the experiment, Gotlib and McCann (1984) found that depressive participants behaved more slowly in naming the colors of negative words; In Mathews and MacLeod (1985), it was shown that anxious patients read threatening words more slowly, especially words related to certain fears of the individual, and Watts (1986) showed that arachnophobes were delayed when reading words related to spiders.

2.18. Demographic and Socioeconomic Factors that Affect Financial Risk

Perceptions of Individual Investors

A person's attitude towards risk has been a subject of interest to both academics and practitioners for centuries. However, most of the studies aimed at understanding, measuring and determining the factors affecting financial risk perceptions of individual investors have been started in recent years (Grable and Lytton, 1999a: 164). Especially the development of financial markets and the proliferation of financial investment alternatives have increased the importance of financial risk perception.

Perception of financial risk is one of the factors that influence an investor's decision to distribute his money among various investment instruments in a way that creates an optimal portfolio in terms of risk and return. In most countries, legal regulations and / or ethical codes require financial advisors to know their clients and to make investment proposals taking into account the clients' financial situation and personal characteristics. Whether due to legal obligations or internal regulations, the investor's attitude to risk or risk tolerance is generally regarded as the most important personal characteristic a financial advisor should learn about his client (Hanna and Lindamood, 2004: 27; Roszkowski and Grable, 2005a: 181.). For this reason, financial risk perception is also an important issue for financial service providers who provide brokerage and consultancy services to investors, as investment professionals and advisors who have information about their customers' risk tolerance can prepare more realistic investment plans that are more suitable for their customers' purposes.

Despite its importance in the financial service industry, there are many unanswered questions regarding financial risk perception. These questions are generally about how financial risk perception can be measured most accurately and how which factors affect financial risk perception. "Which factors affect individuals' perception of financial risk?" Academic research has been carried out for the last 30 years to answer the question. However, the contradictory and inconsistent nature of the research results shows that not much progress has been made in this regard and new studies are needed (Venter, 2006: 2).

Factors affecting an investor's perception of financial risk; personality traits and psychological factors, and demographic and socioeconomic factors. In this study, Relationships between demographic and socioeconomic characteristics such as age, gender, marital status, education level, income, net assets and occupation and financial risk perception are examined.

2.18.1. Financial risk, avoidance and financial risk tolerance

Risk can be expressed as the probability of unexpected events in the future. In terms of financial investments, risk is the probability of the expected return to deviate from the actual return (Korkmaz and Ceylan, 2007: 472). Although risk is one of the fundamental elements of financial investment, it is also one of the most complex and incomprehensible features of investment. Most investors view financial risk as the possibility of losing the principal. However, financial risk is multidimensional and consists of a combination of various risks such as currency risk, interest rate risk, inflation risk, credit risk and liquidity risk (Research Department Investment Company Institute, 1993: 1). For example, an investor who buys government bonds with no credit risk means, knowingly or unknowingly, accepting other risks, such as liquidity risk, interest rate risk, inflation risk, and reinvestment risk.

Each investor's attitude or behavior towards risk is different. Investors are generally divided into three groups in terms of their risk-taking attitudes (Başoğlu et al., 2001: 198): (a) Risk-averse investors, (b) Risk-averse investors, and (c) Risk-seeking (loving) investors.

Risk-averse investors do not like and do not take risks. For this reason, they prefer the less risky investment than the two investments with evident returns. A risk-averse investor has a concave utility curve as the benefit attributed to each additional dollar decreases. Investors who are indifferent to risk are not concerned with risk and it does not matter which investment to choose for them. Therefore, it can be said that investors are indifferent between risk and return. The benefit curve for an investor who is indifferent to risk is linear. For risk-seeking investors, the benefit of the investment is greater than the expected benefit of not investing. The benefit curve of a risk-seeking investor has a convex (convex) structure as the benefit attributed to each additional lira increases (Türko, 2002: 385; Yang, 2004: 119).

One of the main assumptions in finance is that there is a linear relationship between risk and expected return. In other words, the investor wants more returns in order to take more risk. Studies show that expected return is linearly related to risk. Another assumption in financial theory is that investors are generally “risk averse”. However, it is not possible to say that all investors are equally risk averse. Although some investors are extreme risk averse, some investors are risk averse to a lesser extent. In other words, each investor's risk taking behavior or attitude towards risk is different (Konuralp, 2001: 254).

Risk aversion can be expressed as preferring to maintain a certain level of consumption rather than uncertain consumption, even if the expected value of uncertain future consumption exceeds a certain level of consumption. In terms of choosing financial investment instruments, risk aversion is the acceptance of lower expected return rates in order to reduce the probability of loss by the person who prefers certain future consumption (Finke and Huston, 2003: 234).

Financial risk tolerance is the amount of uncertainty that the investor is willing to take or the return volatility of the investment while making a financial decision (Grable, 2000: 25; Faff, 2008: 2). In other words, financial risk tolerance is the degree to which an investor desires or undertakes the possibility of unwanted consequences as a result of his financial decisions (Callan and Johnson, 1999: 7). Risk tolerance is inversely related to risk aversion. Those who avoid more (less) risk will have a lower (higher) financial risk tolerance.

Risk tolerance, which shows the investor's attitude towards risk, is a complex behavior pattern consisting of a combination of different factors. It is generally accepted that people with high risk tolerance will act differently than people with low risk tolerance. People with a low risk tolerance generally want (a) lower probability of loss, (b) unwilling to operate in unknown or unfamiliar situations, (c) less uncertainty, and (d) more information about the investment's performance (Grable and Lytton, 1998: 64). High-risk-tolerant investors tend to be self-confident, more confident, and have their own personal income than investors with low risk tolerance. The sources of information used by investors also vary according to risk tolerance. Investors with high risk tolerance often read articles in magazines or newspapers for investment information, while those with low risk tolerance often use friends, family or work colleagues for investment information and assistance. In addition, investors with low risk tolerance rely more on their accountants and bank employees (Research Department Investment Company Institute, 1993: 6).

Investors' attitudes towards risk; It may change over time depending on demographic, social and economic conditions. In other words, an investor's risk-return preference is dynamic, not static. For example, if a close friend of an investor with low risk tolerance has made a high profit from a risky investment, this may encourage the investor to take risks and lead to risky investments (Cordell, 2001: 1). Empirical studies also show that investors' risk tolerance changes depending on various factors. For example, Grable et al. (2006: 72) examined the relationship between stock price changes and investors' risk tolerances and found that risk tolerance changes depending on the developments in stock markets. Accordingly, when the stock market closed the previous week with an increase, the risk tolerance scores of investors increase, and when the stock prices decrease, the risk tolerance scores of investors decrease in the following weeks. Yao et al. (2004: 249), in their study using stock data between 1983-2001, stated that risk appetite decreased from 1983 to 1989, did not change between 1989 and 1992, increased in 1995 and 1998 and decreased again in 2001, in other words. They found that when stock returns increase, financial risk tolerance tends to increase, and when stock returns decrease, financial risk tolerance tends to decrease.

In order to classify investors into appropriate risk tolerance classes and to propose investment portfolios that best suit investors' risk profiles, risk tolerance must first be

measured. Risk tolerance is an element of "benefit" and maximizing expected benefit is considered the ultimate goal of any financial activity. Therefore, the optimal choice will be different for each investor, because the utility function of each investor is different (Ardehali et al., 2005: 492).

2.18.2. Measuring financial risk tolerance

A financial investment decision-making model to be used by financial investment managers should include at least four variables as inputs. These variables are; The purpose of the investor is the time the investor wants his money to stay, the investor's financial condition and the investor's attitude towards risk (Grable and Lytton, 1998: 61). Although the first three variables are more specific and can be measured easily, the financial risk perception, which has a subjective feature, is more difficult to measure and evaluate.

The approaches used in measuring and evaluating financial risk tolerance can be grouped under three groups (Ardehali et al., 2005: 494).

Objective Criteria

Information about the investor's past investments can be an objective indicator of the investor's attitude towards risk. For example, the composition of financial assets in investors' portfolios can provide insight into investors' risk tolerance.

Intuitive Evaluation

Heuristic valuation methods use demographic, socioeconomic and psychological factors to estimate an investor's financial risk tolerance. Some of these factors are age, gender, marital status, profession, wealth, income, financial information, race and economic expectations. The use of this approach requires an acceptable correlation between the variables in question and financial risk tolerance.

Subjective Assessment

In the subjective assessment method, the risk perception and attitude of the investor against risk are tried to be determined by asking various questions in a meeting with the investor. The questions often describe a specific investment scenario and ask what

respondents will do if certain events occur. In evaluating the answers, the more aggressive (risky) options are scored higher and the investor's risk tolerance is the sum or average of the scores. Then, using these scores, investors are placed in a risk tolerance category ranging from "conservative" (low risk) to "aggressive" (high risk). Today, subjective assessment is the most used method of measuring risk tolerance.

In subjective assessment, often multiple-choice questionnaires (questionnaires) are used. However, there is no standardized risk tolerance scale used by practitioners and academics. Most of the available assessment tools are scales that users develop according to their own needs or adapt scales developed for use in scientific studies. There are some drawbacks to measuring risk tolerance using such scales. For example, some investors may not be able to answer the questions correctly in order not to appear "wimpy" or "cowardly" (Hanna et al., 2001: 54). Similarly, investors may not be able to fill out these forms correctly due to ambiguity, misunderstanding or ignorance. Apart from this, the questions may consist of complex multiple-choice options that generally refer to technical market terms or financial instruments that are not well known by investors (Venter, 2006: 4).

Despite these criticisms, an investor's financial risk tolerance can be accurately measured through a questionnaire prepared in accordance with the principles of psychometrics. In the formulation of the questionnaire, the questions should be evaluated for its understandability and responsiveness, and the ability to distinguish individuals with different risk tolerances. The validity and reliability analysis of the questionnaire should be done (Callan and Johnson, 1999: 4; Roszkowski et al., 2005: 66), and more than one questionnaire should be used, the results should be averaged, high and low evaluation errors should be minimized and the most accurate result should be reached. (Roszkowski and Grable, 2005b: 31).

There is an opinion among investment and portfolio managers that demographic characteristics may be sufficient to classify investors according to risk categories. Classification of investors only according to their demographic characteristics may lead to investment plans that do not fully comply with investment objectives and risk tolerances (Grable and Lytton, 1998: 62). Since risk tolerance has a complex structure, the scale to be used in measuring risk tolerance should include questions based on

financial scenarios and conditions that cover all dimensions of risk tolerance (Grable and Lytton, 2001: 45).

Critical Thinking

It would not be wrong to say that there are situations in which mistakes and biases are beneficial by nature. Especially in uncertainty situations encountered, insufficient information and time limitation, which is often necessary to make decisions together with this uncertainty, make shortcuts, mistakes and mistakes into compatible behaviors. According to many researchers, such a mechanism is not only adaptive but also a feature that we bring cognitively (Tobena, Marks, & Dar, 1999). Another adaptive system is rational thinking and intelligence, which we can define as the ability to adapt to nature.

In terms of methodology, critical thinking or Karl Popper's critical rationality is an old concept (Popper, 1935; Baudoin, 1993). The tradition of critical debate that has been used since Socrates, according to Popper, is not only a personal interpretation but also a methodical reconstruction in which evidence and measurements are questioned. Popper proposes a falsifiable system in which the deductive method stands out, instead of the affirmative approach of the positivist current, which was used by the Vienna circle and dominated science for a period. In this system, both refutation and criticism have a dominant role. Perhaps the most important feature of criticism is that it leaves the information not to personal judgments, but to method, discussion and exchange of ideas.

When we examine the critical rationalism analysis he developed in terms of scientific theories, Popper says that Karl Marx's Marxist and Freud's psychoanalytic approaches and Einstein's perspectives on science and nature are very different from each other. The first two are affirmative, non-critical, untestable, and unscientific dogmatic theories.

Einstein's propositions, on the other hand, are testable, open to falsification, and have a scientific structure that allows critical approaches. It is this critical attitude that distinguishes scientists from others (Corvi, 1997). In a study conducted with natural scientists working in different fields, it was found that the results, which constitute 52% of all results and that appeared contrary to the research hypotheses, were taken into consideration by the researchers and models were tried to be created about the reasons

(Dunbar, 2000). This behavior pattern is in line with Popper's suggestion of "paying attention to falsifying findings" for the scientist.

Critical rationality, which is so important in terms of methodology, or critical thinking, which we can see as its reflection in daily life, is expected to have a positive effect on decision making and problem solving. Said criticism and critical thinking is a constructive analysis aimed at understanding what is happening around us. This analysis system is a system that can be used in defining problems, starting studies for any purpose, making decisions and retrospective evaluations (Chaffee, 1994).

Critical thinking (Royalty, 1995), which shows a positive linear relationship with intelligence measures, can be defined as an efficient, organized and functional cognitive process performed to better understand our own thoughts and the ideas of others and to improve our ability to explain thoughts (Chaffee, 1994; Kökdemir 1999a). The most important feature of this process is that the question of why can be asked when a judgment or interpretation is required at the end, or when it is necessary to have an idea about the relationships between facts. "Why is that?" The question is not just a question asked to find the answer; This question also provides to question the causal relationships in the answers encountered. For example, the proposition "All rock music listeners are satanists" can be tested or questioned "why?" The question needs to be asked (Kökdemir, 1999b). "Why is that?" The question can allow us to find variables that are both contained and excluded by the proposition, and only in this way can the proposition be verified or falsified. It will not be enough just to justify the proposition put forward; testing alternative hypotheses and a deductive understanding of method as suggested by Popper (1935) is necessary in terms of approaching the truth (verisimilitude).

It is enough to take a glance at the comments that emerged after the attacks on twin skyscrapers in New York, USA on September 11, 2001, to see how misleading inferences and confirmatory approaches after any incident can be, and how they can be used, especially by those who seek mystical 'facts'. Links between the number 11 and the attacks were established in the press and internet sites (eg <http://www.september11newscom/Mysteries2.htm>). However, it is possible to use these so-called evidence about the "mystery" of the number 11 in any other history.

For example, Kökdemir, Özgün, and Ergen (2002) showed that similar evidence could be found for the number 13, in other words, even if the attack was on September 13, people who believed in the mystery of numbers would not have difficulty finding them.

As can be seen in the table above, propositions and inferences devoid of evidence and only for verification are possible in almost every situation. For this reason, the thinking process defined as critical thinking should include skills other than just the proposition testing system.

Among the skills included in the critical thinking process, (1) capturing the difference between the proven facts and the claims made, (2) testing the reliability of the sources of the information obtained, (3) extracting unrelated information from the evidence, (4) being aware of bias and cognitive errors, (5) being aware of inconsistent judgments, (6) asking effective questions, (7) using verbal and written language effectively, and (8) metacognition in which the individual becomes aware of his / her thoughts, and so on. These skills also form the basis of critical thinking education (Kökdemir, 2000).

Braman (1999) states that critical thinking skill is important not only in academic settings but also in every platform for problem solving. Critical thinking, in which understanding the other side is an important criterion, plays a key role, especially in peaceful solutions to political problems. The important thing is not to gain an advantage over other people or groups or to get high profits from conflicts. Critical thinking emphasizes not only the quantity or quality of the result, but perhaps more importantly, the methods used to achieve this result (Lundquist, 1999).

The ability to be knowledgeable about one's own biases and to be able to see the different aspects of the situation they face or the problem they need to decide is important for this type of conflict resolution. Hoefler (1994) claims that the reason for the 1992 gulf crisis was the lack of critical thinking. The tension between Iraq and Kuwait was presented by the US President George Bush as "an Arab problem", which was perceived by Saddam Hussein as the US would not interfere in this event and the Iraqi army entered Kuwait's borders. It is not possible to test whether the cause of the event is as simple as Hoefler said, but it would not be wrong to say that the differences in perception are effective in the decisions made. The role of critical thinking here is that perception is not one-dimensional; The interpretation is to remind the individual that judgments and

decisions can vary from person to person and that it is possible to view the same event from different angles. Therefore, the role of the educator should be to show alternatives rather than merely presenting the adopted one-sided dogmatic knowledge to the student in the form of a doctrine (Paul, 1998).

From a more pragmatic point of view, people who are sought to work in 21st century businesses and organizations are no longer asked to be people who do not just do what is said, but rather take initiative using their critical thinking and decision-making skills. As Celuch and Slama (1999) stated, a dysfunctional thinking system not only causes a waste of time and energy, but also creates a feeling of frustration in terms of both the individual and the organization where the individual is located. In order to raise individuals with critical thinking models, the courses taken during university education should be reorganized both in terms of content and consist of problem solving and critical thinking practices for the discipline they are interested in. However, as a result of this type of education, individuals with abstraction and reasoning skills, systematic thinking, measuring and comparing, and high communication and cooperation skills can be raised.

2.18.3. Demographic and affecting financial risk perception socioeconomic factors

When an individual investor is faced with a risky financial situation, what factors influence the investor's decision? Made works; It shows that a person's biological structure, demographic and socioeconomic profile and psychological structure affect his attitude towards risk. Although there are many factors that affect a person's attitude towards risk, there are different opinions about which factors affect how much. Among the reasons for this difference, there are differences in the branches of science conducting the research, the scales and methodologies used (Grable and Joo, 2000: 1). For the purpose of this study, only demographic and socioeconomic factors were examined, personality structure and psychological factors were not discussed.

2.18.3.1. *The relationship between gender and financial risk perception*

Whether there is a difference in women's and men's attitudes towards risk is one of the main research and discussion topics. Women are generally thought to be more risk-averse than men in many areas such as sports, drug and alcohol use, automobile use,

sexual behavior and gambling (Harranta and Vaillant, 2008: 396). There is a similar trend in terms of financial risk-taking preferences. Studies show that, in general, women's financial risk perception is higher than men, in other words, women have lower financial risk tolerance. For example, Grable and Lytton (1998: 68) investigated whether there is a differentiation between individual investors' financial risk tolerance according to demographic variables and found that men have higher financial risk tolerance than women. Jianakoplos and Bernasek (1998: 629) examined the role of gender in financial decision making and found that women are more risk-averse than men and that single women invest less in risky financial assets than single men and married couples. Olsen and Cox (2001: 30) found that female financial analysts and planners working in the finance sector place more weight on the potential for a decrease or loss than men, and that women investors are more susceptible to uncertainty arising from investing in risky financial assets. Dwyer et al. (2002: 151); They examined the impact of the gender factor on mutual fund choices and found that women were less likely to take risks than men. Grable et al. (2006: 72) found that gender is one of the factors that affect risk tolerance and that women have lower risk tolerance scores than men. Mittal and Vyas (2007: 55) investigated the role of gender in the choice of investment instruments and found that there was no gender significant difference in mutual funds, bonds, real estate, gold and derivatives, but the difference by gender was statistically significant in stocks and long-term deposit investments. Watson and McNaughton (2007: 52) investigated the effect of gender on employees' pension fund choices and found that women chose more "conservative" (low risk) investment strategies than men. Grable and Roszkowskj (2007: 795) found that men tend to show more risk appetite than they actually are, whereas women tend to underestimate their risk tolerance. Dohmen et al. (2005: 3); Using a sample of approximately 22,000 people living in Germany, they found that women of all age groups are less willing to take risks than men. Charness and Gneezy (2007: 13) found that women invest smaller amounts than men and are more risk-averse financially. Similarly, Hawley and Fujii (1993: 202), Grable (2000: 25), Grable and Joo (2000: 1), Halek and Eisenhauer (2001: 21), Hallahan et al. (2003: 483), Lugovskyy and Grossman (2007: 2) and Faff (2008: 21) found that men have more risk tolerance than women, in other words, women are more risk-averse than men. Embrey and Fox (1997: 33) investigated the impact of gender on financial investment decisions and that gender does not have a significant effect on investment decisions and the choice of investment

instruments, while working, women who own more assets and await inheritance and risk-seeking. They found that divorced, older, and college graduates were more likely to invest in risky financial assets. Masters (1989: 154), Grable and Joo (1999: 53) and Hanna et al. (1998: 13), on the other hand, found that there was no difference in risk aversion by gender.

There are various opinions regarding the risk perception difference between men and women. These opinions can be grouped under four headings. The first view focuses on biological and psychological factors. According to biology-based evolutionary theories, the fundamental role of women, such as childbirth and motherhood, and women's greater physical vulnerability to violence lead to a physiological adaptation that seeks less excitement and avoids ambiguous situations. In addition, it is stated that the level of monoamine oxidase enzyme that decreases the sensation seeking feeling in women is higher (Olsen and Cox, 2001: 30). Apart from these, women are more cautious, and conservative compared to men, and they are less confident in their financial decision-making skills, which increase their perception of financial risk (Harranta and Vaillant, 2008: 396). The second view emphasizes social and cultural factors. In patriarchal societies, women tend to be less self-confident and risk averse (Olsen & Cox, 2001: 30). Also, in most cultures, there is a belief that men should take more risks than women (Grable and Lytton, 1998: 68). The third view attributes the difference in risk perceptions of women and men to economic variables such as women's generally having lower wealth (wealth) than men, working with lower wages in their working lives, lower wage growth and lower pension premiums (Venter, 2006: 12). The fourth view establishes a relationship between human capital and financial knowledge level and risk perception and states that women's lower risk tolerance can be attributed to women's lower financial knowledge levels compared to men (Dwyer et al., 2002: 151; Venter, 2006: 13).

In practice, the gender factor is one of the most important demographic variables used in classifying investors according to risk tolerance, and women are assumed to have lower risk tolerance than men. Most of the academic studies conducted also confirm this view.

3. RESEARCH METHODOLOGY

3.1.Introduction

Shank (2002) explained that for adopting and implementing research, it is mandatory to understand the ideas and steps considered for undertaking the research study. Moreover, it is very important to even understand the motivation linked to it. The research methodology is one of the vital sections of the research study. Research methodology can be stated as an important procedure through which a scholar can easily search for information as per the chosen subject matter (Bazeley, & Jackson, 2013). Thus, the present chapter will provide details on the research methods implemented for the current study and even provides steps to evaluate the results of the study. It is identified by various researchers that the entire research is dependent on the research methodology, this is adopted to achieve the main aims and objectives of the study. The research methodology enables the study in interpreting accurate things (Bernard, 2011). The research study is developed in a few steps which helps in performing the complete study efficiently (Bryman, 2015).

The researcher will primarily identify the research problem and secondly will relate the literature review. Then will help in developing the research variables of the study, namely dependent and independent variables. Moreover, this will help in developing the research design. Further, the next step is to highlight the chosen research approach and paradigm. Also, this leads to collecting data. The last step of the study is to analyse the collected data, simultaneously interpreting the analysed data. The final step of the research is to discuss the accurate results.

The research problems of the study will be reviewed properly in the first chapter of the study, depending on which the research study would be progressed. Simultaneously, the rich literature drafted by various scholars would be incorporated in the study. The evidence would be considered from the sources like books, journals or articles and conducted it (Creswell, 2017). The research design, paradigm, approaches and data collection techniques are discussed in this chapter. The data analysis and interpretation have been evaluated in the next section followed by discussion or conclusion in the last chapter of the study.

Research strategies enables the researcher in determining the entire plan of the study so that it can be conducted efficiently. The research strategies acts as a guide to the researcher. This allows the researcher to develop the research proper plan, execute it and then monitor it following a systematic process. The plans drafted by the researcher support the developing quality research. For getting quality research, the researcher thus requires applying the research methods so that the research study can be executed appropriately (Creswell, 2016).

The research methods help in outlining various processes, which helps in collecting and interpreting the evidence. These are the means of questionnaires, interviews or statistical methods. There are different research strategies elaborated in a study, but the researcher has to choose a particular tool as per the chosen topic so that proper data can be collected regarding the Ponzi scheme investor. The research strategies will be dependent on the goal of the study and this help the researcher to pursue the answers depending on the research objectives. Besides that, the researcher also needs to ensure that the methods or strategies that have been chosen for the study are in an ethical manner (Denzin, and Lincoln, 2011). No one should be harmed in the course of the research work. Research strategies consist of research methods, paradigms, designs, data collection techniques, approaches, sampling and the data analysis methods.

3.2.Research Paradigm

Paradigm can be precisely defined as the combination of the various groups such as concepts, variables, and the issues related to the research methodology approaches and the integrated tools play a vital role in developing the study. This can be further defined as the particular structure or the framework or blueprint of the study (Morgan, 2007). Chilisa and Kawulich (2012) described the research paradigm as a collective process that includes different discussion processes like positivism, post-positivism, constructivism, etc. The study will adopt an interpretivism research philosophy. This research paradigm is adopted because it is related to a certain idea or belief. The study uses interpretivism because this helps in identifying the issues and their solutions through the human qualities of meanings and ideas. According to the interpretivists, the research must be conducted and fulfilled by understanding the reality and drawing the estimations needed to achieve objectives (Clarke, 2009).

3.3. Research Approach

A research approach is a systematic approach used for collecting information, documentation, etc. In fact, it is the process of gathering the data, examining it, and interpretation of the collected data to understand the particular process (Hennink, Hutter, and Bailey, 2010). For conducting the research and identifying the solution to the research question three different approaches are adopted like quantitative, qualitative, and mixed.

A Qualitative research approach has been chosen by the present study. Qualitative research is also termed as the subjective research approach, which is comprehensive and resulting in some discovery (Jackson, 2015). The qualitative approach can be defined as the social phenomenon that is to be explained by identifying and understanding the viewpoint of the participants. In most cases, the qualitative research approach involves the explanation, description, and interpretation of data that would help in developing some new theories. Therefore, the current study, will help to describe the Ponzi scheme investors.

3.4. Research Design

One of the scholars defined the research design as the blueprint, as this helps in navigating things incorporated for the research study. The research includes rights from gathering the data, analysing the data, and lastly discussing the results. The research design can be termed as the holistic strategy which mainly practiced by scholars. Moreover, this helps in combining the various aspects related to the study coherently and logically. This ensures that the research problem has been addressed adequately. Research design actually serves as the roadmap or the blueprint to collect and measure the data. It further helps in analysing the data for which the researcher gets the required results. Different forms of research designs were also defined as exploratory, descriptive, and explanatory (Salkind, 2010).

The study will adopt an Explanatory research design and will explain the same here. The base for the critical research is the formulation of the causal relationship between the variables in the study. An explanatory research design helps in clearly explaining the meaning of each variable and its relationship. Further, their dependence on each other

(Clark and Creswell, 2007). The variables incorporated in the study will be explained in detail with the help of the explanatory research design.

3.5.Reasoning Approaches

The reasoning approach has been further divided into three major sections like inductive, deductive, and mixed. The researcher has chosen the deductive approach to complete the following work. Moreover, even to understand the relation between the dependent and independent variables was found. The researcher has taken the help of the secondary research. The researcher proceeds from the general ones to the specific types depending on the study variables (Lindlof and Taylor, 2010). Therefore, even the current study will narrow down the specific points and reasons related to the Ponzi scheme investors.

3.6.Data Collection Method

Data collection is an essential part of the research framework. This plays a vital role in securing eminent evidence is an essential task for addressing the objectives of the study. The results and findings of the study are technically inefficient if they do not amass data either through relevant sources or samples. Depending on the feasibility and demand of the study, a data collection method is selected. Moreover, the type of being collected affects the other components of the research methodology being used. Paradis and al. (2016) accentuated that data collection methodology should be in alignment with the objectives of the study. There are three varied types of data collection methods. Two of these techniques are distinct while the third one is an integration of the two prior techniques. These techniques are namely: Primary, Secondary, and Mixed.

Further, the present study will make use of a Secondary data collection approach. Secondary data collection is adopted in this study. Secondary data collection involves a fresh analysis of data that was previously collected and analysed by other researchers for their primary study. The use of such data collection techniques is a viable option for those researchers that may either have limited resources or for those that aim at making a comparative analysis of a given notion over time. It applies the same research principles of accumulating data as primary data collection technique; however, it requires an extra

step of acquiring permission as well as acknowledging the previous researcher or institute whose data has been utilized (Johnston, 2017).

The secondary data collection technique is the vast array of evidence that is collected from the different secondary resources. This type of information is gathered depending on the previous research works performed by the scholars. The main aim of accumulating this data is to gather detailed knowledge depending on the selected topic (Padgett, 2016). This is done by reading various journals and articles that have been formed earlier and are relevant as per the study. The researcher uses different types of secondary resources like journals, articles, educational websites, and books to collect the secondary data. Moreover, in the context of secondary data, a case study approach will be used. The case study will help in gaining deeper insight into the approaches adopted by Ponzi scheme investors. The study will also analyse the case studies related to the Ponzi scheme Investors.

3.7.Data Analysis and Interpretation

After the collection of data, another important task implies the conversion of raw numerical or qualitative data into results that can be easily comprehended by the readers. As a result, it is crucial to select the appropriate tools and techniques for analysing the data in a manner that it is sufficient to address the pre-defined objectives of the study. Based on the data collection method adopted and the specific tool that is utilized, the data analysis technique is chosen. To elaborate, if a primary data collection technique is chosen along with a qualitative approach, the data may be collected through an interview technique. In such a case, a thematic analysis tool will be utilized as major responses will be highlighted in terms of themes from the responses acquired. However, if a quantitative research approach is utilized, irrespective of a secondary or primary data collection technique, a statistical data analysis tool will be implemented as it is known to deal with data in numerical format. Thus, the type of research approach, data collection technique, and tool being used in a research framework shape the specific data analysis technique that is implemented (Panneerselvam and Sivasankaran, 2014).

Therefore, the current study has adopted secondary data collection, so there the current study will be conducting content analysis where content related to the Ponzi scheme would be examined.

3.8.Ethical Considerations

Ethical consideration can be deciphered as the set of predefined rules and regulations that the researcher should abide by, in order to maintain dignity and standards of the study. Complying by the set of rules and regulations of the research accentuates that the research study has been conducted without compromising the ethics of the study (Taylor, Bogdan, and DeVault, 2015). While conducting a research study, a researcher has utilized a secondary data collection technique. For this purpose, the perspectives and opinions of the scholars provided in the research study need to be accumulated so as to derive the results of the study. In lieu of this augment, the researcher should comply with a set of rules. The study has taken many rules and regulations into consideration. During, the collection of the data the researchers must be aware of the main objectives of the study. The study referred during the data collection must be sighted properly and the correct information must be incorporated in the data. This will help the audience to understand which study is conducted by scholars and how have they considered their study.

As the current study adopts a secondary data collection technique where participants are not involved, the research must acknowledge and cite the relevant sources each result has been retrieved or discussed. Further, permission to reproduce quantitative data should be acquired from the prior research before its utilization in further studies.

4. COGNITIVE BIAS AND RISK PREFERENCES RELATED IN THE PONZI SCHEME

4.1. Understanding the Role of Cognitive Bias in the Ponzi Scheme

For many years, the Ponzi scheme or High-yield investment program (HYIP)⁴ has made a continuous growth in the industry (Vase and al., 2015). Most of the time, it is seen that such kind of investment usually promises a great return. However, in some cases, high returns are not gained by the investors and have investors lose all of their money. One of the amazing facts for knowing is that many investors have to lose their money as publicized in the mass media, as this case is still continuing in the court. Under the study of behavioral finance, it is very important to understand the role of cognitive behaviors. Moreover, it is found that cognitive psychology plays a potential role in the field of finance. As it is identified that, this approach offers a better explanation for all the relevant factors which actually influence the investment decisions of the Ponzi scheme as compared to the neoclassical economic approach (Detzer and Herr, 2014). The behavioral finance approach can be elaborated as the people who are not always found rational in making any financial decision. This happens because of cognitive bias and due to emotional factors (Aggarwal, 2014).

Studies conducted by most of the researchers defined in their study that, cognitive bias majorly incorporates variables like overconfidence, availability heuristic and herding. Overconfidence can be explained as the belief where a person poses more abilities and knowledge as compared to others. Overconfident investors tend to perceive themselves to be more competent, and these kinds of people are more willing to take action against their beliefs and take more investment decisions (Mota, 2014).

Another belief factor can be defined as, the factor which directly influences the investors for making a good investment decision. Moreover, which shows the actual availability of heuristic, as this describes a tendency that helps in relying more upon the available information. This helps in making timely decisions making and further leads to profitability. Moreover, this even allows to make the decision-making process more spontaneous and tends to choose investment decisions that are suitable for their final

⁴ A High Yield Investment Program (HYIP) is a form of fraudulent investing that promises extremely high returns on investment. The annual interest rates offered in these programs are often above 100% with the sole aim of attracting more investors who will be future victims of the system.

decision. In addition to this, most of the time, it is found that the availability bias has a positive significant impact on investors' decision making. This happens because investors are highly dependent on easily available information (Kremer and al., 2013).

Further, few scholars delineated the concept and the role of herding. Herding can be properly defined as the form of cognitive bias done by the investors where they base their investment decision not by considering the economic fundamental basis of assets at risk, but by looking at the actions of other investors in the same circumstances or even. Most of the time it is identified that investors who fail in lack of investment information, always tend to present herding behaviors. So thereby if the investors are not having any investment choices, then, such people can make the right kind of investment decision who considers that they have complete information regarding the investment (Damodaran, 2013). Besides, that irrationality which can be mainly considered as the attribute to the belief can also occur due to individual preferences towards risk (Plott, 2011).

Risk tolerance can be further defined as one of the parameters of risk preference, as this helps in elaborating the level of investor tolerance to the risk of the investment. It is often found that an investor with a higher risk tolerance will invest more in a high-risk investment. In contrast to this, otherwise, an investor with a lower-risk tolerance will invest more in low-risk investment (Hanna, 2013; Gilliam, 2011).

Excerpts and the advocates of behavioral finance have been able to elaborate that number of cognitive bias and risk preferences that impacts the investment decision. From most of the findings, it was found that overconfidence, availability bias, herding, and risk preference make a great and significant impact on the investor's decision-making process (Chater, 2010). From the Financial point of view, financial behaviors can be defined as conventional financial theory, which basically ignores the way of the people makes their own decision. Moreover, it is seen that how it creates the differences from one to another. In this approach, the investors are often considered irrational in making financial decisions as they are found cognitive bias and emotional factors.

Overconfidence can be considered as a belief that someone has an over average ability and knowledge which is comparatively highest than others (Merkle, 2013). It is mostly found that the investor who has high overconfidence intend to overestimate their knowledge. Whereas, if the investor has to underestimate risk, this leads them to take the

wrong position in the transaction (Glaser, Weber, 2007). Overconfident investors will trade too frequently, that is, the gains overconfident investors realize through trade will be less than they anticipate and may not even offset the costs of trading (Blake, 2014).

The heuristic can be described as the effort put for processing the information quickly and based on that consolidating the insufficient experience and intuition. One of the heuristic factors in financial decision-making is availability. Moreover, availability plays a crucial role in determining the likelihood of an event according to the easiness of recalling similar instances. In other words, the availability heuristic can be termed as a rule of thumb, which occurs when people estimate the probability of an outcome based on how easy that outcome is to imagine (Kliger and Kudryavtsev, 2010). A heuristic person is the kind of investor who explains the tendency to rely more on available information at the time of decision making. These qualities help in developing quick decisions and tend to choose investment decisions that are relatable to them (Jain, 2015).

Herding is considered as the kind of behaviors which an investor poses, moreover, imitating the observed actions of others or the movements of the market instead of following her own beliefs and information (Saxena, 2016). It is often experienced that investors' decisions can quickly influence by looking after investors' decisions. It might happen usually in terms of selling, purchasing, selecting stock, investment period, and the volume of investment. The investor's decision can influence another investor's decision in terms of selling, purchasing, selecting stock, investment period, and the volume of investment (Kengatharan L. and Kengatharan N., 2014).

Each and every investor hope for getting the maximum expected return from the number of funds invested. However, to obtain the expected return, an investor has to always face a lot of uncertainty (risk). If the investor is ready for facing the uncertainty risk, then he can easily expect higher returns and if the investors are not ready to take the unlimited risk that investor cannot gain a higher return. Therefore, investment is very optimal investment decision of the investor. Thus, it is said that investors must be able to balance both the factors and investors can easily do that then only if they consider both the factors together, because of the trade-off between expected return and risk. Most of the time, it is found that investors' risk preferences influence the choice of alternative decisions. Further, prospect theory describes that investors tend to frame the choice of investment decisions in the context of potential gains and losses based on specific

preferences (Barberis, 2013). As per the theory it is stated that investors tend to have an irrational tendency as they are reluctant to risk profits to losses. The results gained through various studies lastly stated that overconfidence, availability, herding, and risk tolerance, most of the time pose a positive and significant influence on the investment decision. In addition to this, it was found that overconfidence is the main factor that influences the decision to invest in the Ponzi scheme.

4.2.Examining the Concepts of Risk Preferences in the Ponzi Scheme

Risk preference can be defined as the attitude of people who mainly have the ability to hold their majority of risks. This is identified as the key factor in studies on investors' decision-making behaviour. The standard financial theory assumes that investors are rational and believe that making investment decisions they tend to have invariant risk preferences risk-averse. However, from the research, it can be considered that people who gradually find that the investors' decision-making behaviour in real life does not always comply with the assumption of rationality. Moreover, even their behaviors are usually limited by their own cognitive biases and external environment, leading to their risk preferences varying with different situations.

Various research studies were conducted on the development of behavioral finance, a multitude of research identified and indicated further stated few details. Furthermore, the details of the studies revealed that the result of investment in the financial market can affect their decisions, making them exhibit inconsistent risk preference. Kahneman and Tversky (1979) proposed a theory in their study named Prospect theory. The scholar further elaborated on the prominent psychological traits of investors in their decision-making under uncertainty. The experiment conducted by the scholar further recommended that the individual also tend to be risk-averse with gain and risk-seeking with loss. Thus, this has actually confined by all the scholars. Laughhunn and Payne (1984) identified and found evidence regarding the experiment conducted by them. The samples of the study were 20 managers, these managers were in the process of their multiple risk choice performed risk-averse for gains and risk-seeking for losses. Fernandes and Luiz (2007) explored from their study that participants selected for their experiment were less willing to take risks after getting gains and were more willing to take risks after obtaining losses. Similarly, after looking the experiments, other scholars

thought of testing the same and it was seen and expressed that even these scholars (Haigh and List, 2005; Abdellaoui and al., 2007) got the same results. Thaler and Johnson, (1990), scholars conducted an experiment and discovered that investors' risk preferences are depended on the psychological value of return, and even the same finding was observed in the (Barberis and al., 2001; Xiong, 2009). (Brunnermeier and Nagel's, 2008) conducted the research, scholars found that investors' risk preferences are always changing as per their wealth. Therefore, wealth is considered as the dependent factor and risk preference is considered as the independent factor.

Besides, Chou and al. (1992), the scholar further argued with the statement that investors always look for greater compensation for the risk varied with the compensation of the last period. This statement can be described as the that investors' current attitude towards risk always influences by their attitudes in the last period. Anderson and al., (1999), the scholar identified that study investors' current risk compensation is influenced by the last period's residual errors. Furthermore, (Cotter and Hanly, 2010; Li, 2007) found and stated that investors' degree of risk aversion keeps varying as per the time. Lastly, researchers believe that investors' risk preference is time-varying with the influence of the states of gain and loss, the value of return, and some other factors, such as last period's risk preference and last period's residual errors.

One of the most important problems in economics is time and risk preferences, moreover the questions of the degree to which time and risk preference always are subject to change and are considered as the essential problem in economics. Some of the previous evidence collected by the scholars stated that the malleability of such preferences differs. In fact, the standard view presents that one's preferences are essentially permanent having a minor possible impact on the circumstances and life events. Nevertheless, most people change their mindset and their willingness to work after a certain period of time. It is considered as the conceptual plausible taken by the people to update their time and risk preferences. As they gather more knowledge and experience or information about the world, some people develop their expertise and become Master of it. Whereas, on another hand side, some investors will neglect and change their style. From the theoretical expectations received with the help of the empirical paper drafted by Jaeger and al., (2010); Dustmann and al., (2015). They stated in their study that the *ceteris paribus* concept, further added an example stating that one would also expect more patients people

to be less likely to choose to migrate, as such kinds of people are more inclined towards further development. By the same token, migration is inherently risky and is expected to be less attractive to people with little tolerance for risk. Most of the scholars, (Goldbach and Schluter, 2018) from the recent research stated the importance of eliciting these preferences by utilizing the incentivized games rather than survey questions in the context of developing countries (Goldbach and Schluter, 2018). Charness and al, (2019) in their study found that there is no significant relationship between measured risk preferences and the actual (financial) behavior of Dutch adults in the LISS panel raising the question of whether one's underlying ("true") preferences can be accurately measured in the laboratory. In fact, the results of the study further recommended that these lab-in-the-field measures do reflect underlying deep preferences in the field. It is seen by the investors that if there is higher uncertainty which incorporates repeated increases shaking (respectively decreases). Then very few investors will invest in such projects. The intention to emigrate for more (respectively less) risk-averse individuals. Further, it is seen that there is a strong relationship between elicited time preferences and the intention to migrate, with more (respectively less) patience meaningless (respectively more) intended emigration. This is at least a sign that measured risk preferences are meaningful in terms of behavior in the field. At the very least, these natural disasters led to clear effects on expressed time and risk preferences, indicating that there is a definite relationship between one's experience in the world and how one feels about patience and risk.

5. ANALYSIS OF PONZI SCHEME INVESTORS

5.1. Understanding the Motivations Behind Ponzi Scheme Investor Behavior

A Ponzi scheme acts as an essential fraud where investment returns are made to existing investors out of money paid by new investors. Here, investors are generally considered based on misleading promises of astronomically high returns or returns higher than what the market (securities/debt market) can offer. The offender pays dividends to the initial investors from the money received from new investors. For all the investors, the process followed by the investor for investing their fund starts from the process of gathering the information, filtering, organizing, examining and making a suitable decision. It is always found that the information collected, or build affects the behaviors of the investors. The process and interpretation of the collected information might vary and that is affected by the investors and simultaneously received. In today's modern world, it is found that with the constant flooding of the new varied information, the power of the human brain is becoming limited and are getting restricted. Most of the scholars have identified from their research that investors tend to pay attention to the information that confirms their beliefs, moreover it can be called confirmation bias.

In addition to this, such kinds of selective thinker investors pay their attention to the input incentives i.e., especially aim for the high returns but by having low risk or having no risk. Schwarz's (2004) conducted the research and it described that if the investors are positively motivated and it is very easy to crack the deal and get the problem solved. Further was added by one of the scholars Koch and Forgas (2012), if the correct and quality information is given to the people then people will surely arouse positive emotions. Were in on the other hand side, scholar Ariely and Norton (2011) argued in their study that if too much information is given to the investors. This will surely create a problem for the decision-making process.

Further, could also lead to poor decision-making because of the paralyzed and weakened psychological process. Similarly, if the information sent by fraudsters caters ideally matched the requirement of the investors, (looking for the great opportunity) then this will surely inspire investors' imagination. According to Tversky and Kahneman (1974), under uncertainty and risky conditions, it is observed that investors often tended

to overestimate the probability of what they want and analyse what is their suitable preference because of imaginative bias.

Most people subconsciously think that they are lucky enough. Most of the time, the information shared by the people indicates that they have immense opportunity to understand and believe what is true in the market. One of the scholars named Kahneman's described in their study that two system model where it was found that system 1 was fast, intuitive, and prone to errors. On the other hand, system 2 showed a slow and deliberate process. For most of the parts, the first system showed the cognitive process. Thus, in such cases, feeling or intuition is replaced by facts and becomes the basis for judgment and decision. On a similar line, one of the scholars Shiller (2000) stated and believed that most of the ideas lead to people's behavior. Thus, these behaviors are built in the forms of storytelling and rationalization, namely moral anchors. Investor preferences derived from fraudster's information might also influence decision-making. Tversky and Kahneman (1981) argued that the resulting framework designed is often used to examine and identify individuals' behaviors.

In addition to this, the structure enables sorting the examining and abating cognitive pressure. Further also helps in reflecting an intuition which shows the consequences should have a causal relationship with behaviours and match the characteristics of hedonic experience. Most of the investors tend to firstly understand the investment process and then further tries to divide the investment into two parts. Good and bad: it is highly noticed that if the investors are looking after good then person will surely have high returns and will even have low risks. In case of bad, a person has low return and also will have high risks. But as compared with the risk-return framework, the above-described relationship between risk and return can be easily described, and moreover, investors in the Ponzi scheme must bear more potential risks. Most of the smart investors who are into this business since a long time and are still participating knew that scam is happening around them.

Lastly, the study conducted by one of the scholars. Huberman (2001) in their study, recommended that these investors believed they had better information and could get away a step before others. However, arbitrage is risky and limited arbitrage is also one of the two pillars of behavioral finance.

5.2.Examining the Ponzi Schemes and Investment Scams

Ponzi schemes and investment scams cannot be considered as the novel. In Malaysia, similar scams are defined as pyramid schemes or “get-rich-quick” schemes. This scheme was further promoted with the help of “Member-Get-Member (MGM)⁵” or “Multi-Level Marketing (MLM)⁶”. However, as investors became (presumably) more sophisticated, the scams also adopted a veneer of sophistication, utilizing the Internet and promoting capital market products. One of the best examples is the Securities Commission happened between June 1, 2007, to June 11, 2007. Moreover, the Securities Commission has received close to 700 inquiries relating to illegal Internet and investment schemes. As a result of rigorous surveillance, various enforcement actions were taken by the capital market regulator, and the later punishable act was brought in the picture, the Securities Commission (2007b). Under Section 210 of the Malaysian Capital Market and Services Act 2007 (CMSA, 2007), it is stated that the Securities Commission has complete authorization to initiate civil action and even to actions on criminal proceedings for a contravention of the securities law, apart from being allowed to take administrative actions. Various enforcement actions have happened associated with the investment scams, where scams mainly involve the Swiss cash scheme, commodities futures of crude palm oil, and the Geneva gold futures scheme. These investment schemes share similar characteristics with Ponzi schemes that were thrust into the international limelight in the notorious Madoff Ponzi scheme and its allegation of regulatory failure (Mohd Sulaiman, 2016).

5.3.Delineating on the Factors that Expose Investors to Ponzi Schemes

Benson and Simpson (2015) conducted the study and argued that investment schemes (like Ponzi schemes and pyramid schemes) pose various opportunity structures. But these structures are found very similar to consumer fraud. Ponzi schemes mainly rely on deceiving the investors through misrepresentations about the scheme and its return potential. Thus, Ponzi schemes can be termed or defined as the mislabelled products with

⁵ Member-Get-Member is a form of marketing based on a strategy aimed at helping the customers/members of an organization by generally offering them certain advantages (discounts, a gift ...) with the aim that they attract new members /clients.

⁶ Multi-level marketing is a method (strategy) adopted by many direct selling companies to motivate their distributors to bring in new distributors who in return receive a percentage of the sales of their recruits.

misleading advertising. Various scholars have drawn the parallels lines between the fraudulent investment schemes/Ponzi schemes and consumer frauds, moreover, these concepts are only found logical during extending the theory of self-control to the prevention of Ponzi schemes.

Holtfreter, Reisig and Pratt (2008) in their study stated steps of gauging the employed self-control theory. Further, explained that if the victims co-operate with the offenders in facilitating the occurrence of consumer fraud. As per scholars, they expressed that people who lack self-control tend to make impulsive decisions in search of instant gratification and this increases the probability of their victimization. Baumeister (2002) supports the above research and states that self-control determines a person's ability to resist impulses. Understanding impulsive behaviour is important as such behaviour may be in contradiction with long-term goals such as saving money. Further, it was expressed that higher self-control is evidenced to be linked to better money management. It is said that if the investors hold a greater degree of self-control, then they can resist the temptation to invest in schemes. These investors are very lucrative on account of offering abnormally high returns as compared to the average return offered by the market).

Schreck (1999) further added the stated for the above understanding on self-control and argued with the statement that vulnerability to crime can be connected with low self-control. As per the scholars, it was observed that vulnerability to crime is a sub-product of low self-control. One of the scholars Schreck further identifies and described the six dimensions to self-control namely future orientation, empathy, tolerance for frustration, diligence, preference for mental activity as compared to physical activity, and risk avoidance. The scholar's observation expressed that Individuals who are deficient in all or any of these dimensions pose low self-control and hence are more susceptible to victimization. Thus, low self-control increases the vulnerability of the targets. Relative to fraudsters, investors are considered at a natural information disadvantage. Under such circumstance's conditions, the collection of information done by the people is mostly with the help of the social networks and due diligence to reduce "Asymmetry Information"⁷ (Nash and Bouchard, 2018).

⁷ Asymmetric information, or information failure, is a situation in which one party in an economic transaction has more information or more knowledge than the other party. (e.g., in some transactions, sellers may take advantage of buyers because there is asymmetric information through which the seller has better knowledge of the good being sold than the buyer).

Further, one of the scholars added that investors who mainly depend upon social relationships always tend to make investment decisions with lower likelihood and this happens due to diligence. It is seen that if there is a greater uncertainty, then it is observed that there would be more risk of relying on social relationships to balance information asymmetry. It is even noticed that social relations are considered as a factor in engendering herd behaviour. Pressman (1998) identified and believed that conducting due diligence can also lead the investors to take into a false sense of security. This happens because the investor is unaware of the forged information.

In addition, Shiller (2000) identified and expressed in their study that the most fundamental characteristic of a human being is the continuous exchange of information. Driven by inner emotions, the conversation is most people's favourite thing. Face-to-face communication plays a vital role and that is considered the most effective way of gathering or spreading information. One of the fastest ways of communication is face-to-face. In the Ponzi scheme, when the previously involved investors did get the promised return, news spreads quickly, more investors will follow, and the scale of the scam will increase rapidly. The herd behaviour makes the Ponzi scheme spread at a high speed and this is the key to reducing the interest burden (to realize the returns of existing investors).

6. CONCLUSION AND RECOMMENDATIONS

6.1. Major Findings

The present study is based on a theoretical framework, therefore the study primarily analysed the findings based on theoretical information and interpreted the results. In conjunction with the main objective of the study the results have been generated. The primary objective of the study is to evaluate the cognitive bias and risk preferences with respect to Ponzi Scheme Investors and analyse the relationship between these two factors in determining the investment decisions of Ponzi Scheme investors. The preceding sections of the study provide thorough information on the various aspects of investment decisions and Ponzi Scheme investors which supports the findings of the study.

The findings of this study revealed that Ponzi Scheme as an investment has transpired to change the shape of the investment landscape over the years. It indicated that despite the Ponzi scheme being a fraudulent investment in which multiple investors lost their money as presented in the mass media, the scheme still continues to grow massively (Sari & Nugraha, 2016). The results also showed that while making financial decisions, factors such as overconfidence, availability, and risk preference play a huge role in enabling investors to process information, and among these four factors, risk preference has a significant influence on investment decision making (Ji, 2019).

The study recognized that the behavior of fraudsters involved in Ponzi schemes has a significant impact on the perspective of information. Fraudsters design and employ such information that prevents investors to accurately evaluate their businesses and manipulate their understanding of the companies or individuals thereby causing information asymmetry. As a result, investors are naturally at an information disadvantage (Ji, 2019). Frauds and scams can also convert from information to belief as once the belief is inflicted on an individual, he/she is unwilling to accept any evidence that contradicts their beliefs. This finding clearly explained why Ponzi schemes occur repeatedly despite repeated scams. Before the collapse of the scam, fraudsters distributed returns regularly which resulted in a representative bias among Ponzi investors as they believed that returns will keep coming. After obtaining substantial gains their risk tolerance increases which leads to reinvestment of the proceeds.

The findings also revealed that Ponzi schemes potentially abuse the confidence of

the investors in the financial market. It showed that trust and affinity, investment awareness and knowledge, educational qualification, and level of insight on Ponzi have a significant impact on the chances of an investor falling victim to scams. However, among these factors, trust and affinity showed the most significant effect on investor victimization (Amoah, 2018).

The study indicated that behavioral and psychological biases have a major impact on the investment decisions of investors. However, these cognitive biases have the potential to create errors in investment decision-making because they are based on abstract factors that might lead to irrational decisions. Since decisions based on cognitive biases are not factual they increase the risk of an investor towards falling victim to Ponzi scams (Baker & Puttonen, 2017).

The present study investigated the motivations behind the behavior of a Ponzi scheme investor with the help of existing literature on the same area and suggested that the reputation of a manager and investment exclusivity also significantly explains the behavior of an investor although investment exclusivity has a very small effect on the motivation of an investor (Murphee, 2019).

In conclusion, the study attempted to explain the role played by cognitive bias and risk preferences in Ponzi scheme, the various concepts of risk preferences in Ponzi scheme, the motivations behind Ponzi scheme investors' behavior, the different Ponzi schemes and investment scams, and the different factors that expose investors to Ponzi scams.

6.2.Summary of the key findings

The key findings of the study provide a detailed understanding of the extensive information gathered from existing literature on a similar area. It suggested that among the various factors that play a huge role in enabling investors to process information, the risk preference factor significantly affects investment decision-making. Information asymmetry has been stated as one such factor that prevents Ponzi investors from properly evaluating their investment decisions. Moreover, the reasons for the repeated occurrence of Ponzi investments despite their fraudulent activities have also been mentioned. The significant effect of the trust and affinity variables on investor victimization has also been

elaborated. The influence of cognitive biases in causing errors in investment decision-making of Ponzi investors has been identified. Furthermore, the influence of the reputation of managers and investor exclusivity on the motivation of investor behavior has been enumerated.

6.3.Recommendations

The results of this study on the cognitive bias and risk preference analysis of Ponzi investors are equivocal and subject to future research. The study provided a comprehensive theoretical narrative on the several aspects of the Ponzi scheme, however, future research in a similar area is required in order to provide more precise explanation of the respondents and their characteristics with measurable data and account for such variances that may exist in structured cognitive biases, considering particularly economic and cultural influences.

Although the present study considers the motivations of Ponzi investors towards making such investments, only a few motivation variables have been included in the study. Therefore future research could broadly consider the more motivation variables of Ponzi investors for investing in such schemes. In addition to that, more variables could also be added to the present model in the context of Ponzi victimization predictors and an examination of the relationship that exists among those variables could also be conducted. Further, an investigation on the influence of competition in the financial industry on the Ponzi schemes could be performed (Amoah, 2018).

Further research could also be conducted on the issue of Ponzi schemes and pyramid schemes in different sectors. This would predominantly include the variation and rise of such schemes particularly due to advancement in technologies and changes in the manner in which Ponzi schemes are operated at both domestic and international levels. Apart from that, the research could also emphasize the introduction of multiple revenue models through digital marketing as some of the investment schemes still continue to develop from such companies which initially started as digital marketing companies (Omany, 2017).

Furthermore, Ponzi schemes should be integrated into the financial systems of the respective countries so as to embed them to the regulatory environment of the country

thereby minimizing the future consequences of failure and scams of the schemes (Obamuyi et al. 2018). It is evident from the study that a comprehensive analysis of how this fraudulent investment scheme could be disrupted with the help of regulation and policy implementation will be of great significance to policymakers (Moore et al. 2012).

6.4.Limitations

The present study had the following limitations:

- i. The study predominantly focuses on the High Yield Investment Program (HYIP) Ponzi scheme. Whereas, there are a number of Ponzi schemes that result in financial fraud in the financial markets which need to be addressed.
- ii. The findings of the study are based on a qualitative analysis of the theoretical information. Incorporating measurable data and conducting a quantitative analysis of the information would provide a clearer picture and in-depth understanding of the research topic.
- iii. The study has not mentioned the area of data collection, therefore, the data would be spread across the different opinions.
- iv. The study has only mentioned and considered the Ponzi scheme investor but has failed to collect information regarding the normal investors, as this will give a clear picture of the Ponzi investors and of the normal investor.

6.5.Contribution to the Study

For many years, the Ponzi scheme or HYIP (High-yield investment program) has made continuous growth in the industry. Most of the time, it is seen that such kind of investment usually promises a great return. One of the amazing facts for knowing is that many investors have to lose their money as publicized in the mass media, as this case is still continuing in the court. Under the study of behavioral finance, it is very important to understand the role of cognitive behavior. Therefore, the present study has covered detailed information about the Ponzi scheme. Further, have contributed by stating their details of which factors impact human behavior. Moreover, it is found that cognitive psychology plays a potential role in the field of finance. As it is identified that, this approach offers a better explanation for all the relevant factors which actually influence

the investment decisions of the Ponzi scheme as compared to the neoclassical economic approach.

Risk preference can be defined as the attitude of people who mainly have the ability to hold their majority of risks. This is identified as the key factor in studies on investors' decision-making behavior. The standard financial theory assumes that investors are rational and believe that making investment decisions they tend to have invariant risk preferences risk-averse. However, from the research, it can be considered that people gradually find that the investors' decision-making behavior in real life does not always comply with the assumption of rationality. Therefore, the present has majorly covered the information of the risk preference and how that differs from one person to another person. One of the most important problems in economics is time and risk preferences, moreover the questions of the degree to which time and risk preference always are subject to change and are considered as the essential problem in economics. Thus, the study has even focused on the time and how risk changes according to the time. Further, the study has covered the behavior of the investor.

Furthermore, it was added by one of the scholars, if the correct and quality information is given to the people then people will surely arouse positive emotions. Were in on the other hand side, scholars argued in their study that if too much information is given to the investors. This will surely create a problem for the decision-making process. Further, could also lead to poor decision-making because of the paralyzed and weakened psychological process.

Thus, the study has included how people understand the information and how is that affecting the decision-making process. The present study even contributed information about the Ponzi scheme scams happening across the globe. Lastly, the study has even identified the factors that expose the investor to the Ponzi scheme. Various factors are listed in the present study and how are they creating the problem for Ponzi scheme investors.

6.6.Future Research and Concluding Remarks

Based on the findings of the current study, it can be elucidated that there is a long way to go for adhering to understand Cognitive Bias and Risk Preferences Analysis of

Ponzi Scheme Investors. Moreover, the study recommends conducting future research on designing some new applications which will help the Ponzi scheme investors to build their knowledge regarding various schemes. The study also recommends conducting a future research framework for outlining the ways of adopting practices that can help Ponzi scheme investor to reduce their fraudulent act and save their valuable time. Nonetheless, the current study can be replicated by increasing the number of qualitative interviewees to get a greater dig into the course of events.



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