PhD Dissertation

The Role of Heuristic-Driven Biases in Investment Management Activities and Perceived Market Efficiency: Evidence from an Emerging Country

Researcher:

Maqsood Ahmad

73-FMS/PHDFIN/F16

Supervisor:

Prof. Dr. Syed Zulfiqar Ali Shah

Deputy Dean & Chairman Higher Studies and Research, Faculty of Management Sciences,
International Islamic University Islamabad, Pakistan

Department of Business Administration

Faculty of Management Sciences

International Islamic University Islamabad, Pakistan

The Role of Heuristic-Driven Biases in Investment Management Activities and Perceived Market Efficiency: Evidence from an Emerging Country

By

Maqsood Ahmad

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Marketing management
Social marketing
Product management - marketing

In the name of Allah, the most merciful and beneficent

DEDICATION

Dedicated to Holy Prophet (Peace be upon Him), the Greatest Social Reformer. And, to My Praiseworthy Mother (Late), Dearly Loved Father, My Fatherly Figure Brothers Shahid Anjum, and Mumtaz Ahmad for the Many Sacrifices They Made for Me.

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DECLARATION

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Mr. Maqsood Ahmad
PhD Management Sciences (Specialization in Finance)
Faculty of Management Sciences

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Name of Student: Mr. Maqsood Ahmad

Registration No: 73-FMS/PHDFIN/F16

Accepted by the Faculty of Management Sciences INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD, in partial fulfillment of the requirements for the Doctor of Philosophy Degree in Management Sciences with specialization in Finance.

Viva Voce Committee

Prof. Dr. Syed Zulfiqar Ali Shah
(Supervisor)

Prof. Dr. Hassan Raza
(External Examiner)

Dr. Habib Ahmad
(External Examiner)

Dr. Hameeda Akhtar
(Internal Examiner)

Chairman Higher Studies & Research

Dean, FMS

Date: 3rd December 2020

FORWARDING SHEET

The thesis entitled "The role of heuristic-driven biases in investment management activities and perceived market efficiency: Evidence from an emerging country" submitted by ***Mr. Maqsood Ahmad*** *as partial fulfillment of PhD degree in Management Sciences with specialization in* ***Finance****, has completed under my guidance and supervision. The changes advised by the external and the internal examiners hava also been incorporated. I am satisfied with the quality of student's research work and allow her to submit this thesis for further process as per IIU rules and regulations.*

Date:_____ Signature:_____

Name : **Dr. Syed Zulfiqar Ali Shah**

Abstract

Purpose – This study aims to explore and clarify the mechanism by which heuristic-driven biases influence the decisions and performance of institutional and individual investors, actively trading on the Pakistan Stock Exchange (PSX), and the perceived market efficiency, with the mediating role of fundamental and technical anomalies and moderating role of financial literacy.

Design/methodology/approach – The deductive approach was used, as the research is based on the theoretical framework of behavioural finance. A mixed-method approach namely sequential explanatory design was used for answering research questions and testing hypotheses. Data included information from interviews (i.e., qualitative data) and the surveys (i.e., quantitative data). A 5-point Likert scale questionnaire was used for collecting quantitative data in which closed-ended questions were asked of the target population and a semi-structured interview was used for collecting qualitative data in which open-ended questions were asked of the target population. A convenient, purposively sampling technique and snowball method were used for data collection. The collected data were analyzed using SPSS and Amos graphics software. The sample consists of 307 individual investors, 180 institutional investors trading on the PSX, and 5 brokers and/or investment strategists/advisors who are maintaining the accounts of investors or providing investment advice to the investors on the PSX, who were selected on a convenient basis. The hypotheses were tested through the structural equation modelling (SEM) technique and multigroup analysis.

Findings – The article provides further insights into the relationship between heuristic-driven biases and investment management activities and perceived market efficiency. The results suggest that heuristic-driven biases have a markedly negative influence on the perceived market efficiency and investment performance and positively influence the investment decision-making of institutional and individual investors. The results also suggest that fundamental and technical anomalies mediate the relationships between the heuristic-driven biases on the one hand, and the perceived market efficiency and investment management activities on the other. At the same time, financial literacy appears to moderate these relationships in the case of institutional investors but it does not moderate these relationships in the case of individual investors. The results of the study demonstrate that individual and institutional investors equally immune to heuristic-driven biases. To some extent, institutional investors behave differently from individual investors (compared to individual investors, institutional investors are relatively immune to heuristic biases) but that difference is not significant. The findings of this study also show that heuristic-driven biases have a significant positive effect on the short-term and long-term investment decision-making of investors.

Practical implications – The results of the study suggested that investment strategies rely on heuristic-driven biases would not result in better returns to investors Based on the findings, the researcher would like to suggests that investors should not rely on heuristic-driven biases while making decisions related to investment management activities, but conduct a proper

analysis of investment opportunities, develop quantitative investment criteria and establish investment objectives and constraints, base decisions on their financial capability and experience levels instead of making investment decisions by using heuristic factors and sentiments, to make better investment decisions, and move towards appropriate investment opportunities. It provides awareness and understanding of heuristic-driven biases in investment management activities, which could be very useful for finance practitioners (an investor who plays at the stock exchange, a portfolio manager, a financial strategist/advisor in an investment firm, a financial planner, an investment banker, a trader/ broker at the stock exchange, or a financial analyst as well as all those persons who manage corporate entities and are responsible for making its financial decisions) in decision making and to understand normal behaviours, from which justify their reactions for better returns. This study helps investors to select better investment tools and avoid repeating the expensive errors which occur due to heuristic-driven biases. They can improve their performance by recognizing their biases and errors of judgment, to which we are all prone, resulting in better investment decisions and a more efficient market. The study also highlights the importance of relying on professional knowledge, giving it greater weight than feelings and biases. Security organizations may also use this information for a better understanding of investors to forecast more accurately and give better recommendations. Thus, the stock price will reflect its fundamental value and the Pakistan stock market becomes the yardstick of the economy's wealth and help enterprises to raise capital for production and expansion.

Originality/value – As the gaps analysis suggesting that heuristics and their effect on investment management and market efficiency are highly demanded area, needed to be explored in the field of behavioural finance. This study provides a practical framework to explore and clarify the mechanism by which heuristic-driven biases influence investment management activities and market efficiency. The current study is the first to focus on links between heuristic-driven biases, anomalies, financial literacy, investment decisions, and performance, and market efficiency. it will provide insights regarding heuristic biases affecting investment management activities and the perceived market efficiency. This dissertation enhanced the understanding of the role that heuristic-driven biases play in investment management activities and more importantly, it went some way towards enhancing understanding of behavioural aspects and their influence on the investment decision-making and performance of investors in an emerging market. It also adds to the literature in the area of behavioural finance specifically the role of herding behaviour in investment management activities; this field is in its initial stage, even in developed countries, while, in developing countries, little work has been done. It is probably one of the pioneering efforts in Pakistan regarding the Pakistan Stock Exchange. As such it contributed to the body of literature on behavioural finance for this part of the globe.

Keywords - Financial literacy, Behavioural finance, Cognitive heuristics, Recognition-based heuristics, Fundamental and technical anomalies, Market efficiency, Investment decisions and performance.

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List of Abbreviation

SPSS	Statistical Package for the Social Sciences
PME	Perceived Market Efficiency
EMH	Efficient Market Hypothesis
PSX	Pakistan Stock Exchange
IDM	Investment Decision Making
IP	Investment Performance
FA	Fundamental Anomalies
TA	Technical Anomalies
CHDB	Cognitive Heuristic-Driven Biases
RBHDB	Recognition Based Heuristic-Driven Biases
LF	Financial Literacy
STIDM	Short-term Investment Decision Making
LTIDM	Long-term investment decision-making
CMB	Common Method Bias
CFA	Confirmatory Factor Analysis
AVE	Average Variance Extracted
CR	Composite Reliability

Heuristics	Heuristics is referred to as "rules of thumb" or mental shortcuts, which finance practitioners (both individual and group level) used in complex and uncertain situations to make decision simple and efficient.
Recognition-Based Heuristics	It is defined as "If one of two objects is recognized and the other is not, then infer that the recognized object has the higher value" **OR** When one alternative is recognized and the other is not, it selects the recognized one; such a phenomenon is known as recognition heuristic

Recognition-based Heuristic-Driven Biases

1. Names Fluency	Names fluency is a heuristic in which judgments is based only on fluency cue: "when both alternatives are recognized but one is recognized faster, it selects the one that is recognized faster".
2. Alphabetical Order	Investors prefer trading in company stocks commencement with the letters that appear early in the alphabet more than stocks commencement with later letters of the alphabet such a phenomenon is known as alphabeticity bias.
3. Names Memorability	When investors may simply limit stock choices to firms they remember such type of behavior is the reflection of names memorability bias.
Cognitive Heuristics	Cognitive heuristics generally refer to the influences of various cognitive shortcut strategies in decision-making due to limited cognitive ability.

Cognitive Heuristic-Driven Biases

1.Herding	Herding occurs when a group of investors trade on the same side of the market in the same securities over the same period of time or when investors ignore their own private information and act as other investors do.
2. Disposition Effect	The tendency of investors to hold the losing investments too

	long and to sell the winning investments too early for maximizing the returns while delaying the losses.
3. Overconfidence	When people overestimate their knowledge and skills, it is a reflection of overconfidence, Too many people overvalue what they are not and undervalue what they are"; such people suffer from overconfidence bias.
4. Availability	A mental shortcut, that occurs when people rely too much on easily available information in their judgments or forecasting.
5. Anchoring and Adjustment	Anchoring occurs when individuals make estimates by referring to an initial value. In investment application, investors' forecasts of future value may be affected by reference to some benchmark. Anchoring tells us about human beings' tendency to rely excessively on the first piece of information provided (the "anchor") when making decisions.
6. Representativeness	A mental shortcut that involves decisions being made according to mental stereotypes. Representativeness is defined as the degree of similarity that an event has with its parent population. Representativeness suggests that the already existing information regulates how to process the new information. People tend to classify new information on the base of past experiences. If new information matches the existing information then individual believes become stronger and he decides without further evaluation, actually such individual suffering in representativeness.
Anomalies	Deviation from the normal situation. When the actual result is different from the expected result under a given set of assumptions this phenomena is known as anomalous. There are three main types of market anomalies that effect efficient market hypothesis: fundamental anomalies, technical anomalies, and calendar anomalies.
Technical Anomalies	Irregularities that emerge when stock prices are anticipated on the basis of technical analysis.
Fundamental Anomalies	Irregularities that emerge when stock prices are anticipated on

	the basis of fundamental analysis. Investors consistently overestimate or underestimate the prospects of growth companies which lead to irregularities
Market Efficiency	Market efficiency means the price of securities holds with fair value, even if some investors make errors due to biases. In efficient markets, investors are regarded as rational, unbiased, and consistent actors, who make optimal investment decisions, without being affected by their psyches or emotions.
Financial Literacy	Financial literacy is "the ability to make informed judgments and take effective decisions regarding the use and management of money" Financial literacy covers basic knowledge regarding financial instruments namely savings, budgeting, investments and risk management. According to Huston (2010), financial literacy has two main dimensions: one is understanding or knowledge of personal finance and the second is using it.

Chapter One

INTRODUCTION

1.1 Introduction

This chapter aims to introduce the topic as well as high lighting its importance. Chapter one is very important for a dissertation or a thesis, as it summarizes the whole dissertation. Firstly, the background to the problem is presented. Secondly, the problem statement is discussed. After that research question, objectives, and the study's rationale are discussed and then gaps in the literature are identified; hence the research questions and research objectives are focused on an identified gap in prior studies or an addition to current knowledge. Subsequently, the study's significance is highlighted. This can be divided into two parts: one is a general significance and the second is specific significance. In the general significance, the author discusses this specific study's has importance concerning the area of specialization, and the specific significance can be further divided into four parts: the theoretical contribution, the methodological contribution, the practical contribution and, finally, the contextual contribution.

In the theoretical contribution, the author discusses the study's theoretical contribution to the existing body of literature on the behavioral finance paradigm. In the methodological contribution, the author discusses how it contributes methodologically. In the contextual contribution, the author discusses this specific study's importance with respect to the context of Pakistan and in the practical contribution discusses how this specific study will benefit investors and forthcoming researchers. After that, theories supporting the study are discussed. Finally, the organization of the study is presented.

1.2 Problem Background

Individuals make distinctive choices in their lives, some choices are substantial and others are of little consequence. Some decisions are simple and others are complicated and require a multi-step decision-making process. Human beings are referred to as making decisions on the basis of their experience and intuition, instead of gathering information, which would encourage them to make better decisions. Theories of finance have been developed on the assumption that investors in financial markets are rational, take part in frictionless markets and always make rational decisions. In the financial literature, there are important conventional theories, such as the efficient market hypothesis (EMH; Fama, 1970) and the modern portfolio theory (Markowitz, 1952), which hold that individual investors are rational as well as risk averse and prefer a low risk to a high risk at a given level of return. The capital asset pricing model explains market trends and the behavior of individual investors, and large numbers of studies support these theories. Thus, traditional financial theories assume that individual investors are rational beings.

The studies in the field of standard finance show that investors want to make their investment decisions rationally (Kubilay & Bayrakdaroglu, 2016) and use different models and theories of standard finance to estimate the risks and expected returns when making investment decisions (Arora & Kumari 2015). But, in reality, investors display irrational behavior in the market place: they trade excessively, purchase stock without looking at the fundamental value, buy stocks which their friends are buying, base their decisions on past performance and retain loss-making stocks while selling winning stocks (Shah et al., 2018). Investors often simplify their decision-making processes by using behavioral heuristics that might

cause systematic errors in judgment and lead to satisfactory investment choices, but not maximize utility (Kahneman and Tversky, 1979).

Recent work in behavioral finance has revealed several behavioral biases that influence investors' decisions (Itzkowitz & Itzkowitz 2017). According to behavioral finance researchers, every individual has unavoidable behavioral biases that prevent them making rational decisions, and have very bad consequences on investment decisions and performance of investors (Ahmad, & Shah 2020), as well as on market efficiency (Shah et al., 2018). Bakar and Yi (2016) found that psychological factors have a significant impact on the decision-making of investors in stock markets. According to Baker and Nofsinger (2010), "cognitive errors", "fundamental heuristics" and "psychological biases" affect the investment decision-making process. Mental biases are alluded to as convictions and inclinations (Pompain, 2006); they collectively influence the individual to adopt a particular method of activity (Sahi et al., 2013) and, in addition, intuitive reasoning and judgment clearly guide investment-related decisions (Bondt et al., 2013).

Cohen and Kudryavtsev (2012) showed that investors' decisions are influenced by their knowledge, historical performance, past experiences, and expectations. Individual investors tend to show behavioral biases while trading and, due to these biases, they make trading mistakes (Chen et al., 2007) and then, due to these trading mistakes and/or incorrect investment decisions anomalies exist in the market, as a result, the market may overreact or underreact; in both situations, the market becomes inefficient. Stock prices decrease dramatically, as a consequence of funds or capital moving from the stock market into the real estate market, and cause the withdrawal of a large number of investors, as a reflection of the effect of behavioral factors on investors' decisions and reactions (Ngoc, 2014). According to

Zaidi and Tauni (2012), investors' psychology strongly impacts their decision-making and causes them to behave irrationally.

Much of this research is based upon the idea that humans are "boundedly rational" (Simon 1956). Simply said, human beings' information processing capacity is limited, making economically rational behavior impossible. One way we deal with this limited processing capacity is through the use of heuristics, or shortcuts, that simplify decisions but sacrifice information use (Tversky & Kahneman 1973). Heuristics can cause systematic errors in judgement and lead to satisfactory investment choices, but do not maximize utility. Investors often utilize heuristics, causing several behavioral biases, when trading in the stock market, leading investors to make sub-optimal decisions (Itzkowitz & Itzkowitz 2017). The literature highlights that behavioral biases are the main reason for irrationality in decision-making and poor investment performance (Shefrin 2007).

Standard financial theory neglects these biases and assumes that people in finance are rational actors who always choose the best option (Pompian, 2006). According to Fama (1970) and other believers in the fundamental theories of standard finance hold that markets are almost always efficient. Market efficiency means the price of securities dominating the financial market reflects all available information (Fuentes, 2011). In efficient markets, investors are regarded as rational, unbiased, and consistent actors, who make the best investment decisions, without being affected by their psyches or emotions (Hayat, et al., 2006). The implication of "efficient market hypothesis" is that no investment strategy can consistently beat the market and get a superior return over a long period.

Several studies have demonstrated that, in reality, markets are inefficient because of bounded rationality, cognitive and emotional weakness, fundamental heuristics, intuitive reasoning and limited information, as well as anomalies which persist in the market and produce inefficiency (Ajmal et al., 2011). Financial specialists make common errors because of behavioral biases (Baker and Nofsinger, 2002), which significantly affect the market price (Maheran and Muhammad, 2009) and, as a result, markets become inefficient. Due to heuristic biases, errors occur and the price of securities deviates from their fundamental value (Shefrin, 2006), thus causing markets to become inefficient. In recent years, the behavioral approach has also emerged, stating that financial markets are made up of individuals who can make irrational decisions, leading to inefficiencies in financial markets (Akerlof and Shiller, 2010).

Therefore, exploring the mechanism of how heuristic biases affect market efficiency, investment decisions and performance, recognizing the complex decision-making process of choosing investments, can play an important role in enhancing the ability to make better decisions, in reducing faults in decision-making and, furthermore, enhancing the performance of investors (Yaowen, Suqing & Tian 2015) and leading the market to become efficient.

1.3 Problem Statement

The literature highlights the lack of research regarding investment heuristics and their effect on investment management and market efficiency in the context of an emerging countries. "Investment decision" and "market efficiency" are still muddled ideas – all the debate on their various aspects has not yet produced objective rules or theories (Ahmad & Shah, 2020).

There is a positive connection between the stock market and the economy; the decline of the stock market will negatively affect the development of the economy and vice versa (Shah et al., 2018). So, the decisions of individual and institutional investors on the stock market have a great influence on the market trend, which then affects the economy (Phuoc et al., 2011). According to standard finance theory, investors behave rationally and markets are efficient (Fama, 1970), but, in reality, investors make irrational investment decisions and so, markets are inefficient (Shah, Ahmad, & Mahmood, 2018). To understand this and to provide an explanation for investors' decisions and market behavior, it is important to discover which behavioral factors influence the decisions of individual and institutional investors at the PSX and how these factors affect their investment performance and the efficiency of the market.

Many factors affect the decisions of individual and institutional investors and their investment performance, such as limited information, cognitive and emotional weakness, fundamental heuristics, bounded rationality, intuitive reasoning, and anomalies. The issue is how these behavioral issues affect market efficiency, investors' decisions and their investment performance. The focus of the study will be on behavioral biases, specifically the study will explore how heuristic-driven biases affect perceived market efficiency, Pakistani investors' decisions, and their investment performance by taking fundamental and technical anomalies as mediators and financial literacy as moderators.

It is helpful for finance practitioners (such as an investor who trades on the stock exchange, a portfolio manager, a financial strategist/advisor in an investment firm, a financial planner, an investment banker, a trader/ broker at the stock exchange, or a financial analyst, as well as all those who manage corporate entities and are responsible for making financial decisions) to understand normal behavior, from which they justify their reactions for better returns.

Security organizations may also use this information to provide more accurate forecasts and improved recommendations.

1.4 Research Questions

Theis study thus plans to seek answers of the following questions.

Research Question 1: Are the heuristic-driven biases influencing investment management activities (investment decision-making and investment performance) of individual and intuitional investors at the PSX and their perceptions related to market efficiency?

Research Question 2: At which level (if any) do heuristic-driven biases influence the investment management activities of individual and institutional investors at the PSX and perceived market efficiency?

Research Question 3: Do the heuristic-driven biases affect investment decisions in both the short and long-run?

Research Question 4: Do fundamental and technical anomalies mediate the relationship between heuristic-driven biases and investment management activities (investment decision-making and investment performance), and between heuristic-driven biases and perceived market efficiency?

Research Question 5: Does financial literacy moderate the relationship between heuristic-driven biases and investment management activities and between heuristic-driven and perceived market efficiency?

Research Question 6: Do heuristic-driven biases affect individual and institutional investors equally?

Research Question 7: Do heuristic-driven biases lead to investors behave irrationally?

Research Question 8: What are the factors causing an increased use of heuristic variables by individual and institutional investors?

Research Question 9: How can the negative effect of heuristic-driven biases be overcome so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic factors?

1.5 Research Objectives

The study thus focuses on achieving the following objectives.

Research Objective 1: To find out the heuristic-driven biases influencing investment management activities of individual and intuitional investors at the PSX and their perceptions related to market efficiency.

Research Objective 2: Identifying the impact levels of heuristic-driven biases on the investment management activities of individual and institutional investors at the PSX and perceived market efficiency.

Research Objective 3: Comparing which type of investors, individual or institutional, are less affected by heuristic-driven biases and vice versa.

Research Objective 4: Identifying the impact levels of the heuristic-driven biases in short-term and long-term investment decisions.

Research Objective 5: To empirically investigate the mediating effect of fundamental anomalies and technical anomalies on the relationship between heuristic-driven biases and investment management activities (investment decision-making and investment performance) and on the relationship between heuristic-driven biases and perceived market efficiency.

Research Objective 6: To empirically investigate the moderating effect of financial literacy on the relationship between heuristic-driven biases and investment management activities and on the relationship between heuristic-driven biases and perceived market efficiency.

Research Objective 7: Exploring the heuristic-driven biases which could lead investors to behave irrationally.

Research Objective 8: Exploring the factors causing increased use of heuristic variables by individual and institutional investors.

Research Objective 9: Giving recommendations for individual and institutional investors to overcome the negative effect of heuristic-driven biases and adjust their behavior, so that they can improve investment results.

Research objective 10: Setting the background for further research in behavioral finance.

1.6 Rationale of the Study

The basic motivation behind this current study is to discuss new perspectives on financial markets and institutions and to provide an extensive perspective of the psychological

fundamentals and their application to finance. In the financial literature, there are important conventional finance theories such as "Modern Portfolio Theory" (Markowitz, 1952), CAPM Model and APT Model, which hold that investors are rational and independent and, consequently, it is extremely hard to get an alpha return from the market, for example, the efficient market hypothesis (Fama, 1970). The implication of an "efficient market hypothesis" is that no one can constantly beat the market and get a superior return over a long period of time. However, there are a large number of investment funds generating a large extent of alphas (Yuen, 2012). If the CAPM Model, APT Model, and modern portfolio theory are valid, then why do investors display irrational behaviors in the market-place? If the financial market is efficient enough to eradicate all alphas within the stock market, then what is the reason there are so many investors in the market generating a superior return?

Investment is based on forecasting, pervious performance, market timing, and so on. Kumari (2015) said that, from a very long duration, investors entrusted various models and theories of standard finance to estimate risk and expected returns while making investment or financial decisions. However, today's departure from rational decision making has been noticed in almost every aspect of financial activity with the market's inefficiency, which motivates the author to explore the reasons for such types of behavior.

Behavioral finance is becoming an important part of the decision-making process, because it strongly influences the performance of finance practitioners, whose performance can be improved if they recognize the behavioral biases and judgmental errors to which we are all prone. It gives an easy response to the ambiguity of why only a small number of investors can track the exact deviation of the prices from their fair value (Zahera & Bansal, 2018). Thus, understanding behavioral finance will help finance practitioners select better

investment tools and avoid repeating expensive errors in the future. All these factors motivated the investigator to conduct this current study. Thus it is necessary to understand finance practitioners' behavioral patterns, in order to improve their financial stability and that of the Pakistani economy.

1.7 Gaps Analysis

The author has evaluated the published research into individual and institutional investors, focusing on the behavioral finance paradigm in recognized journals, in order to discover where the substantial gaps are. A limited review of prior studies, regarding behavioral finance and the significant gaps, is provided below.

- Early research by **Oprean (2014)** studies the irrational and rational behaviour of investors in the financial markets. The investigation recognizes the existence of confidence, optimism, pessimism, and the rationale of Romanian and Brazilian investors. The results of the study confirm that investors behave irrationally in stock markets. **He suggested further studies should explore more factors which could lead investors to behave irrationally and how these irrational behaviours exist in different economic circumstances in various countries.**
- A study by **Kumar and Goyal (2015)** systematically reviewed quantitative investigations into investment decisions from around three-and-a-half decades prior to 2015 in order to find areas for future research in behavioural finance. **Based on the existing literature, they recommended further studies concentrating on the following:**

1. Further studies can be performed focusing on emerging stock markets, as there is limited research in developing economies in this field.

2. Further studies should use primary data-based empirical research to investigate investors' behavior while making investment decisions, as the vast majority of the studies have used secondary data-based empirical research which does not depict the actual behavior of individual and institutional investors.

3. Further studies can be performed to investigate herding in investment decision making, as there is a lack of empirical research on people who display herd behavior.

4. Further research can be directed by comparing different types of investors, such as individual and institutional (investment advisors, pension funds, mutual funds, hedge funds, etc.) investors, to discover how their behaviors differ and the impact of behavioral biases in their financial decisions.

- **Kumar and Goyal (2016)** investigates the influence of behavioral factors on the rational decision making of investors in the financial markets. The study recognizes that Indian investors are susceptible to the disposition effect and overconfidence. The results of the study confirm that rational decision making has a statistically significant association with psychological fundamentals, i.e. behavioral biases. The results of the study indicate that rational decision-making is a time-varying phenomenon. Investors start by following a rational decision-making process. However, psychological factors emerge at different times when decisions are being made, causing investors to behave irrationally. **They suggested further studies can be performed by considering more psychological**

biases in various economic conditions and interrelationships between various behavioral biases could also be investigated.

- **Jaiyeoba and Haron (2016)** studied the investment behavior of retail investors in Malaysia, using a qualitative research method. They showed that retail investors' decisions depend on feelings of comfort or convention, rather than quantitative analysis. **They recommended further research using a mixed-methods approach to study investors' behavior when they make decisions.**

- **Kumari and Sar (2017)** studied the impact of herd behavior bias, overconfidence biases, and risk tolerance bias on the performance of Indian investors. Results with a sample of 106 investors show that herd behavior bias, overconfidence biases, and risk tolerance bias affects investment performance. **The further research can be conducted, including additional biases to learn their effect on investment performance.**

- **Itzkowitz and Itzkowitz (2017)** studied the behavior of individual and institutional investors to discover the differences in their behavior and the impact of behavioral biases on their financial decisions. The results of their study indicate investors use name-based heuristics, i.e. name memorability, alphabetical ordering, and name fluency, when trading stocks, resulting in irrational decisions. The research also reveals that institutional investors are relatively immune to name-based biases as compared to individual investors; the two types of investor process information differently, so name-based heuristics may not have the same impact on all investors. **They suggested further exploration of the use of heuristics by institutional investors to test whether the**

behavioral biases that occur as a result of loss aversions, such as status quo bias, sunk costs, and endowment effects, affect investors to the same low degree.

- **Ahmad, Ibrahim, and Tuyon (2017)** systematically reviewed quantitative research to synthesize the empirical evidence on the effects of psychological factors on institutional investors at work and to find gaps for future research in behavioral finance. The findings of their study reveal that, in behavioral finance research, the theoretical underpinning of the irrational behavior of investors has been neglected. Behavioral heuristics and biases are dynamic and complex. Sympathetic behavioral biases, foundation, causes, and end results require interdisciplinary viewpoints from the fields of biology, psychology, and sociology. **Based on the syntheses of theory and empirical evidence, they recommended further studies be conducted focusing on the following.**

1. To explores the possible effects of cognitive heuristics, i.e. anchoring, availability, confirmation, disposition effect, gambler's fallacy, hot hand fallacy, overconfidence, and representativeness, etc. and effective biases (mood, emotion, and sentiment), on investment decision making and performance.

2. To test whether institutional traits, cultural traits, and individual traits moderate the relationship between cognitive heuristics and investment decision-making.

3. To test whether institutional traits, cultural traits, and individual traits moderate the relationship between affective biases and investment decision-making.

4. Further research can be directed by considering the differences between individual and institutional investors, to identify the heterogeneity of human behaviors.

5. The best approach to understand investors' behavior is to study their financial decisions through controlled experiments, observations, and detailed interviews. The literature is deficient with regards to research about in these perspectives in finance.

- The paper by **ul Abdin, Farooq, Sultana, and Farooq (2017)** seeks to highlight the effect of certain heuristics, i.e. representativeness, availability, overconfidence, and anchoring, on the decisions and performance of individual investors with the mediating role of fundamental anomalies and technical anomalies. The results of the study suggested only fundamental anomalies mediate the relationship between heuristics and investment performance. Psychologically, this all means that heuristics are the cause of fundamental anomalies. Overall results indicate heuristics are the cause of stock market anomalies, resulting in irrational decisions that affect investment performance. **According to them, further research can be carried out:**

    1. By including additional biases, like the illusion of knowledge, illusion of control, conservatism, and gambler fallacy, in the study.

    2. By exploring the effect of heuristics, i.e. representativeness, availability, overconfidence and anchoring, on the investment decisions and performance of institutional investors with the mediating role of fundamental anomalies and technical anomalies and

    3. These factors can be studied by taking moderator variables.

- The latest paper by **Shah et al., (2018)** explores the possible effects of heuristic biases on investment decision making of individual investors and market efficiency. The results of

their study suggest that cognitive heuristics, i.e. overconfidence, representativeness, availability, and anchoring, have a significant negative effect on perceived market efficiency and investment decision-making of individual investors. **They suggested further research can be carried out by including mediator and moderator variables in the study, to better understand the impact of psychological factors on investment-related choices and market efficiency. The studies also further tested to find the impact of heuristics on both short-term and long-term investments.**

- The effect of heuristics, namely availability, and representativeness, on investment decision making with the moderating role of locus of control has been studied **by Rasheed Rafique Zahid and Akhtar (2018).** Their results conclude that both these heuristics cause investors to deviate significantly from rational decision making, while the locus of control has no significant moderating effect. **They recommended the study be further extended by including all relevant heuristics in the model.**

- A qualitative approach was employed by **Jaiyeoba, Adewale, Haron, and Ismail (2018)** to understand behavioral biases and their influence on the investment decisions of individual and institutional investors trading at the Malaysian stock exchange. And also to identify how to mitigate the effect of emotion, behavioral biases, sentiments and challenges faced by investors while making decisions. The results revealed that Malaysian individual and institutional investors suffer from psychological biases. Furthermore, the findings exhibited that individual investors are likely to be more influenced by the emotions and psychological biases than institutional investors. They also highlighted that institutional investors can mitigate the impact of psychological biases and emotions by maintaining self-discipline, talking about investment intentions in

meetings of the board of trustees, following guiding principles of investment, before investing or putting resources in a company to seek information relevant to the company to know their business activities and receive investment advice from the investment team and occasionally from other portfolio managers. Moreover, individual investors can minimize the influence of emotions and psychological biases by reading newspapers, magazines, seeking investment advice from financial strategist/advisor's reports, family members, friends, traders in the stock market, online forums, and online search. **They recommended further studies used a mixed-methods approach to clearly understand this phenomenon.**

- **Chaudary (2019)** explored the effect of the "salience heuristic" on both short-term and long-term investment decisions and determined whether it influences both individual and institutional investors equally. The results demonstrate that the salience heuristic has a significant positive influence on investment decisions, both in the short and long run. Furthermore individual investors suffer more from the salience heuristic than institutional investors, specifically for short-run investment choices. **She suggested further studies could include other heuristic-driven biases that may affect both short- and long-term investment decisions.**

- **Jaiyeoba, Abdullah, & Ibrahim (2020)** studied the investment behavior of Malaysian individuals and institutional investors in an attempt to determine whether behavioral biases influence these groups of investors equally. Their results indicate that institutional and individual investors are equally influenced by psychological biases, i.e. anchoring bias, overconfidence bias, and representativeness heuristic, and differently influenced by herding bias and religious bias. **They suggested that further study can be performed**

to find additional psychological biases and their impact on the decisions of individual and institutional investors, and to illustrate the differential effect of these behavioral biases in their financial behavior.

- The effect of overconfidence on individual investors' decisions and performance, with the mediating role of risk perception and the moderating role of financial literacy, was studied by **Ahmad and Shah (2020).** They conclude that risk perception fully mediates the relationships between overconfidence and investment decisions and performance. At the same time, financial literacy appears to moderate these relationships. The results suggest that overconfidence can impair the quality of investment decisions and performance, while financial literacy and risk perception can improve their quality. **According to them, the research can be extended by including additional biases like alphabetical ordering, name memorability, and name fluence, because only limited research has been carried out on these name-based heuristics among investors. Furthermore, they suggested applying behavioral finance theories to study other behavioral factors, which influence the decisions of individual investors and significantly affect their performance, as mediated by risk perception and moderated by financial literacy. Other mediating variables studied could include fundamental and technical anomalies. A study covering data from three different markets, such as a developed country, a developing country, and a not so developed economy, might also be helpful. Such a comparative study could be a meaningful addition to the literature on behavioral finance.**

- **Ahmad (2020)** explored the mechanism by which the underconfidence heuristic-driven bias influences short-term and long-term investment decisions of individual investors, actively trading on the PSX. The results of this study suggest that the underconfidence bias has a markedly negative influence on both types of decision made by investors in developing markets. **The researcher suggests exploring other heuristic-driven biases that may influence both short-term and long-term investment decisions, also considering fundamental and technical anomalies as a mediator and financial literacy as a moderator variable to clearly understand how psychological factors affect investment-related choices. Indeed, future work should explore whether institutional and individual investors are equally affected by behavioral biases that occur as a result of cognitive heuristics (i.e. herding, availability, representativeness, overconfidence and anchoring, etc.). Furthermore, it may also be helpful if a study was carried out that used a mixed-methods approach to clearly understand heuristic-driven biases and their effect on investment management activities. As well as identifying the factors causing an increased use of heuristics by investors, it could suggest how to overcome the negative effects of heuristic-driven biases and how they might be utilized positively in investment strategies.**

- Recognizing the importance of investment heuristics and their effect in investment management activities, a multinational research firm "Hillcrest asset management" called special issues on a regular basis from 2014 to 2018 on the topic of "The impact investment heuristics can have on rational asset selection and practical approaches to overcoming them" (**More details relating to the calls for paper are shown in**

Appendix 3). This shows the importance and interest of finance practitioners toward exploring how investment heuristics influence investment management activities.

Hence many researchers from the scholarly community, like Kumar and Goyal (2016), Kumari and Sar (2017), Ahmad, Ibrahim, and Tuyon (2017), Itzkowitz and Itzkowitz (2017), ul Abdin, Farooq, Sultana, and Farooq (2017), Shah, Ahmad, and Mahmood (2018), Rasheed, Rafique, Zahid and Akhtar (2018), Ahmad and Shah (2020), Ahmad, (2020), have suggested that it is important to explore heuristic biases which influence perceived market efficiency, investment decisions and performance of investors, and to consider mediating and moderating variables in order to clearly understand how heuristic factors affect investment related choices and market efficiency, particularly in an emerging economy.

Many highly reputable journals like Management Decision, International Journal of Emerging Market, Review of Behavioral Finance, Studies in Economics, sustainability and Finance, Qualitative Research in Financial Markets, etc. call for papers for special issues on behavioral finance, including topics relating to heuristics, anomalies in the financial market, investors' behavior and sentiments and investors' judgment and decision making, etc., as well as the institutional investment management firm "Hillcrest Asset Management" as mentioned above.

Thus, both research scholars from the behavioral finance community and institutional finance practitioners have highlighted that investment heuristics and their effect on investment management activities and market efficiency are very important areas, which need to be explored in the field of behavioral finance. Therefore the current study will fill this gap in the current body of literature on behavioral finance for this part of the globe, which will

contribute to theory and practice by providing a framework that clarifies the mechanism by which heuristic-driven biases influences investment management and perceived market efficiency and to discuss a practical approach to overcoming the negative effects of heuristic factors so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic biases, as well as discussing how heuristic factors can be positively utilized in investment management activities. **Additionally, on the basis of the above-discussed gaps analysis, three main categories of gap, namely theoretical, methodological, and contextual gaps, are identified and discussed below.**

1.7.1 Theoretical Gaps

After reviewing the literature in similar domain, the author concluded that many studies have examined the relationship between cognitive/psychological biases and investment decisions, investment performance, and market efficiency, but there is still a gap to explore the direct relationship between them because limited research has been carried out on heuristic biases used by investors. As Itzkowitz and Itzkowitz (2017) have suggested, further studies are needed to explore investors' use of heuristics. Also, as Ahmad, Ibrahim and Tuyon (2017) reported in their systematic review of the psychological biases of institutional investors in investment management activities, research can be conducted which explores the effect of cognitive heuristics, i.e. anchoring, availability, confirmation, disposition effect, gambler's fallacy, mental accounting, overconfidence, and representativeness, etc., on investment decision-making and investment performance.

Moreover, ul Abdin et al. (2017) studied heuristic factors like overconfidence bias, representativeness bias, availability bias, and anchoring bias affecting the investment

decisions and performance of individual investors. According to them, further studies can be conducted including additional heuristic factors like the illusion of knowledge, illusion of control, conservatism, and gambler fallacy in the research. Hadi (2017) studied the impact of representativeness, availability, and the illusion of control bias on perceived market efficiency. According to him, further studies can be performed to find additional biases and their impact on the investors' decisions and perceived market efficiency. Research by Shah et al., (2018) suggests that it is important to explore heuristics biases that influence the perceived market efficiency and investment decisions of investors, particularly in a developing economy like Pakistan. Another, later, study by Ahmad and Shah (2020) has recommended exploring the impact of heuristics, namely alphabetical ordering, name memorability, and name fluence, on investors' decisions and performance, because limited research has been carried out on these name-based heuristics among investors.

Thus, the first gap in the literature this present study is going to address is a comprehensive theoretical and empirical analysis examining the impact of cognitive and name-based heuristics on investment decision making, investment performance and perceived market efficiency. This study incorporates six components of cognitive heuristics—disposition effect, herding, availability, representativeness, overconfidence, and anchoring—three components of name-based heuristics, namely alphabetical ordering, name memorability, name fluency, and treats them independently to evaluate their differential impact on anomalies, investment decision-making, investment performance and perceived market efficiency. Understanding the distinctions between these components will help investors comprehend their stock selection behavior and make better investment decisions (ul Abdin et al., 2017), which could lead to the market becoming more efficient.

Another reason for choosing these heuristics factors is that the impact of these heuristics is not limited to laymen, but have been shown to affect experienced investors. According to Rasheed et al. (2018), it is not surprising that investors use heuristics in making decisions, but it is curious that experienced investors do not use their knowledge and experience when applying basic statistical principles to making rational decisions, and instead use heuristics to make their decisions. Their mentality is such that they are not willing to acknowledge rational analysis, but use psychological biases, which result in sub-optimal decisions (Moser, 1989).

The empirical literature also suggests new mediators and moderators need to be introduced to understand clearly how heuristic factors affect investment-related choices, investment performance and market efficiency. Contingency theory holds that bivariate relationships are not linear but depend on the level of a third variable (Rosenberg, 1968), such as a moderator variable or a mediator variable, which is why introducing moderators and mediators into bivariate relationships is important. The latest work by Shah, Ahmad, and Mahmood (2018) suggests that it is important to explore heuristic biases which influence the investment decisions of investors, and to consider mediator and moderator variables in order to clearly understand how psychological factors affect investment related choices and market efficiency, particularly in a developing economy like Pakistan. Ul Abdin et al., (2017) argue convincingly that while many studies have examined the direct relationship between heuristic biases, investment decisions and performance, they have paid less consideration to the underlying mechanism through which these relationships and effects flow.

The latest work by Ahmad and Shah (2020) recommends exploring the heuristic biases which influence the decisions of individual investors and have a significant effect on their

performance, as mediated by risk perception, and moderated by financial literacy. They suggest that fundamental and technical anomalies might also be used as mediating variables. Ahmad (2020) also argues convincingly for considering fundamental and technical anomalies as a mediator and financial literacy as a moderator variable to clearly understand how psychological factors affect investment-related choices.

Therefore, the second gap in the literature this present study is going to address is a comprehensive theoretical and empirical analysis examining the mediating role of fundamental and technical anomalies between heuristic biases and investment decision-making, between heuristic biases and investment performance and between heuristic biases and perceived marker efficiency. The mediation analysis is considered in order to understand the complexities of the relationship between heuristic biases, investment decision-making, investment performance, and market efficiency. Farooq et al. (2017) described how, by investigating mediation mechanisms, we can better understand the processes, address the question of causality (Peloza, 2009), and demonstrate the nature of the relationship between heuristics and investment performance (ul Abdin et al., 2017), investment decisions and market efficiency. Understanding those mechanisms also provides the level of detail required by an investor who trades on a stock exchange, a portfolio manager, a financial planner, a financial strategist/advisor in an investment firm, a trader/broker at a stock exchange, an investment banker, or a financial analyst, as well as all those who manage corporate entities and are responsible for making its financial decisions; it enhances the pragmatic applications/implications of research (Peloza, 2009) and enables finance practitioners to better manage their investment activities (ul Abdin et al., 2017).

According to behavioral scientists (e.g., Hirshleifer & Subranmayam, 1998; Brealey et al., 2006; Barber & Odean, 2008), some anomalies persist in the market that may affect finance practitioners' investment decisions and performance and produce market inefficiency. As per Pompain (2006), these anomalies can be divided into three main categories: calendar, fundamental, and technical. Ul Abdin et al. (2017) state that technical and fundamental anomalies mediate the relationships between heuristic biases and investment performance; that is why the study has taken these two anomalies as mediator variables.

When investors use heuristics in making their financial decisions, they reduce the mental effort required (Shah et al., 2018); as a result, anomalies arise in the market which, in turn, affect other investors' decisions and performance lead to market inefficiency. Several studies, however, have demonstrated that in reality markets are inefficient, because of behavioral biases that give rise to anomalies which in turn lead to market inefficiency (Ajmal, Mufti & Shah, 2011), thus further modifying investors' decisions and performance (ul Abdin et al., (2017).

The present study makes a third theoretical contribution to exploring the moderating effect of financial literacy on the relationships between heuristics biases and investment decision making, between heuristics biases and investment performance and between heuristics biases and perceived marker efficiency. Moderation analysis is also considered in order to understand the complexities of the relationship between heuristic biases and investment decisions, investment performance, and market efficiency. Understanding moderation mechanisms enhances practical applications of the research, enabling finance practitioners to improve their investment activities. Several studies have demonstrated the role of financial literacy, known as being financially knowledgeable, on financial behavior

(Dinç, Aydemir, & Aren, 2017). These examinations have discovered the positive effects of financial literacy on a variety of financial behaviors (Aren & Aydemir, 2014). In addition, earlier research focused on its direct impact but limited research has been carried out on the indirect effects. In this present study, the author considers indirect effects, in that financial literacy, as a moderator variable, may change the relationships between heuristic biases and investment decision-making, between heuristic biases and investment performance and between heuristic biases and market efficiency. In this study, we would learn whether and how heuristic factors interact with financial knowledge in influencing investment decision-making, investment performance, and market efficiency.

Most previous studies relating to the behavioral finance paradigm focus on individual investors or institutional investors as a unit of analysis and, therefore, empirical research is necessary to considered both individual and institutional investors as a unit of analysis in order to discover the differences in their behavior and the impact of behavioral biases on their financial decision-making. According to Itzkowitz and Itzkowitz (2017) all investors are not the same; institutional investors have a greater variety of trading experiences and more training than individual investors and, as a result, behavioral biases may not influence all investors equally. Many behavioral finance scholars (e.g., Kumar and Goyal 2015; Ahmad, Ibrahim and Tuyon 2017; and Jaiyeoba, Abdullah, & Ibrahim, 2020) strongly recommended that further research should focus on different types of investor, such as individual and intuitional investors, to identify the heterogeneity and homogeneity of their behavior and to exemplify the differential effect of behavioral biases in their financial behavior. **So, the fourth specific gap this study is going to address is which type of investor (individual or institutional), is less affected by heuristic biases.**

Furthermore, the majority of studies, with one identifiable exception, have just explained the investment decision-making of investors as a whole and have not tested the relationship of heuristics biases on both short-term and long-term investments. It has been noted that heuristics may be quite useful, but can sometimes lead to systematic errors or errors in prediction or estimation (Tversky & Kahneman, 1974). Consequently, empirical research is necessary to understand whether and how heuristic factors are beneficial or harmful to both long-term and short-term investment decision-making. Shah et al. (2018) suggested further, that a study can be performed to find the impact of heuristic biases on both long-term and short-term investments. **Hence the thesis has a fifth theoretical contribution to examining heuristic biases' links to both long-term and short-term investment decisions**. With this study, we would know whether and how heuristics are influencing both short-term and long-term investments.

1.7.2 Methodological Gap

Zahera and Bansal (2018) systematically reviewed studies on investment decisions to identify gaps for future research in behavioral finance. Their investigation found that correlation analysis, chi-square test, regression analysis, t-statistics, analysis of variance (ANOVA), structural equation modeling, simulation, Mann–Whitney U-test, and multiple techniques are the common analysis tools used in this area of study (Kumar & Goyal, 2015). Looking at the rationale behind the studies reviewed by Zahera and Bansal (2018) and Kumar and Goyal (2015), we can conclude that this research has exhibited both theoretical and practical benefits.

However, none of them have employed a mixed methods approach to discover how the influence of behavioral biases is mitigated by investors, despite the growing consensus that a mixed methods approach could lead to a better understanding of how investment decisions are made and the influence of behavioral biases are mitigated. As Jaiyeoba and Haron (2016) recommended, further studies should preferably use a mixed-methods approach in this area of study. Similarly, Ahmad (2020) also recommended further studies use a mixed-methods approach to clearly understand heuristic-driven biases and their effect on investment management activities, as well as to identify the factors causing an increased use of heuristics by investors, how to overcome the negative effects of heuristic-driven biases, and how they can be positively utilized in investment strategies. **Considering this limitation, the present study utilizes mixed methods to investigate investment related choices of Pakistani investors (individuals and institutional) and market efficiency, to better acknowledge and familiarize readers with this area of study, other important aspects of investment decisions, investment performance, and market efficiency.**

1.7.3 Contextual Gap

As the area of behavioral finance is relatively new, the majority of empirical research studies (Kudryavtsev 2018; Barber and Odean, 2001; Barber and Odean, 2000; Odean, 1999; Daniel et al., 1998; Grinblatt et al., 1995 and others) have been carried out in developed economies, especially in the USA, UK, and Europe, to obtain a strong understanding of investors' behavior (Zahera & Bansal, 2018). The reason behind this could be that, in developing nations, markets are emerging which have low growth potential. In the past decade, the scholarly community in emerging markets is making efforts to work in this domain (Nga &

Yien, 2013). According to Kumar and Goyal (2015), after globalization, emerging and developing economies have higher development potential and investors (institutional and individuals) are more prone to invest in the share market, which leaves a wide field for future research. Thus, future research will focus on emerging stock markets, as there is limited research in emerging and developing economies in this field. According to Zahera and Bansal (2018), the economy of developing nations is as yet progressing; there is a lack of studies of investor behavior, the variety of investment patterns, and how behavioral elements impact the pricing.

The latest research by Shah et al. (2018) asserts that "most studies concentrate on individualistic cultures and well-developed financial markets, and very little is known about the profiles, inspirations, and behavior of investors in collectivist cultures and less developed markets". **So this present study helps fill this gap in the literature by considering how investors' behavior is influenced by psychological factors, how investor behavior influences markets, and how markets become inefficient in collectivist societies, particularly in Pakistan, which is considered an emerging country.**

1.8 Significance of the Study

1.8.1 General Significance

The present study contributes to the domain of behavioral finance by exploring the diverse heuristic biases that may affect overall investment decisions, investment performance, and market efficiency. The research is important for the field of behavioral finance because the concept of behavioral finance is new compared to other financial theories. In emerging

markets, behavioral finance is used to discover the factors that impact financial decisions which could lead to markets becoming inefficient. However behavioral finance has a limited number of applications in emerging financial markets. This research is conducted with the hope of ensuring the suitability of using behavioral finance for all kinds of financial market.

It is important to understand the diverse physiological factors that may affect investment decisions, investment performance, and market efficiency. Cognitive and emotional weaknesses affect investment decisions; as a result investors can lose their wealth and markets become inefficient. Understanding such cognitive and emotional weaknesses will permit suitable corrective actions or measures, in order to reduce emotional biases and their effect on investment decisions, possibly leading to improved investment returns (Yasir et al., 2013), as a result of which, eventually, the market will become more efficient (Shah et al., 2018).

1.8.2 Specific Significance

1.8.2.1 Theoretical Contribution

The present study makes a number of theoretical contributions to the behavioral finance paradigm. First, this study extends knowledge of heuristic-driven biases, anomalies, financial literacy, market efficiency, investment decision-making, and performance relationship by elaborating how heuristic-driven biases influence anomalies, perceived market efficiency, investment decision-making and the performance of individual and institutional investors. The thesis also demonstrates whether and how heuristic factors interact with financial knowledge influencing investment decision-making, investment performance, and market efficiency. Based on the result of this research, the researcher has highlighted the points that

will be helpful for finance practitioners. The current study is the first of its kind, focusing on the links between heuristics, anomalies, financial literacy, perceived market efficiency and investment decisions, and performance, which have not tested before in such an underlying mechanism. It is probably one of the pioneering efforts in Pakistan with reference to the less developed financial market. As such, it is a theoretical contribution to the body of literature on behavioral finance for this part of the globe.

This study also extends knowledge as it is the first of its kind to directly compare heuristic use between individual and institutional investors. Thus the study contributes to the field of behavioral finance by showing how individual and institutional investors differ along multiple dimensions. In this context, the author clarifies whether novices and expert investors are equally immune to heuristic biases. This research also contributes to the existing body of literature on behavioral finance by elucidating the mechanism by which heuristics influence both long-term and short-term investments. This research is a pioneering study in this context. With help of a qualitative approach, the researcher also highlights some factors causing an increased use of heuristic variables by individual and institutional investors and discusses practical approaches to overcoming the negative effects of heuristics, so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic biases, which also contributes to the behavioral finance paradigm.

1.8.2.2 Methodological Contribution

The studies in the established literature are found analyzing the relationships in the context of heuristics are evaluated using either quantitative or qualitative approach. No study as yet has applied both in a comprehensive study setting. The current study is pioneer in discussing the

role of heuristic-driven biases in perceived market efficiency and investment management activities through the **mixed-method approach**. Moreover, this study contributes to understanding the role that heuristic-driven biases play in investment management activities and is thus useful to researchers, academicians, and those working in the area of behavioral finance.

1.8.2.3 Practical Contribution

Knowledge of behavioral heuristic biases, causes, and effects can be utilized by speculative investors to formulate investment analysis and fund management strategies to capitalize on the positive effects and to evade negative impacts of psychological heuristic biases. Montier (2002) and Fromlet (2001) have warned investors of the serious consequence if behavioral biases are ignored in investment analysis. Thus the present study provides awareness and understanding of heuristic biases in investment management, which could be very useful for finance practitioners in this part of the world. This study helps investors to select better investment tools and avoid repeating the expensive errors which occur due to heuristic biases. If investors can improve their performance by recognizing their biases and errors of judgment, which all people tend to have, the result will be a more efficient market.

The study also aims to facilitate financial advisors in gaining a better understanding of their customers' psychology and to help them devise behaviorally modified portfolios, which will better suit their customers' inclinations. It will assist investment bankers in understanding market emotions, because these behaviors create public issues for their companies. It will help financial strategists make better forecasts and aid security analysts in formulating efficient stock recommendations.

This study can provide insights for stock market policy-makers and regulators, assisting them in understanding the mechanism and role of behavioral factors in investors' decision-making processes. This study can help them to better understand investors and develop policies that take into account these psychological factors to ensure smooth market movement. According to Spindler (2011), investors' protection is a major concern for policy-makers, along with stronger regulation of capital markets, after the global financial crisis. As Rasheed et al. (2018) showed, investors are considered to be rational but the global financial crisis raises some serious questions about this assumption and reveals a genuine requirement for considering investors' behavioral factors when setting policy.

1.8.2.4 Contextual Contribution

As mentioned above, the field of behavioral finance is a very new area of research, which is why, contextually, this research is unique. Studies conducted in Western countries cannot be generalized to Asian nations and may not apply in the Pakistani context, because of the difference in contextual paradigm (i.e. individualist v/s collectivist). It is important because, in an emerging economy like Pakistan, investors are not fully aware of their behavioral biases, so it is useful for them to become aware of these behavioral biases and their impact on their decision-making processes with regard to their investments.

When investors are aware of the psychological factors that lead to irrational decisions, then they can take corrective action to prevent these factors clouding their decision-making processes, which will be beneficial in reducing decision-making faults, which could lead to the market becoming efficient. In an emerging countries, like Pakistan, market fundamentals are not the same as in well-developed countries and, also, investors' level of thinking differs

from that of investors in developed countries (Shah et al., 2018). These are the reasons why this research is going to contribute contextually. Hofstede (2006) says that "power distance as the culture is the collective programming of the mind which distinguishes the member of one group or category of people from another".

Theoretically, social scientists and psychologists believe that inclinations for psychological biases are nurtured by their respective culture, although its impact may differ (Yates et al., 1997). Hofstede (1980) and Kim & Nofsinger (2008) differentiate among cultures with an individualism and collectivism continuum. Asian countries reflect collectivism, and an investor in collectivistic country suffer from overconfidence that leads to psychological biases in decision making (Luong and Ha 2011).Cultural differences, notably life experience, social values, and education, can influence individual behaviours; thus, it reckoned that inclinations towards psychological biases might vary from culture to culture. Limited literature is available to prove that Asian people often fell prey to behavioural biases than people raised in Western countries (Yates et al., 1997).

1.9 Supporting Theories

A major obstacle in current behavioral finance research is the lack of a unified theory to explain irrational behaviors, causes, and effects. Existing prospect theory and bounded rationality theory are not sufficient to describe the complexity and dynamic nature of human behavior. Therefore, it is important to establish a unified theoretical base (Ahmad, Ibrahim, and Tuyon 2017). In this regard, Ahmad et al. (2017) proposed a conceptual framework, to explore the origins, causes, and effects of fund mangers' psychological biases, which was based on a different theoretical underpinning. Prospect theory, a theory of mind, theory of

bounded rationality, and the ABC model collectively explain their conceptual framework. Similarly, Tuyon and Ahmad (2014) proposed the "theoretical triangulation of the following theories to holistically understand and acknowledge interdisciplinary perspectives from psychology, sociology, and cognitive neuroscience in theorizing and modeling the irrational behavior of investors". Some scholars have highlighted the triangulation of interdisciplinary perspectives as a possible solution to understand human thinking, behavior, and actions (Bednarik, 2013). Consequently, the same is needed in behavioral finance.

1.9.1 Bounded Rationality Theory

The theory of "bounded rationality" was developed by Herbert Simon in 1955. Bounded rationality theory suggests that decision-makers cannot make a rational decision due to the limited information they have, the cognitive limitations of their minds, and the limited time they have for making a decision. Thus, even decision-makers who intend to make optimal decisions are bound to make satisficing (rather than maximizing or optimizing) decisions in complex situations, within their data processing and cognitive limitations. For making satisficing decisions, they often rely on rules of thumb. According to Otuteye and Siddiquee (2015) "heuristics are useful tools for simplifying decision-making in a complex environment due to uncertainty, limited information, and bounded rationality".

1.9.2 Prospect Theory

Prospect theory, which is explained by Kahneman and Tversky (1979), proposes that people make decisions based on their gains and losses rather than final outcomes; they also make reference points and take decisions accordingly. People value gains and losses differently.

This value is calculated from a reference point. In other words, we can say that an alternative theory of choice, in which a different value is allotted to gains and losses rather than final outcomes, in which decision weight is associated with probabilities of that event could be a theme of major biases and heuristics (Kahneman & Tversky, 1979).

So, individuals will decide which outcomes are considered as a reference point. The outcomes that have greater gains are considered as reference point as compared to those outcomes which are less are considered as losses, as displayed in Figure 1.2 below. The value of the reference point can be ascertained on the basis of individual perception (Tversky & Kahneman, 1981). The value function of prospect theory is defined on the basis of reference point, normally concave for gains and convex for losses, steeper for losses than gains, and steepest at the reference point.

In short, prospect theory indicates that individuals are risk averse when they are in the domain of profit or gain. Specifically, it is a tendency of human beings to select options that offer a small but certain profit or gain, as compared to the options that offer a larger but uncertain profit or gain, unless the gain is highly uncertain or only reasonably lower than the right one. On the other hand, individuals are more likely to take risks when they are losing (Pompian, 2006). According to Plous (1993), prospect theory is opposite to utility theory, which expects that the choice in a decision-making process will rely on how the problem is integrated. If the reference point is specified on the basis of an outcome perceived as a gain, the resulting value function is concave and decision makers are in the domain of risk aversion. On the other hand, if the reference point is specified on the basis of an outcome perceived as a loss, then the value function is convex and decision makers are said to be risk seeking.

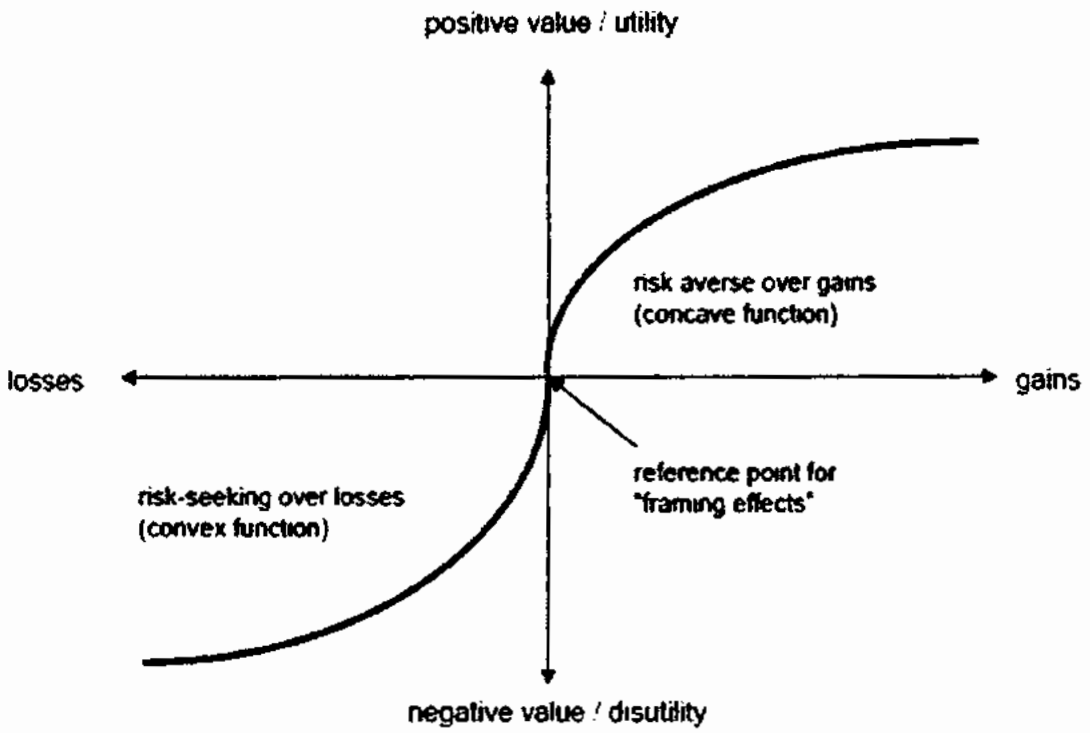

Figure 1.1. Value Function for Financial Gains and Losses (Kahneman & Tversky 1979)

1.9.3 Heuristics Theory

According to heuristics theory, decision makers use heuristics to reduce the risk of losses in uncertain situations. Heuristics are rules of thumb, which decision makers use in complex and uncertain situation in order to make decisions easily (Ritter, 2003), by reducing the complexity of measuring probabilities and forecasting values to simpler judgments (Kahneman & Tversky, 1974). In other words we can say that, it refers to rules of thumb, which human beings use to made decisions in complex and uncertain environments (Brabazon, 2000). Heuristics allow investors or human beings to speed up decision making compared to rationally processing the available information. In general, these heuristics are beneficial and useful, the when time period is limited (Waweru et al., 2008), but sometimes

they lead to biases (Kahneman & Tversky, 1974). According to Shah and Oppenheimer (2008), all heuristics depend on reducing effort by using one or more of the following methods: analyzing only a few clues, integrating less information, analyzing only a few alternatives, etc.

1.10 Theorization

Disposition effect, herding, availability, representativeness, overconfidence, anchoring, alphabetical ordering, name memorability, name fluency are heuristic-driven biases which are used by investors due to bounded rationality, to reduce the risk of loss in uncertain situations. When individual investors use heuristics, they reduce the mental effort in the decision-making process, but that leads to errors in judgment and, as a result, anomalies persist in the market; due to these anomalies, investors make irrational investment decisions, and their investment performance reduces, which could lead to the market becoming inefficient. Financial literacy plays an important role in overcoming the negative effect of heuristics factors. If investors used heuristics with financial literacy, then the negative effects of heuristic factors will reduced; as a result, investors can positively utilize heuristics in their investment management activities. Gigerenzer and Gaissmaier (2011) assert that heuristics can be more accurate than complex techniques despite the fact that they process less information. They also argue convincingly that a heuristic is not bad or good, irrational or rational, but its precision relies upon the structure of the environment. With adequate experience, individuals figure out how to choose legitimate heuristics from their adaptive toolbox.

Many researchers in financial economics argue that these heuristics can effect financial decision-making and forecasting financial variables, namely earnings or material profit (Abarbanell & Bernard, 1992), as well as influencing financial markets' behavior (Debondt and Thaler, 1985). Standard finance does not explain these patterns satisfactorily; they normally hurt the investor's portfolio performance. But behavioral finance provides a satisfactory demonstration and understanding of why investors trade, how they choose their portfolios, how they perform (Subrahmanyam, 2008) and why markets become inefficient.

1.11 Structure of the Study

The thesis consists of six chapters as shown in the Table of Contents. The first chapter introduces the topic as well as highlighting its importance. In the second chapter, the relevant pervious literature is presented and a research model with hypotheses is proposed through existing literature, to be followed during the research. The research methodology and research design are given in the third chapter. In the fourth chapter, the study's empirical findings are reported. The fifth chapter contains the analysis and discussion and the sixth chapter provides a conclusion and recommendation. Finally, at the end reference of study, are the appendices.

Chapter Two

LITERATURE REVIEW

2.1 Introduction

This chapter aims to review the relevant pieces of literature on the current study particularly it surveys the theories and research focused on heuristic-driven biases among individual and institutional investors in "investment management activities" and "perceived market efficiency" in the lenses of "behavioral finance" paradigm. The literature review is significant to really understand the broader issues related to the irrational investment management activities, market inefficiency and the role of heuristic-driven biases in investment management activities and perceived market efficiency. It is not just reporting prior studies but is to criticize and synthesize prior studies and justify how these studies contribute to the current study. Furthermore, the literature was driven by the research questions and objectives, hypotheses and contain some critical analysis of prior studies.

The remaining of this chapter proceeds as follows: Section two is related to "behavioral finance: history and foundations" which consist of nine sub-heading such as what is behavioral finance about? a common misconception, "historical background of behavioral finance", definitions of behavioral finance, types of behavioral finance, what is conventional finance about? conventional finance versus behavioral finance, the significance of behavioral finance, and behavioral finance in Asia. Section three is related to "heuristic-driven biases in investment management activities and market efficiency" which consist of eleven sub-heading namely what is market efficiency about? what are investment decisions about? what is investment performance about? what are heuristics? what are heuristic-driven biases

about? the rationale for heuristics, the use of heuristics in investment strategy, heuristic-driven biases in investment decision-making and investment performance of individual investors, heuristic-driven biases in investment decision-making and investment performance of institutional investors, are individual and institutional investors equally influenced by heuristic-driven biases? and heuristic-driven biases and market efficiency. In the four sections, the researcher discusses anomalies and mediating effects of anomalies. Section five is related to financial literacy and the moderating role of financial literacy. In the six sections, the author discusses the role of heuristic-driven biases in short-term and long-term investment decision-making. In section seventh, based on the gaps analysis, theories and evidence, Figure 2.2 and 2.3 conceptual frameworks are derived to empirically examined the role of heuristic-driven biases in investment management activities and perceived market efficiency with the mediating role of "fundamental and technical anomalies" and moderating role of "financial literacy". The outline for the literature review also displayed in Figure 2.1.

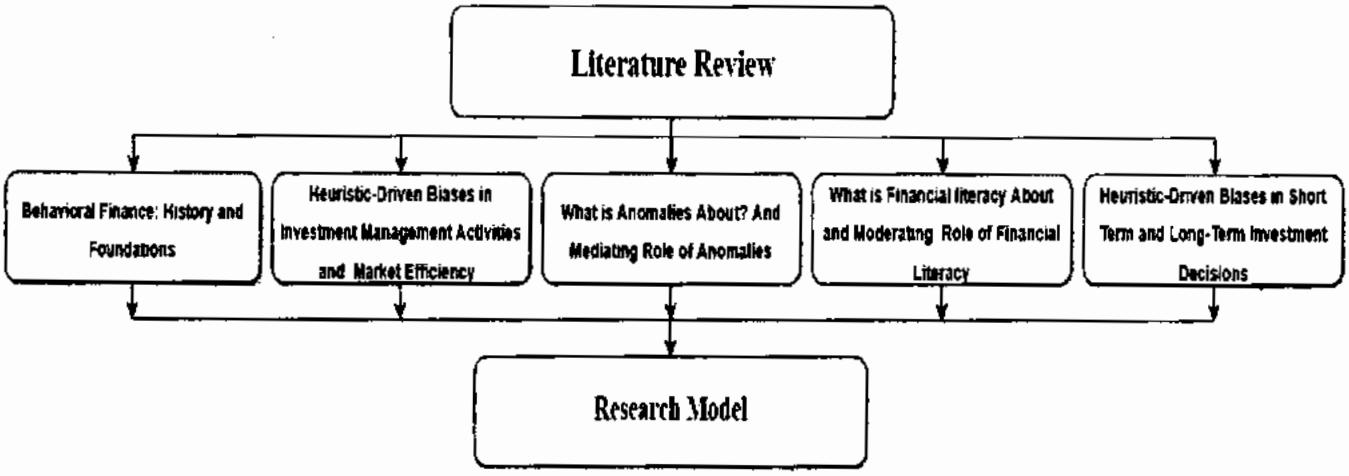

Figure 2.1. The Literature Review Outline

2.2 Behavioral Finance: History and Foundations

This section discusses the main goals of behavioral finance research and the development of the discipline. The prime objective of this section is to highlight the historical background and significance of the rapidly growing field of behavioral finance. A detailed discussion regarding the history and foundation of behavioral finance is presented below.

2.2.1 What is Behavioral Finance About?

A very simple approach to understanding the scope and essence of a subject is to study the composition of the term used to describe it. The term 'Behavioral Finance' has two words: Behavior and Finance. Let us look at the meaning of these words separately. Behavior refers to the range of actions and mannerisms used by individuals (or groups of individuals, like a company) in relation to themselves or their environment, which include the other people or groups as well as physical environment. It depicts the manner in which a person, or a group of people, reacts to a given situation, or generally makes a decision, whether consciously or subconsciously.

A number of factors influence these reactions, for example psychological, cognitive, social and environmental factors. This at least partly explains why different people make different choices under seemingly similar situations. While the word Finance has several technical meanings, in simpler terms it commonly refers to managing the money. This includes raising money for a purpose, investing surplus money and generally regulating the inflow and outflow of money to achieve one's chosen objectives. Now if we put the two words (Behavior and Finance) together, we will arrive at a simplistic yet fairly comprehensive meaning of the term Behavioral Finance. The author will try to formally define the subject

later in this chapter, but for the time being let us look at it in a simplified form. *It is a field of study that helps us understand how persons, or groups of persons, make choices relating to management of their monetary resources, in order to achieve their preferred objectives.*

2.2.2 A Common Misconception

It is commonly believed that people who deal in finance are very sensible people, that is they make their decisions very carefully and *rationally.* If this assumption were correct, all the investors at any given financial market (e.g. stock exchange) would behave in virtually the same way; the market would almost always be perfect and fluctuations in share prices would be minimal, infrequent and dependent only on extraordinary events. However, history has shown us that investors do behave irrationally, almost no financial market is ever perfect and share prices fluctuate disproportionately to any given piece of new information. This paradox can only be explained by accepting the fact that investors do not always make rational decisions individually and as a consequence the financial markets (euphemism for all the investors collectively) are seldom close to perfection. A study of Behavioral Finance can help us understand why different individuals (or groups of individuals) react differently to a situation and how financial markets are affected by the differences in decision-making styles of investors. As we will see later in this chapter, the roots of this influence lie in psychology, sociology and other similar sciences.

2.2.3 Historical Background of Behavioral Finance

Perhaps the first attempt to connect human behavior with investment decisions was made in a book "Psychology of the Stock Market" by Selden in 1912. This was the first book to claim

that movements in share prices are remarkably dependent on the psychological state of mind of the investors. Selden also said that human sentiments have a major influence in the "game of stock market". In 1955 Herbert Simon came out with his models of bounded rationality and 1956 Fessinger presented the concept of cognitive dissonance. A few years later, in 1964, Pratt discussed risk aversion and the utility function. In 1974 Kahneman and Tversky published their paper on "Judgment under uncertainty: heuristics and biases", introducing the concepts of heuristic biases such as anchoring, adjustment, representativeness and availability. While many present day researchers think that Kahneman and Tversky's 1973-74 studies were the informal origin of the behavioral finance as a distinct field of study; it is now widely believed that the formal emergence of behavioral finance was also caused by the same pair in 1979 when they published their landmark paper on "Prospect Theory: A Study of Decision-making under Risk". They criticized the expected utility theory of standard finance as a descriptive model of decision making under risk. Their paper offered critiques to the generally accepted models of the standard finance such as rational choice in decision making and expected utility theory - and provided an alternative model in the form of Prospect Theory. Kahneman earned the Nobel Prize in Economics in 2002, principally because of his work in the psychology of decision making and judgment as well as behavioral economics.

Another major breakthrough in behavioral finance came in 1980 when Richard Thaler wrote his article "Towards a Positive theory of Consumer Choice" in which he endorsed Kahneman and Tversky's Prospect Theory as the basis for an "alternative descriptive theory". Thaler asserted that in well-defined situations consumers act irrationally. This behavior is quite inconsistent with the theories of standard finance. He offered different reasons to explain

why consumers acts irrationally and why this inconsistency occurs, for example endowment effect, sunk cost effect and regret aversion etc. Later Richard Thaler collaborated with Kahneman and Tversky and the three behavioral scientists are today considered as founding fathers of behavioral finance. Richard Thaler was also awarded the Nobel Prize in Economic Sciences for his contributions in the field of behavioral finance in 2017. In 1985, De Bondt and Thaler published another significant research article "Does the Stock Market Overreact?" which provided empirical evidence on irrationality and inconsistency in investors' decisions. The paper tabulated evidence of investors over-reaction on unexpected and dramatic occurrence of certain events at the stock market. The results of this research were inconsistent with the weak form efficiency as propounded by Fama in 1970 in his Efficient Market Hypothesis. A startling discovery of this study was the evidence that losing stocks earned more than the winners' stocks after certain period. This evidence defied the Capital Assets Pricing Theory. Further developments in the field of behavioral finance came in the form of Shefrin and Statman's Behavioral Asset Pricing Theory in 1994, and Barberis, Shleifer and Vishny's "Investor Sentiment Model for Under-reaction and Over-reaction on Stock Prices", published in 1998.

In 1999, Thaler published a paper entitled "Mental Accounting Matters, in which he defined mental accounting as the set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities". In 2000 Shefrin, and Statman, presented a Behavioral Portfolio Theory. In the same year, Andrei Shleifer published his book "Inefficient Market: An Introduction to Behavioral Finance" that firmly established behavioral finance as a separate field of finance, an alternate to the standard finance. In this book he criticized the efficient market hypothesis on the basis of psychological evidences.

Then he explained the behavioral finance aspects and the role of arbitrageurs, investors and noise traders' in the financial decision making. He showed how psychological factors like agency problems and risk aversion can impose limits on arbitrage. Arbitrage theories were quite opposite to the efficient market theory. In the last section of his book, Shleifer discussed the investors sentiment: how it is built and how it affects the investors' financial decision process. He provided empirical evidence on how price bubbles violate the theory of efficient markets. This book succeeded in replacing the fundamentals of the efficient market hypothesis with Behavioral Finance approach as a more reliable model for understanding the investors actions under different situations.

In summary, the author believes that the birth of present day Behavioral Finance took place with the book by Selden as it presented the concept of share prices being dependent on psychological framework of investors. Kahneman and Tversky's work on Prospect Theory was also inspirational in offering an alternative to the idea of rational choice and Expected Utility Model. Another major contributor to this field is Thaler who presented successfully demonstrated, with empirical evidence, the impact of psychology on the financial decision-making processes. And lastly Shleifer's book was also a significant contribution to the field of behavioral finance by formally introducing an alternative approach for studying financial markets.

2.2.4 Definitions of Behavioral Finance

In every field of study human nature want to define every concept but the behavioral finance field not relay on a single concept/ definition, indeed scholarly community define behavioral finance formally in their own way. Multiple definition provides multidimensional view

helping in understanding the behavioral finance in better ways. It would be helpful if we take a look at various definition of Behavioral Finance that are already available.

- ***Shefrin, 1999***

"Behavioral Finance is the application of psychology to financial behavior – the behavior of investment practitioners"

- ***Fromlet 2001***

"Behavior of investor is a part of behavioral finance, which helps to understand and predict systematic financial market implications of psychological decision processes. Behavioral Finance closely combines individual behavior and market phenomena and uses knowledge taken from both the psychological field and financial theory"

- ***Pompain, 2006***

"Behavioral Finance is the application of psychology to finance"

- ***Forbes 2009***

"Behavioral Finance is defined as a science regarding how psychology influences financial market. This view emphasizes that the individuals are affected by psychological factors like cognitive biases in their decision-making, rather than being rational and wealth maximizing"

- ***Sewell 2010***

"Behavioral Finance is the study of the influence of psychology on the behavior of financial practitioners, both individual and group level, and the subsequent effect on markets - it helps to explain why and how markets might be inefficient"

- ***Zindel, et al., 2014***

"Behavioral Finance is a science that includes the knowledge of cognitive psychology, economics and finance in order to understand the financial decision-making processes"

- ***Author's View***

One thing that clearly emerges from the above definitions is the fact that Behavioral Finance does not aim at explaining how finance practitioners *should* make their decisions. Instead, its focus is on clarifying *why* these practitioners make the decisions that they do make. Three points need to be paid attention to here:

- Behavioral Finance aims to study those factors that influence the decision-making thought process of an individual (or group).
- Because different finance practitioners have different psychological mind sets, they end up making different decisions under seemingly similar situations.
- The individual behavior of finance practitioners has a collective effect on the market in which they operate.

Author therefore propose the following definition: "*Behavioral Finance is the study of the manner in which various psychological and social factors influence the individual decision-making thought processes of finance practitioners and the collective impact it creates on the*

conduct of the markets in which they operate." As a field of study it does not prescribe a particular model which may be superior to others for the purpose of making a financial decision– not does it proffer a cause-and-effect table to encompass all possible reactions to all possible biases arising out of different psychological and social factors.

2.2.5 Types of Behavioral Finance

According to Pompain (2012), a study of Behavioral Finance can be carried out at two distinct levels: Micro and Macro.

2.2.5.1 Behavioral Finance at Micro Level

This is related to the underlying foundations of behavioral biases and mechanisms by which individuals (or bodies) make their financial decisions. While the bulk of existing literature on the subject focuses on how individuals make investment decisions, it is the considered view of the author of this dissertation that Micro Level Behavioral Finance covers *all finance related decisions* (including investments in financial and/or physical assets, selection of sources of finance, capital structures, etc.) by all finance practitioners. Pompain argued that when discussion is with respect to Micro behavioral finance, the debate asks: Can emotional and cognitive biases influence financial decisions of individual investors or Are they perfectly rational?

Much of financial and economic theory depends on the concept that individuals behave logically and consider all "available information" when making decisions. In scholastic investigations scholars have recognized ample proof of irrational behavior and repeated biases in judgment by experienced human subjects. While we agree with Pompain's

assertion, we would like to replace the words "individual investors" with "individual finance practitioners" so as to include all those individuals who are tasked with responsibility of making all sorts of financial decisions, not just investment of surplus funds. Thus, micro behavioral finance study the behavior of individual practitioners, identify their behavioral biases and explore their impact on resource "allocation" choices. Consequently, the effects of those behavioral biases on the investment management activities can be managed.

2.2.5.2 Behavioral Finance at Macro Level

Macro Level Behavioral Finance concerns the study of financial markets and how they are impacted by the decision of individual finance practitioners. According to Pompain, macro behavioral finance detects and defines anomalies in the financial markets. An anomaly is a deviation from the normal situation. Behavioral Finance at Macro level identifies anomalies in the EMH that may be explained by behavioral model. In other words, "macro behavioral finance focuses on explaining how and why markets deviate from what we would term efficient in traditional finance" Schweser (2012). Illiashenko (2017) asserts that "macro behavioral finance" is mostly related to the financial market "anomalies" and the question of financial market efficiency. Thus, macro behavioral finance studies the behavior of capital market, identifies anomalies in the capital market and explores their impact on market efficiency. This study can help all concerned to manage the effects of those anomalies on the market efficiency. Pompain, (2012) argued that when discussion is with respect to Macro behavioral finance the debate asks: "Are markets efficient, or are they subject to behavioral effects"?

According to Fama (1970) and other believers in the fundamental theories of standard finance, markets are almost always efficient meaning that the price of securities holds with fair value, even if some investors do make errors due to biases. In efficient markets, investors are regarded as rational, unbiased, and consistent actors, who make optimal investment decisions, without being affected by their psyches or emotions (Hayat, Bukhari & Ghufran, 2006). Several studies, however, have demonstrated that in reality markets are inefficient, because of individual biases that give rise to anomalies which in turn lead to market inefficiency (Ajmal, Mufti & Shah, 2011). Due to behavioral biases Investors make trading mistakes (Baker and Nofsinger, 2002), which have a significant impact on market prices (Maheran and Muhammad, 2009), resulting inefficient markets .

2.2.6 What is Conventional Finance About?

Statman (1992) argues that "Conventional Finance is the body of knowledge built on the pillars of the arbitrage principles of Miller and Modigliani, the portfolio principles of Markowitz, the capital asset pricing theory of Sharpe, Lintner, and Black, and the option pricing theory of Black, Scholes, and Merton". According to Pompian (2006), traditional finance is based on unreal assumptions and on rules directing how ideal investors should behave in a given situation, not on rules describing how real investors actually behave. Traditional finance explains the financial behavior of markets using models in which the participants are regarded as purely rational and change their beliefs when they gain new information, making decisions in accordance with the new information. Unfortunately, over time, it was clear that this model could not explain all the market's behavior. According to

Barberis and Thaler, (2002) some behavior of markets can be better elucidated using models in which "participants" are regarded as irrational.

2.2.7 Conventional Finance versus Behavioral Finance

Conventional, or standard, finance is prescriptive; it lays down how investors *should* act on the basis of mathematical models and finance or economic theories. On the other hand, behavioral finance is descriptive in nature; it attempts to explain the observed decision-making process of investors which may lead to a decision that may not be entirely logical or rational. This aspect of financial decision making is not generally explained by conventional finance.

According to standard finance, price of securities equals its "fundamental value" and no conflict exists between a security's price and it fundamental value, based on the assumption that financial players are rational at all times. The fundamental value means intrinsic value, or in accounting terms it is taken to be the "discounted sum of expected future cash flows". Investors have been able to process all available information accurately, and the intrinsic value or discount is in line with acceptable selection criteria. (Barberis and Thaler, 2003). The EMH supports the view that prices reflect fundamental values. According to Behavioral Finance scientists, however, financial markets do not always have "informational efficiency" (Ritter, 2003). Behavioral Finance believes that cognitive and emotional biases exist in the "personality of every individual" that prevent him from making rational decisions. A study of Behavioral Finance therefore plays an important role in financial management as it explains how cognitive psychology can help us understand human behaviors.

The prime difference between conventional finance and behavioral finance lies in the basic assumption of rationality. Under conventional finance it is assumed that all financial decision makers are rational and free of any biases or emotional influences. Hence, if ten different persons were given the same set of information and asked to make a decision, they will all arrive at the same decision. Under behavioral balance, the assumption of rationality is replaced by the assumption that different persons have difference cognitive and emotional biases which influence their respective decisions. If ten different persons were given the same set of information and asked to make a decision, they are most likely to arrive at six or seven different decisions. Behavioral Finance helps us understand why that happens and how cognitive and emotional influences shape a person's final decision. While assumption of rationality allows decision makers to rely on statistical models, assumption of presence of different biases among decision makers makes it necessary to see the final decision in this context.

Conventional finance studies its assumption in idealizes financial behavior on the other hand behavioral finance studies its assumption in observed behavior. In short, we can say that, in conventional finance, people are regarded as rational and working without emotion. But people in behavioral finance are regarded as normal (Statman, 1999); they work with emotions and use their mental ability to achieve or avoid subjective outcomes (Pompain, 2006).

2.2.8 Significance of Behavioral Finance

The author of this thesis are essentially against the idea of confining behavioral finance studies to investors at capital market. However, if we take a look at any secondary capital

market (like the PSX), we observe that investors regularly display irrational behaviors: "they purchase stock without looking at its fundamental value, trade excessively, base their decisions on past performance, buy stocks which their friends are buying, and retain loss-making stocks while selling winning stocks" (Shah et al., 2018). Investors frequently make simpler their decision-making processes by using behavioral heuristics, which can cause systematic errors in judgement or lead to apparently satisfactory investment choices, but which do not maximize utility (Kahneman & Tverskey, 1979). The implication of "efficient market hypothesis" is that no one can constantly beat the market and get a superior return over the long period of time. However, there are large number of investment funds that fairly consistently generate large extent of alphas (Yuen, 2012).

Just as conventional finance's reliance on assumption of rationality fails to explain the fluctuations in share prices, it also fails to identify real causes of a large number of other financial decisions. Let's say, if a company were to make a decision on its capital structure purely on rationality grounds, the answer would be to have a capital mix that produces the lowest WACC (weighted average cost of capital). In reality this may not happen at all. Decision will be based on company sponsors' attitude to debt, their views about possible fluctuations in interest rates, their desire to maintain a control over the voting shares, etc. Taking this point further, we see in Pakistan that despite tremendous opportunities of raising finance (and expanding operations) through getting companies listed at the PSX, less than 10% of the public limited companies are actually listed. Standard finance has no explanation for this state of affairs, behavioral finance does.

As a separate field of study, Behavioral finance has succeeded in attracting the attention of researchers and academicians. Over the last few years a large number of studies have been

made in this area. Earlier studies in Behavioral Finance were generally theoretical in nature but subsequent research has come up with a considerable quantum of empirical evidence to prove the importance of studying Behavioral Finance. Dr. Richard Thaler, a pioneer in behavioral finance, states that "this area of study attempts to clarify and augment comprehension of the reasoning patterns of financial specialists, including the emotional procedures encompassed and the degree to which they influence the decision-making process. Basically, it attempts to clarify the what, why, and how of finance and investing, from a human point of view." It can be said that a person who knows and comprehends these behavioral patterns gains ability to evaluate his own capacities, harness his strengthens and tamper his negative emotions in order to arrive at better decisions.

Behavioral finance researchers have developed a good number of theories over the recent past that explore the behavioral patterns of individuals and groups operating in the financial markets, such as prospect theory, mental accounting, heuristics theory, bounded rationality, loss aversion, gambler's fallacy, herd behavior, greed and fear, endowment effect, disposition effect, cognitive framing, disappointment, behavioral portfolio theory, behavioral biases, behavioral asset pricing theory and sunk-cost fallacy etc. Understanding Behavioral Finance enables us to avoid emotion-driven speculation (that may lead to losses), and equips us with a capacity to maintain a balance between rationality and personal preferences. Such a balance can lead to development of appropriate financial management strategies.

2.2.9 Behavioral Finance in Asia

Pakistan is an emerging country in Asia. Pakistan's financial markets have many cultural characteristics similar to those of other Asian financial markets. This section provides an

overview of behavioural finance in Asia as well as the importance of behavioural finance in the Asian context, particularly in Pakistan.

Asia is known as for its different level of capitalism, and financial experience of its participants, as the different experience and knowledge leads to difference in financial decision making. Due this reason it is interesting platform for studying behavioural finance. Furthermore, Asian people are suffering more in cognitive biases as compared to Western people and individual investors of Asia considered as gamblers (Kim and Nofsinger, 2008). Studies of risk perception conducted by Weber and Hsee (1998) also found that people in Asian cultures are less risk averse and more overconfident than people in Western cultures. Chen et al., (2007) provided additional knowledge about the behaviour of Asian people and how their behaviour effects the financial decisions; they confirmed that Chinese investors display more overconfidence bias and disposition effect than individual U.S. investors.

Theoretically, social scientists and psychologists believe that inclinations for psychological biases are nurtured by their respective culture, although its impact may differ (Yates et al., 1997). Hofstede (1980) and Kim & Nofsinger (2008) differentiate among cultures with an individualism and collectivism continuum. Asian countries reflect collectivism, and an investor in collectivistic country suffer from overconfidence that leads to psychological biases in decision-making (Luong and Ha 2011). Cultural differences, notably life experience, social values, and education, can influence individual behaviours; thus, it reckoned that inclinations towards psychological biases might vary from culture to culture. Limited literature is available to prove that Asian people often fell prey to behavioural biases than people raised in Western countries (Yates et al., 1997).

Admittedly, there are some literature regarding the behavioural biases distinction between Western individuals and Asian individuals, but that literature is still quite skimpy. According to Weber and Hsee, (2000) "the bottom line is that the topic of culture and decision making has not received much attention from either decision researchers or cross cultural psychologists". Shah, Ahmad, and Mahmood, (2018) argue convincingly "most studies focus on well-developed financial markets and very little is known about investors behaviour in emerging markets or collectivist-dominated cultures". So, empirical research is necessary to understand the behavioural patterns of investors and to improve their financial stability in context of collectivist-dominated cultures or emerging markets like Pakistan. Kim and Nofsinger, (2008) assert that Asian financial markets are considered as largest financial markets as compared to others financial markets of the world and there is some evidence – anecdotic, empirical, and theoretical – that Asians fell prey from psychological biases on a different level in comparison to individuals of other cultures. Thus Asian financial markets could be a fertile testing ground for behavioural finance scholars.

Thaler (1999) had a wish, to conduct research on behavioural finance in future. He wished to conduct behavioural finance research on corporate finance. Kim and Nofsinger (2008) also had a wish, to conduct more behavioural finance research on Asian financial markets. As the gaps analysis suggesting that investment heuristics and their effect on investment management and market efficiency are highly demanded areas, needed to be explored in the field of behavioural finance in the context of developing countries. Thus the current study aims to clarify the mechanism by which heuristic-driven behavioural biases influences the perceived market efficiency and investment management activities of investors, actively

trading on the PSX, with the mediating role of fundamental and technical anomalies and moderating role of financial literacy.

2.3 Heuristic-Driven Biases in Investment Management Activities and Market Efficiency

Many researchers have investigated the role of heuristic-driven biases and their effect on investment management activities of institutional and individual investors and market efficiency in different cultures or environments, as well as studying the relationships of emotional and cognitive biases with anomalies and financial literacy. Some of their results are very relevant and valuable for this present study. A limited review of prior studies, regarding the relationship of heuristic-driven biases with individual and institutional investors' decision making and performance, market efficiency, financial literacy, fundamental anomalies, and technical anomalies is provided below.

2.3.1 What is Market Efficiency About?

Fama (1970) explained the concept of market efficiency in his paper, "Efficient Capital Market". It is one of the most important theories of standard finance, stating that financial markets are efficient (Sewell, 2011), meaning that the price of securities holds at their fair value (Aguila, 2009), while reflecting all available information (Fuentes, 2011; Malkiel, 2003). So, we can say that a market in which prices always amply reflect all available information is called an "efficient market" (Fama, 1997).

According to Ritter (2003), the EMH is based on the assumptions that decision makers and financial investors are rational and competes to earn abnormal profits, and that the prices of securities hold their fundamental value due to competition between different profit-oriented investors. Moreover, Shiller (2003) said that all investors integrate all available information in their decisions, which is why prices can be considered as the best for true investment. We cannot hold onto the theory of rational behaviour, however; people do not remain rational for long periods but are affected by their beliefs, mood, and emotions. So, we reject the traditional theory of finance (Shah et al., 2012).

The previous literature shows that behavioural biases can make financial markets less efficient by mispricing securities, even though there are rational arbitrageurs who bring security prices to their fundamental values (Kyle and Wang, 1997; Odean, 1998). The price of securities do not always hold with their fair value but can deviate from their fundamental value because of traders who are not fully rational (Barberis and Thaler, 2003). Shah et al. (2012) said that, due to heuristic biases and framing effects, the price of securities deviates from their fundamental value and, as a result, markets become inefficient. According to Birau (2011), it is impossible to improve markets for a longer period of time.

Several studies have demonstrated that, in real life, markets are inefficient because of behavioural biases, as well as other aspects of capitalism. In reality, markets are never absolutely efficient nor absolutely anomalous (Pompain, 2006). Fama (1997) explained in his paper "Market Efficiency, Long Term Returns, and Behavioural Finance" that anomalies persist in the market for short periods of time, due to methodology, but, in the long run, the anomalies go away due to changes in proficiency. The "noise trader risk" and "limit to arbitrage" explain why so many anomalies persist in the markets that they produce

inefficiency (Baker and Nofsinger, 2010). Pompain (2006) said in his book "Behavioural Finance and Wealth Management" that anomalies' persistence in the markets contradicts the EMH.

The concept of bounded rationality also persists in the market; due to bounded rationality, individual investors cannot take decisions that cover every contingency and, as a result, markets become inefficient (Dietrich et al., 2001). Russel and Torbey (2002) said that individuals have limited capability to process information; therefore, they show systematic bias in information processing, which leads them to make mistakes and, as a result, markets become inefficient. Furthermore, according to Simon (1957), the power of human thinking is limited in a critical time, and so, when solving problems, we cannot process information at our maximum capacity.

According to the limit of arbitrage theory, if "irrational traders cause deviations from fair or fundamental values, then rational traders are powerless to do anything about it" (Shleifer and Vishny, 1997). Behavioural finance indicates that deviations from fair or fundamental values are caused by traders, who are not fully rational (Barberis and Thaler, 2003). This mispricing is evidence of limited arbitrage, which is why the prices of securities change even if their fundamental value does not change. According to Jo and Kim (2008) when "rational and irrational traders interact, irrationality can have a substantial and long-term impact on prices". Daniel et al. (2001) state that arbitrageurs are risk averse; therefore, they may not be able to correct all systematic mispricing. According to Shleifer and Vishny (1997) and Shleifer (2000), arbitrage opportunity is the basis of EMH but, in a real situation, arbitrage is not only risky but also limited.

A common reason for the disappearance of the EMH is that investors normally do not gather complete information and thus their trading behaviour is based on incomplete data. For example, investors may respond to functioning, selling stock in which they face losses and buying stock in which they face a gain; such a response leads to the price of stock deviating from its fair or fundamental value (Ajmal et al., 2011). Both underreaction and overreaction persist in the market as a result of trading behaviour, which Fama (1997) described as confirmation that anomalies persist in the market; as a result, the EMH changed. Shah et al. (2012) suggest that market inefficiency exists because the price of securities may not correctly reflect all available information. Some securities may be overvalued or undervalued. The concept of market efficiency is wrong because efficient market theory may lead to totally incorrect interpretation of events, such as a "major stock market bubble" (Shiller, 2003).

2.3.2 What are Investment Decisions About?

Investment is the process of purchasing assets out of available resources with an aim to reaping greater future benefits. In terms of capital market, these assets refer to financial assets, that is securities and tradeable instruments. The world of investment is variable but, you can be successful through research and keeping your head straight. Every investor wants to make optimal investment decisions (Sharp, 1964) but, according to Merton (1987), optimal and rational investment decisions depend on advanced financial knowledge. Standard finance assumes that people have complete information and make rational decisions at all times.

Behavioural finance, however, assumes that investment decisions are often irrational, due to imperfect information (Bikhchandani et al., 1992), bounded rationality (Pompian, 2006), anomalies (Ajmal, Mufti & Shah, 2011), fundamental heuristics (Baker & Nofsinger, 2010), psychological biases (Baker & Nofsinger, 2002) or behavioural biases (Shefrin, 2007) and psychological accounts of investors' mental developments play a key role in irrational decision making.

According to cognitive theory, cognitive biases and heuristics may cause individuals to participate in less than rational decision making (Baron 1998; Bazerman 1998). Bazerman, Giuliano and Appelman (1984) argue that cognitive biases are personal beliefs that help individuals deal with difficult decisions. Both biases and heuristics are mental short cuts, which decision makers use in complex and uncertain situations (Ritter, 2003), by reducing the complexity (Barnes, 1984). According to Tversky and Kahneman (1974), due to these heuristics and biases, systematic errors occur; as a result, decision outcomes are affected adversely (Barnes, 1984).

2.3.3 What is Investment Performance About?

Investment performance - is the return on investment portfolio. An investment portfolio may consist of one or more assets. Some researchers argue convincingly, the poor performance of irrational investors could get them out from the security market (Le et al., 2011). On the contrary, some others believe that irrational investors (like overconfident investors) who have the excessive trading behaviour could benefit with higher returns (Anderson et al., 2005). By their study Anderson, et al., (2005) also have highlighted investors who place the most orders and have the highest number of transactions may result in higher returns than those with the

least orders and transactions. The paper by Kim and Nofsinger (2003) asserts that stocks with the largest decline in individual possession may have a positive abnormal return during the year; However stocks with the largest increase in individual ownership may obtain negative abnormal returns.

In the field of behavioural finance, many scholars have looked into the issue of investment performance specifically in portfolio management and material profit perspective. According to behavioural finance scholars, investors display a range of irrational behaviours in the market place, which leads to higher standard deviation and lower market returns (Feldman 2011).

Behavioural finance researchers also documented that behavioural biases were the underlying cause for irrational investing and under performance of investors (Feldman 2011). Many researchers in economics argue that heuristic-driven biases can effect financial decision-making and forecasting financial variables, such as earnings or material profit (Abarbanell and Bernard, 1992). A limited review of prior studies regarding heuristics are discussed below.

2.3.4 What are Heuristics?

According to Gestalt psychologists Max Wertheimer, Wolfgang Koehler, Karl Duncker and a handful of later philosophers, especially Herbert Simon (1955), heuristics are strategies that guide information searches and modify the depiction of a problem to facilitate solutions. From its origin, the term heuristics have been used to describe useful and important ways to identify solutions to problems that cannot be handled by logic and theory of probability (Groner, Groner, & Bischof, 1983). In the late 1960s and early 1970s, the heuristics

definition has modified approximately to the point of inversion. In an investigation on reasoning, judgment, and decision-making, heuristics refer to strategies that inhibit one from discovering correct solutions to problems that posit by the probability theory (Goldstein, & Gigerenzer 2002). In this streams of thought studies primarily deal with general rules of thumb and the deviations from a rational computation that they tend to yield referred to as behavioural biases. Thus heuristics have even become allied with irrationality and unavoidable cognitive illusions (Piattelli-Palmerini, 1994). A brief debate on both streams of thought is presented below.

According to Hertwig and Pachur (2015), heuristics "referred to as mental shortcuts or rules of thumb. One of their core functions is to diminish the complexity of the problem by neglecting some of the accessible information or searching only a subset of all possible solutions". Gigerenzer and Gaissmaier (2011) propose a definition of heuristic as "a strategy that ignores part of the information with the goals of making decisions more quickly frugally, and/ or accurately than more complex methods". According to Shah and Oppenheimer (2008), all heuristics are a form of effort reduction, using one or more of the following: analyzing only a few clues, reducing the effort of recovering cue values, integrating less information or analyzing only a few alternatives. Thus Heuristics is referred to as "rules of thumb" or mental shortcuts, which finance practitioners (both individual and group level) used in complex and uncertain situations to make decision simple and efficient. Business actors and finance practitioners often use heuristics in order to simplify the decision-making process, typically these heuristics are useful and beneficial when decision makers have limited time and information (Waweru et al., 2008) but sometimes they lead to systematic

errors in judgment (Ritter, 2003). Conventionally, heuristics have been considered as necessary and effective tools, however, ones that produce only second-best solutions.

Moreover, Gigerenzer and Gaissmaier (2011) argue convincingly that individuals and organizations often rely on fast and frugal heuristics in an adaptive way, and ignoring part of the information can result in more accurate judgments than adding and weighing all data, such as small samples and low predictability. Similarly, Gigerenzer and Goldstein (1996) assert that relying on one of the best reasons (and neglecting the rest) can lead to greater prediction accuracy than is accomplished by linear multiple regression. This means that the less-is-more effect. Additionally, as Gigerenzer and Marewski (2015) state, fast and frugal heuristics can be more effective and are the only potential opportunity for making appropriate decisions in given situations. Thus in an investment strategy that relies more on fast and frugal heuristics principles, it is possible to yield better returns when compared with the same depending on complex strategy. The research scholars from the psychological research community have highlighted that due to limited knowledge and time in taking decisions and uncertainty, people often used heuristics. In this situation, fast and frugal heuristics may be useful for making an adaptive decision with fewer resources and can, in fact, outperform more complex strategies (Hertwig & Pachur 2015).

Some scholars disagree with this school of thought that the less-is-more effect. They demonstrate that investment strategy, rely on fast and frugal rules, would not produce better returns on a consistent basis. The cost of relying on these shortcuts is the jeopardize of committing systematic errors and serious illusions of reasoning. The paper by Shah, Ahmad, and Mahmood, (2018), seeks to highlight that investors rely on heuristics ostensibly to reduce the risk of losses in unpredictable situations. When investors use heuristics, their

technical knowledge and reasoning faculties are impaired, leading to errors in judgement. As a result, investors make irrational decisions, which in turn adversely affect their investment performance. The literature revealed that when finance practitioners and business actors use heuristics, they reduce the mental effort in the decision-making process, causing a number of behavioural biases.

2.3.5 What are Heuristic-Driven Biases About?

The list of heuristic-driven biases that finance practitioners have committed is too long to be given here in full. We are discussing only those that are reflected in the reviewed empirical papers during gap analysis. They can be grouped into two broad categories, that is, recognition-based heuristics and cognitive heuristics which are listed and discussed below.

2.3.5.1 Recognition-Based Heuristics

One of the most fast and frugal heuristics introduced by Gigerenzer and colleagues is the recognition heuristic (Goldstein & Gigerenzer, 2002; Goldstein & Gigerenzer, 1999). It is defined as "If one of two objects is recognized and the other is not, then infer that the recognized object has the higher value" (Goldstein & Gigerenzer, 1999). It is a simple mental strategy which considers only the recognition cue and leads to efficient decision making (Pachur, et al., 2011). When one alternative is recognized and the other is not, it selects the recognized one; such a phenomenon is known as recognition heuristic (Goldstein and Gigerenzer, 2002). Additionally, Gigerenzer, & Gaissmaier(2011) state that heuristics that bases judgments only on recognition information and neglecting other signals is called recognition heuristics. Thus recognition heuristic is a judgment and decision-making strategy

in which judgement is made by relying on one single cue (recognition), ignoring other information.

The recognition heuristic was considered as a one-cue, non-compensatory inference strategy (Dhami & Ayton, 2001), which means that no additional information aside from recognition is taken into consideration in the judgment. In reality, the "inconsequentiality of further knowledge" (Goldstein & Gigerenzer, 1999) is a crucial element of the heuristic. This peculiarity is referred to as less is more effect. Psychologically this means that individuals and organization with little knowledge can make a better decision than individuals and organization with comprehensive knowledge about the matter.

Some scholars contradict with Goldstein and Gigerenzer's school of thoughts that the recognition heuristic rely only on one single cue. As Hilbig (2010) clarifies that recognition heuristic considers multiple-cue, not only rely on one single cue as proposed by Goldstein and Gigerenzer (1999; 2002). Newell and Shanks (2004) assert that individuals consider both recognition and expert opinions in a stock market simulation. Thus according to this school of thought when individuals making a judgement by using recognition heuristics they take into account additional evidence aside from recognition. The recognition heuristic is domain-specific, cannot be useful to every situation or we cannot make correct inference in every situation by using it. According to Goldstein and Gigerenzer (1999) "ignorance is beneficial if it is correlated with what one wishes to infer".

In the recognition-based heuristics debate, we have two streams of thought: Gigerenzer and his research group (1999) claim that recognition based heuristics can be successful in complex and uncertain environments as they guide the decision maker in searching information "by effectively and efficiently exploiting information structures in the

environment" (Bertel and Kirlik, 2010). Contrary to this position, Some researcher postulated that the human mind relies on recognition based heuristics strategies affected by systematic and predictable errors (biases), that allows only a second-best decision. Based on the gap analysis evidence, author explored some recognition based heuristic-driven biases that affect the decision-making process of finance practitioners which are listed and discussed below.

2.3.5.1.1 Recognition Based Heuristic-Driven Biases

There are three type of recognition based heuristic-driven biases which are listed and discussed below.

2.3.5.1.1.1 Names Fluency

Name fluency is a recognition based heuristic-driven bias, in which decision makers rely on recognition and retrieval fluency when making judgments. It is also known as name based behavioral bias (Itzkowitz & Itzkowitz, 2017). When information is easy to process, or fluent, people tend to feel at ease, and therefore incorrectly regard this as a positive assessment of the information. "Because investors link the ease of processing a fluent name with positive feelings toward the stock, stocks with more fluent names should trade more than stocks with less fluent names" (Itzkowitz & Itzkowitz, 2017). According to Hertwig et al. (2008), names fluency is a heuristic that bases judgments only on fluency cue: "when both alternatives are recognized but one is recognized faster, it selects the one that is recognized faster".

2.3.5.1.1.2 Alphabetical Order

Another recognition based heuristic-driven biases, in which decision makers choose early alphabet options more frequently than others. It is also known as name based behavioural

bias (Itzkowitz, & Itzkowitz, 2017). Itzkowitz, Itzkowitz, and Rothbort (2015) argue convincingly, investors prefer trading in company stocks commencement with the letters that appear early in the alphabet more than stocks commencement with later letters of the alphabet such a phenomenon is known as alphabeticity bias. Two psychological factors contribute to alphabeticity bias one is known as status quo bias and other is satisficing

Investment alternatives are normally listed in alphabetical order (Doellman, et al., 2018). Even though a list of investment choices can easily be re-ordered based on individual stock characteristics, people more often rely on the default (status quo) list given to them (Kahneman, Knetsch, & Thaler, 1991). Thus, because information related to stocks are normally presented in alphabetical order and individuals depend on the default ordering (status quo), early alphabet stocks are bought and sold more frequently than stocks with later alphabet, as a result stocks beginning with the early letters of alphabet have greater turnover and value than stocks beginning with later letters of alphabet (Itzkowitz & Itzkowitz, 2017). Doellman, et al., (2018) assert that conviction on the status quo correlates with decision makers tendency to satisfice resulting in an alphabeticity bias. When making a choice between large numbers of options, decision makers often satisfice, as a result, stops the search after an acceptable option is found, even if prolonged searching could yield a better result (Caplin et al., 2011). Furthermore, when decision makers (investors) glance through lists of stocks, they will be preferably to buy and sell stocks appearing toward the beginning of the list. Thus, initial ordering has a significant influence on which stocks are elected for purchase or sale.

2.3.5.1.1.3 Names Memorability

Finally, names memorability is a recognition based heuristic-driven biases, in which decision makers rely on recall and recognition when making judgments. When investors make investment decisions based on the stock of a firm they remember, such a phenomenon is known as names memorability bias. According to Itzkowitz, and Itzkowitz (2017) the memorability of a firm's name is a name-based behavioural bias: when investors simply limit their stock choices to firms they remember, such behaviour is the reflection of names memorability bias.

2.3.5.2 Cognitive Heuristics

"Cognitive heuristics generally refer to the influences of various cognitive shortcut strategies in decision-making due to limited cognitive ability" (Wärneryd, 2001). From the survey based investigation during gap analysis, the researcher explored some common cognitive heuristic-driven biases that affect finance practitioners' decision making which are listed and discussed below.

2.3.5.2.1 Cognitive Heuristic-Driven Biases

The current study includes six component of cognitive heuristics which are listed and discussed below.

2.3.5.2.1.1 Overconfidence Bias

Overconfidence is a cognitive heuristic bias, which can be defined as "unwarranted faith in one's intuitive reasoning, judgement, and cognitive abilities" (Pompian, 2006). "When people overestimate their knowledge and skills, it is a reflection of overconfidence" (De

Bondt & Thaler, 1995). Psychologists have determined that overconfidence causes people to overestimate their knowledge and skill. According to Chernoff (2010), "too many people overvalue what they are not and undervalue what they are"; such people suffer from overconfidence bias.

Pompain (2006) explains in his book "behavioural finance and wealth management", there are two types of overconfidence. One is known as prediction overconfidence and second is known as certainty overconfidence. In prediction overconfidence, an investor's prediction is based on narrow information and in certainty overconfidence investors are too certain on the accuracy of their own judgment. In which investors beliefs in their own skills, they think whatever we are doing will be true.

As Simon et al. (2000) asserts that, "overconfidence may exist because individual investors do not sufficiently revise their initial assessments after receiving new information"; therefore, they do not realize how incorrect their assessments may be. They think their judgement is too certain, which is the reason for overconfidence. Some researchers state that Overconfidence bias exists in the personality of investors or human beings over time, when they experience one thing again and again and attain the same results every time. Overconfidence occurs when decision-makers or financial investors are overly optimistic in their initial appraisal of a situation, and they are slow to integrate additional information about a situation into their appraisal because of their overconfidence (Busenitz & Barney 1997).

Overconfidence can induce excessive trading behaviours (Bodnaruk & Simonov, 2015; Palomino & Sadrieh, 2011; Pikulina, Renneboog, & Tobler, 2017) because overconfident investors perceived that they possess financial knowledge advantage, as a result generates high trading volumes. overconfident investors underestimate their downside risk and hold

under-diversified portfolio, leading to poor returns (Pompian, 2011). According to Shefrin (2000), investors "overestimate their own ability in forecasting the trend accurately which results in bad forecasting". In short, the consequences of the Overconfidence heuristic bias are that decision-makers, who are suffering in overconfidence bias, underestimate risk factors, overestimate expected profit (Nofsinger, 2002), poorly diversified their portfolios and trading excessively as well as experience lower profit or returns than those of the market (Odean, 2002).

2.3.5.2.1.2 Representativeness Bias

Representativeness is a "cognitive heuristic bias which can be defined as a mental shortcut that involves decisions being made according to mental stereotypes" (Shefrin, 2005). Representativeness is defined as "the degree of similarity that an event has with its parent population" (DeBondt and Thaler, 1995) or we can say that the degree to which an event represents its population (Kahneman and Tversky, 1974). Representativeness puts too much trust in stereotypes and leads individuals to make forecasts that are not appropriate for the relevant situation (Shefrin, 2008).

There are two types of representativeness bias one is known as base-rate neglect and second is known as sample-size neglect. Base-rate neglect means the decision maker considers irrelevant or incorrect information, when judging the likelihood of a particular investment outcome or we can say that they depend on stereotypes when making investment decisions, without adequately incorporating the base likelihood of the stereotype occurring (Pompain, 2006). Sample-size neglect occurs when decision makers try to generalize on the basis of too few examples (Barberis and Thaler, 2003) or "incorrectly assume that small sample sizes are representative of populations" (Pompain, 2006).

According to Kahneman and Tversky (1974), individuals use the representativeness heuristic because they do not fully understand the basic concept of forecasts, the preponderance of an event within its population of events or characteristics. Another reason is insensitivity to the sample size because it is incorrectly believed that small samples of events, people, etc. are representative of the entire populations from which the sample is drawn. People tend to overestimate the likelihood that the characteristics of a small sample of a population adequately represent those of the entire population. "We also tend to use the representativeness heuristic when we are very aware of anecdotal evidence based on a very small sample of the population" (Kahneman and Tversky, 1974).

The consequences of the representativeness heuristic are that decision makers adopt forecasts on the basis of a small sample and update beliefs using simple classifications rather than complex data (Shah, Ahmad, & Mahmood, 2018).

2.3.5.2.1.3 Availability Bias

Availability is a "cognitive heuristic bias that occurs when people rely too much on easily available information" (Ngoc, 2014), for example "when investors assess the likelihood of an outcome based on how easily the outcome comes to mind" (Brahmana et al., 2012; Kahneman & Tversky, 1974). There are four types of availability heuristic; one is retrievability, second categorization, third is the narrow range of experience and four is resonance

Retrievability means idea or information easily or more quickly comes to mind than another idea or information that idea will be chosen as correct even in reality it is not (Pompian, 2006). In short, we can say that retrievability suggests that investors took decisions on the basis of information or idea that comes to mind easily. Categorization means investors took a

decision based on information that they perceive as relevant search sets. In other words, we can say that investors make different categories of existing information and try to match the new information to those existing categories. If new information match with existing categories then took the decision based on that information such type of behavior is known as Categorization (Pompian, 2006). The narrow range of experience means investors have lack of experience, due to lack of experience they have insufficient information and based on that limited information they took decision (Pompian, 2006).Resonance means some time people are biased by how closely a situation match their own personal situation or the degree to which certain, given situation match with individuals own personal situation can also influence judgement (Pompian, 2006). In short if new information contradicts from the investor's personal information then they took decision based on their own personal information.

Investors who are fell prey to availability heuristic fail to diversify their investment portfolios, they select investments based on retrievability rather than a thorough analysis of the options, fail to allocate their assets appropriately and, because they limit their investment opportunities, they do not choose alternative investments when suitable.

2.3.5.2.1.4 Anchoring and Adjustment Bias

Anchoring and adjustment is a cognitive heuristic bias that tells us about human beings' tendency to rely excessively on the first piece of information provided (the "anchor") when making decisions. Anchoring and adjustment occurs during the decision-making process, when investors use an initial piece of information to make decisions or judgments. Once an anchor is set, then all other assessments or judgments revolve around that anchor; as a result, there is an error or bias towards interpreting other information around the anchor. Slovic and

Lichtenstein (1971) explain the "anchoring and adjustment bias as people using some initial values to make an estimation that is adapted to yield the final answer". The initial value may be adjusted with the help of problem formulation, or it may be suggested by partial computation. Kahneman and Tversky (1974) argue that different starting points yield different estimates, which are biased towards the initial value. We call this phenomenon anchoring. In short, we can say that Anchoring and adjustment heuristic suggests that initially, investors make reference point based on any information then all assessment revolves around the reference point.

2.3.5.2.1.5 Herding Bias

Another cognitive heuristic bias is defined by research scholars from the behavioural finance community in several ways. To clearly understand the concept of herding we take a look at the various definitions of herding that are already available in the literature.

According to Banerjee (1992), herding is defined as "everyone doing what everyone else is doing, even when their private information suggests doing something quite different". Individuals who ignore their own beliefs and base their investment decisions solely on the collective actions of the market or imitate the actions or reactions of other investors, even when they disagree with its prediction such individuals suffer from herding (Christie and Hwang, 1995). Vieira, & Pereira (2015) propose a definition of herding as "a group of investors ignoring their own information and beliefs and following the decisions of other investors, imitating them". According to Patterson and Sharma (2007) "herding occurs when a group of investors trade on the same side of the market in the same securities over the same period of time or when investors ignore their own private information and act as other investors do".

Moreover, as Galariotis et al. (2016) and Galariotis et al. (2015), assert that herding is a process where investors trade in the same way simultaneously, either because of mimicking each other or because of conversion to the market average. Chen, (2013) argue convincingly, herding can be defined as an investment strategy in which investors follow the market consensus and/or mimic the actions of financial experts. According to Hwang and Salmon, (2004) hedging is defined as the situation in which investors ignore their predictions and beliefs and copy the decisions made by their peers or the movements on the market. The phenomenon of herding eventuates when a group of investors deliberately imitates the activities of other investors who they contemplate to be better knowledgeable, rather than following their own convictions and utilizing their own prediction when purchasing or selling similar stocks over a specific timeframe (Chen, 2017; Blasco & Ferreruela, 2008). Thus when investors intentionally or unintentionally mimicking the actions or reactions of other investors and/or base their investment decisions solely on the collective actions of the market, instead of making investment decisions based on their own convictions and prediction such type of behaviour referred to as the herding.

Literature reveals that there are two different forms of herding; one is known as spurious herding, second is referred to as intentional herding, Firstly, we take a look at spurious herding which is also known as unintentional herding. According to Indārs, Savin, and Lublóy, (2019), spurious herding referred to as "a situation whereby investors take similar actions after receiving similar information; herding without mimicking the behaviour of others". Bikhchandani and Sharma (2000) argue persuasively unintentional herding can be defined as a situation whereby investors facing analogous fundamental-driven information set as a result, they take homogenous trade decisions, without the latter being due to intent.

Gavriilidis, Kallinterakis, & Ferreira (2013) assert that some common features exist among investment professionals that may lead them to take homogenous trade decisions thus generating the impression of herding, without imitating the behaviour of others that phenomenon is called spurious herding. Such correlation in their trades, may occur as result of professional investment being characterized by relative homogeneity taking into consideration their features in common (like resemblances in their investment experience, educational background and indicators used for their analyses' purposes) and the common regulatory framework they are subject to (Voronkova & Bohl, 2005). Indārs et al. (2019) argue that "spurious herding, being generated by rational investors as a result of information processing, can be based on both non-fundamental and fundamental factors". Additionally, style investing for example momentum strategies (it is likely that they herd into recent winners and out of recent losers), used simultaneously by a group of investors can lead to spurious herding as well (Guney Kallinterakis, & Komba, 2017).

On the contrary, intentional herding is real herding which is the result of the investor's intention to imitate the actions of other investors regardless of whether others make smart investment decisions (Kim, & McKenzie, 2007). According to Bikhchandani and Sharma (2001), intentional herding can be defined as a situation where investors emulate the behaviour of each other's with intent in order to protect remuneration and preserve reputation or due to informational cascades. Furthermore, Indārs, et al., (2019) assert that intentional herding may occur as a result of the strong willingness of investors to mimic the behaviour of others in the market. In this type of herding, investors disregard their predictions and convictions, deliberately copy the actions of others and/or follow some market consensus for the purpose of reputation and compensation or blindly mimicking. Normally investors herd

intentionally when they wish to preserve reputation and secure a profit from such behaviour in the form of a positive externality, either professional or informational (Gavriilidis et al., 2013). Based on the above definitions, intentional herding further categories into two different forms of herding: First is termed as rational herding second is titled as irrational herding. Firstly, we take a look at rational herding.

According to Vieira and Pereira (2015), "herding can be entirely rational and that it results from the deliberate intention of investors to mimic each other". when investors intentionally mimicking the actions or reactions of other investors and/or base their investment decisions solely on the collective actions of the market to preserve reputation and secure a profit, by simply ignoring rational analysis such type of herding behaviour is referred to as rational herding. Bikchandani and Sharma (2001) assert that rational herding is likely to emanate from information cascading, compensation concerns, reputation concerns, information asymmetry, and information-based intentional herding or come into existence when investors worked in an imperfect information environment. In this situation, investors confront trouble in interpreting the imperfect data, and they infer private information from the behaviour other investors who they contemplate to be better known as a result herding emerged. Literature divulges that there are five models of rational herding; one is alluded to as compensation-based herding, second is hinted at as information acquisition models, third is reckoned as informational cascades model, fourth is known as a principal-agent model and fifth is called behavioural models. A brief discussion about these models given below.

The model of compensation-based herding was developed by Brennan (1993), which may take place when remuneration of the investment manager (an agent) is contingent on comparison of his performance with benchmark investors (other professionals) (Bikchandani

and Sharma, 2001). The remuneration of an investment manager is an increasing function of the profit he earns and a diminishing function of other professionals (benchmark investor) profits, both the benchmark investor and an agent make decisions about stock returns based on imperfect private information. Consequently, an agent's portfolio choice decision is followed by the action of the benchmark investor. However imitating the investment decisions of other professionals threshold the maximum remuneration, simultaneously it provides insurance against low compensation: poor performance in comparison to the benchmark investor can be avoided (Indārs, et al., 2019).

The models of information acquisition herding was introduced by Hirshleifer, Subrahmanyam, and Titman (1994) which focus on investors' patterns of information acquisition. Information acquisition herding emerges when a group of investors, decide to consider similar information sources or purchase information only if numerous different speculators do. According to Devenow and Welch (1996) under certain situations, investors find it advantageous to procure additional information only if other professionals do. thus investors herd on information acquisition and as a result trade in the same way simultaneously. The model of informational cascades herding was developed by Bikhchandani, Hirshleifer, and Welch in 1992. The informational cascades model divulges that the actions of other investors transmit information or signals to observing investors. At one point, these investors will ignore his own information and follow the decisions of others and as a result, engage in herding behaviour. The principal-agent model of herding was presented by Scharfstein and Stein in 1990. The key characteristic of this type of model is that it encompasses the comparative performance appraisal and concern for the reputation of managers or analysts causes principal-agent problems. In this situation, agents will herd and

imitate the investment decisions or earnings forecasts of other agents, to show their principals that they possess superior skills.

The behavioural model of herding introduced by Shiller and Pound in 1989. According to the behavioural model of herding, there are three underlying factors (for example interpersonal communication, mimetic contagion, and investor psychology) that encourage herding behaviour among investors. The interpersonal communication among aristocrats seems to bring a kind of focus and encouragement that leads to behaviour change. Shiller and Pound (1989), assert that investors seem to have no systematic buying decisions, and initial interest in stocks by individual and institutional investors has been stimulated by other investors. According to Topol, (1991) mimetic contagion is more concerned with short-term behaviour where investment managers do not really have time to interpret news and follow actions of other market participants spontaneously. Lux, (1995) demonstrate that mimetic contagion is a situation where agents or investment managers try to trace out information regarding fundamentals from the ask and bid prices of others (who, however, may be as uninformed as they are themselves). Simulation is more likely to occur when the decision is made for the first time, when the decision-making environment is competitive or challenging and/or when the decision-making environment changes. Lux (1995) model also takes into consideration psychosomatic factors explicitly that have a significant influence on the behaviour of non-sophisticated traders. These traders are unable to obtain information regarding fundamental values, as a result, their decisions rely on market observation. Psychological factors are demonstrated as follows. Traders can either be pessimistic or optimistic. Suppose a high proportion of traders are optimistic. Because traders are non-sophisticated and susceptible to the actions of other traders, the remaining pessimistic traders are very likely to change their

attitudes and become optimistic as well. Herding is thus classified as an epidemic of sentiment (Oehler & Chao 2000).

On the other hand irrational herding takes place "when investors with insufficient information and inadequate risk evaluation disregard their prior beliefs and blindly follow other investors' actions" (Lin, Tsai, & Lung, 2013). When individuals refer to others actions as a determinate social norm and emulate the actions of others passively such phenomenon is referred to as irrational herding (Wang, Guo, & Sun, 2019). According to Devenow & Welch (1996) irrational herding relying on investor psychology, where investors simply ignoring rational analysis and follow the actions of others blindly. Vieira, & Pereira, (2015) demonstrate that irrational herding occurs due to herding instinct, through which groups of investors take similar decisions.

Several researchers have endeavored to recognize potential reasons for the existence of the herding phenomenon some of them discussed here. As Hirshleifer, Subrahmanyam, and Titman (1994) argues convincingly, the occurrence of herding depends on the propensity of investors to follow the similar sources of information, homogeneously interpret the signals delivered to the market and as a result taking similar economic decisions. Consequently, correlated behaviour patterns occur when individuals have access to the same sources of information and interpret it similarly (Vieira & Pereira 2015). Trueman (1988) states that institutional investors support herding behaviour in financial markets because they engage in negotiations excessively or analyzed the same group of securities and transact similarly. There are many other potential underlying factors such as trading noise in prices (Lin, Tsai, & Lung, 2013; Black, 1986), compensation schemes (Demirer & Kutan, 2006), the desirability of similar assets (Patterson & Sharma, 2006), the cost of reputation (Calvo &

Mendoza, 1997), the degree of complexity of the market and the quality of the information conveyed to the market that encourages herding (Scharfstein & Stein, 1990; Rajan, 1994). The consequences of the herding are that decision-makers who are suffering from the herding fail to diversify their investment portfolio, which in turn adversely affects their investment performance. In financial markets herding can distort the stock prices, and other financial assets for instance currencies, because they are traded below or above from their fundamental value.

2.3.5.2.1.6 Disposition Effect

The disposition effect is also heuristic-driven cognitive biases which is defined as the tendency of investors to hold the losing investments too long and to sell the winning investments too early for maximizing the returns while delaying the losses (Zahera, & Bansal, 2019). As Shefrin and Statman, (1985) assert that a situation where investors hold losing stocks for a too long period and sell winning stocks too soon such a phenomenon is known as disposition effect. This definition of disposition effect consistent with many renowned researchers argument like Odean, (1998), Weber and Camerer (1998) and Brown et al., (2006) etc. who says that the investors which tend to close winning positions too quickly and hold losing positions too long such types of investors suffering from disposition effect. Thus the disposition effect is defined as the tendency of investors to sell shares with capital gains too quickly and to hold shares with capital losses for an excessively long period, this is because of their reluctance to recognize shares of losers. And indeed the disposition effect describes investors' desire to realize profits by selling stocks that have appreciated but to postpone the realization of losses. Several researchers have endeavoured to recognize potential reasons for the existence of the disposition effect. There are several psychological

elements like mental accounting, Thaler (1985), regret aversion, Bell (1982), prospect theory, Kahneman and Tversky (1979), seeking pride, overconfidence, and sign realization preference, etc. that lead to the disposition effect (Zahera, & Bansal, 2019). A brief discussion regarding how these elements related to the occurrences of the disposition effect are presented below.

Prospect theory, which was explained by Kahneman and Tversky (1979), states that people make decisions based on gains and losses, rather than final outcomes, as well as making reference points and taking decisions accordingly. People value gains and losses differently and these values are calculated from reference points. In the literature of behavioural finance, the dispositional effect is explained by two main features of prospect theory. First, investors make their investment decisions in terms of potential gains and losses. In concordance with the prospect theory, they value their losses and gains with respect to some reference point. They are risk-seeking in the domain of losses and risk-averse in the domain of gains. Second, they behave as if they evaluate the consequences of the decision on an S-shaped value function, which is convex for losses and concave for gains. According to prospect theory the shape of the value function reveals diminishing marginal sensitivity of the investors concerning profits and losses. An experimental approach has been applied by Jiao (2017) to understand risk-seeking in the region of losses and risk aversion behaviour in the region of profit, its influence and meaning to the investors and to signifying prospect theory as an underpinning theory for disposition effect phenomenon. According to Jiao (2017) and other authors like Lucchesi et al. (2015), Grinblatt and Han (2005), and Odean (1998), etc. prospect theory is the possible explanation regarding the occurrences of the disposition effect.

Thaler (1999) presented the mental accounting concept. Investors have different views and preferences about their multiple financial investments. Every decision is taken on the basis of mental accounting which leads toward the disposition effect (losses or gains). The mental accounting elucidates that investors allocate their gambles (investment prospects) to different accounts and gamble with its results, excluding the possibility of interaction between them. Every mental account has a different value for investors. Investors have to close their position at a loss if they realize the losses in any mental account. But it is possible for irrational investors to close any of the mental accounts at a loss; as a result, the disposition effect phenomenon emerges. Several authors like Cekauskas et al. (2011), Liu and Chen (2008), and Parveen (2016) argue convincingly that overconfident investors also suffer from the disposition effect.

Shefrin and Statman (1985) conceptualized the regret aversion concept that investors often hold onto losing stocks and sell the winning stocks due to a negative sensation that is activated after a losing investment. It concerns the feeling that arises not only from the monetary compensation but also from the feeling linked with losing or winning a stock. Investors feel of regret on realizing that the option they chose does not perform as well as the one they did not choose. However, investors feel proud when their choice performs better than the alternatives. The speculators always want to avoid regret and to seek pride consequently, they are suffering disposition effect bias. Thus regret aversion and pride seeking behaviour leads toward the disposition effect phenomenon.

The consequences of the disposition effect are that investors, who are suffering in disposition effect bias, become less sensitive to the price changes in the market and, thus, will yield smaller returns (Grinblatt, & Han 2005). Several researchers suggested that as the disposition

effect increases, the stock volatility and volume of the return decreases (William 2008), on the other hand, the momentum of the stock market (Kaustia 2011; Hur et al. 2010) and the tax liability of the investors increases (Barber et al. 2011).

2.3.6 The Rationale for Heuristics

There are many factors causing an increased use of heuristic by decision makers, some of them are describe in this section. According to Baker, and Nofsinger, (2010) decision makers may be use heuristics, even when an ideal solution of problem exists, because they are not aware of the best way to solve the problem. Furthermore, they might not have the resources (or access to credit) to seek help from others, or the costs of consideration involved may be too high. They also states that policies makers formulate strategies, rely on heuristics when they are unable to get all the information needed for an optimizing solution, or they may not be capable to do so at the time a decision must be made. Even if all the information is available, the decision maker may not be able to complete the optimization calculation in a timely manner (Baker & Nofsinger, 2010).

2.3.7 The Use of Heuristics in Investment Strategy

Perhaps the first attempt to implement the heuristics in constructing portfolio strategies was made by Borges, Goldstein, Ortmann, and Gigerenzer in 1999. The authors aimed to explore and clarify whether investors take advantage of a fast and frugal decision making process to see if it was possible to build a better portfolio with less information than an investor had access to abundant information and resources. This was the first article to empirically prove that constructing portfolios rely on the recognition heuristic, often yielded better returns than

the market index. According to them, investors can earn an abnormal return by using recognition heuristic: constructing an investment portfolio based only on one piece of information such as the company name recognition. No other information such as financial indicators and firms' fundamentals etc. would be indispensable in building investment portfolio strategies. As the Ortmann, Gigerenzer, Borges, and Goldstein, (2008) assert that stock portfolios that are constructed by implementing the heuristics outperformed in the vast majority of cases and often clearly, mutual funds, market index, portfolios of unrecognized stocks and individual investment decisions. Furthermore, recognition heuristic can be implemented with a minimum of effort and make accurate inferences at little cost.

Some researchers disagree with the view that investment strategy, rely on fast and frugal rules (heuristics), would produce better returns on a consistent basis. Boyd (2001) replicated the same study as Borges et al. (1999) to make it clear whether the heuristics strategies also outperformed in different market conditions. The results show that investment portfolio strategies based on heuristic factors produce abnormal return only during bull markets, while during other market conditions, the strategy produced poor results. According to Boyd (2001,) "a high degree of company name recognition can lead to disappointing investment results in a down market, and it can also be beaten by pure ignorance". A similar study was conducted by Andersson and Rakow (2007) empirically prove that a simple strategy relies on fast and frugal rules (name recognition) that cannot be utilized as a general strategy for selecting stocks that generate better than average revenue. The results of their study show that "intermediate levels of recognition might yield better (or worse) returns than both low and high levels of recognition also failed to show a consistent or predictable pattern". Another study on the topic conducted by Lobão, Pacheco, and Pereira, (2017) investigate

whether a portfolio constructed based on most recognized stocks yield abnormal returns consistently by using methodology based on a survey and google trends. The results from the survey-based methods exhibited that market portfolio outperformed than investment portfolio constructed by implementing the recognition heuristic, which in turn beat the unrecognized portfolio by a small margin. The results from the google trends methods indicated that the investment strategy relies on the recognition heuristic yielded weak but statistically insignificant abnormal returns on consistent basis. According to by Lobão, Pacheco, and Pereira, (2017) investment strategy rely on fast and frugal rules (heuristics) would not result in better returns to investors than investing in a market portfolio.

After reviewing the literature in similar domain, the author observed that some investigations demonstrated that heuristic-driven biases positively related with the investment strategies which investment strategies, rely on fast and frugal rules (heuristics), would produce better returns to investors than investing in a market portfolio. while number of studies have demonstrated adverse relationship between them, which means investment strategies rely on fast and frugal rules (heuristics) would not result in better returns to investors on a consistent basis, other researchers suggested that the impact is being conditional, weak and/or non-existing. Thus existing literature suggested, heuristics factors have positive/negative impacts on the investment strategies.

Although numerous investigations have articulated that people tend to use fast and frugal rules (heuristics) in an adaptive way (Katsikopoulos & Martignon, 2006), that is, to best exploit the features of the environment in which the decision takes place, there is still lack of consensus on the utility of fast and frugal rules (heuristics) in the field of portfolio management. Thus, the lack of consent on this topic suggests that further research could

contribute to the literature. This study measures the influence of heuristic-driven biases on the perceived market efficiency and investment management activities of investors, actively trading on the PSX, by taking fundamental and technical anomalies as mediators and financial literacy as moderators. A limited review of prior studies of how heuristic-driven biases (both cognitive and recognition-based heuristic) affect perceived market efficiency, investment decisions and investment performance of investors is discussed below.

2.3.8 Heuristic-Driven Biases in Investment Decision-Making and Performance of Individual Investors.

An individual investor is a person who manages his/her own money in order to achieve personal financial goals. He trades only for his own account rather than for a financial institution. Several studies had been conducted to study the relationship between heuristic driven biases and the decisions and performance of individual investors; some of them found that heuristic-driven biases had significant positive effect on the decision-making and performance of individual investors. Toma (2015) investigated the impact of behavioral bias on the decisions of individual investors trading at the Romanian stock exchange and found that heuristic-driven biases such as representativeness bias, disposition effect, and overconfidence bias positively affected investment decisions. He suggested that individual investors' returns increased due to representativeness bias. Irshad et al. (2016) also found a positive relationship between representativeness bias and investment decisions. Ikram (2016) investigated the impact of behavioural determinants on the decisions of individual investors trading on the Islamabad stock exchange and found that availability and representativeness heuristic-driven biases positively affected their investment decisions, meaning that, due to availability bias, individual investors' returns increased. Khan (2015) also found that

availability bias has a significant impact on the investment decisions of individual investors. The fuzzy analytic hierarchy process was used by Jain, Walia, and Gupta, (2020) to explore the possible effects of behavioural biases on individual equity investor's decision-making. The results reveal that eight behavioural biases i.e. herding bias, regret aversion bias, representative bias, overconfidence bias, loss aversion bias, mental accounting bias, availability bias, and anchoring bias have a significant influence on the decision making of individual equity investors. Moreover, they documented that loss aversion, herding, and overconfidence biases have appeared as important psychological biases influencing investor's decision-making. Also, as Metawa, Hassan, Metawa, & Safa, (2019) with the study of 384 individual and institutional investors, actively trading on the Egyptian Stock Market, concludes that herd behaviour and overconfidence bias have a significant effect on the investment decisions. Additionally, as Madaan, & Singh (2019) concludes that herding and overconfidence bias have a significant positive influence on investment decisions of individual investors trading the "National stock exchange" of India.

Rehan and Umer (2017) explored the possible effects of emotional and cognitive biases on the investment decisions of individual investors, actively trading on the PSX; their results show that psychological biases, i.e. regret aversion, risk aversion, representativeness, overconfidence, and anchoring, have a significant positive impact on investors' decisions, while availability and mental accounting do not have any significant impact. Moreover, by their study, Chhapra, Kashif, Rehan, and Bai (2018) also have described the investment behaviour of individual investors at the PSX. Their results provide empirical evidence for the positive effect of overconfidence bias and herding behaviour on investment decisions made by individual investors of Pakistan. A study conducted by Ishfaq and Anjum (2015)

suggested that anchoring positively affects risky investment decisions. Qasim, Hussain, Mehboob, and Arshad (2019) also concluded that investment decisions of individual investors were significantly influenced by overconfidence bias and herding behaviour. A study conducted by Nalurita, Leon, and Hady, (2020) clarify the mechanism by which behavioural factors such as regret aversion, loss aversion, and market factors influence the investment decisions by taking locus of control as a moderating variable. The results show that regret aversion, loss aversion, and market factors are significantly associated with investment decisions and locus of control appears to moderate these relationships.

Parveen, Satti, Subhan, and Jamil, (2020) investigate the role of representatives on the investment decisions by taking overconfidence as mediator. The results of the study suggest that representativeness has a significant effect on investment decisions and overconfidence appears to mediate this relationship. A study conducted by Pandey, and Jessica, (2019) explore the mechanism by which behavioural biases influence the reinvestment intention by taking investment satisfaction as a mediator. The results suggested that behavioural biases have a significant effect on the reinvestment intention and investment satisfaction appears to mediate this relationship positively. Metawa, et al., (2019) investigate the role of behavioural factors namely herd behaviour, investor sentiment, overconfidence, underreaction, and overreaction in financial decisions. The findings of the study suggest that herd behaviour, investor sentiment, overconfidence, underreaction, and overreaction have a significant effect on financial decisions. Peña, and Gómez-Mejía, (2019) study the relationship between optimism, anchoring and stock market forecasts. The results suggest that optimism, anchoring have a significant impact on the forecast of stock market index.

Khan, (2020) explore the role of cognitive heuristic-driven biases namely mental accounting, disposition effect, and herding bias in investment decisions by taking financial literacy as moderator. The results of the study suggested that cognitive heuristic-driven biases have significant positive influence on the investment decision-making. Madaan, and Singh, (2019) also clarify the mechanism by which behavioural biases such as disposition effect, herding, anchoring, and overconfidence, influences the investment decisions of individual investors. The results show that behavioural biases namely herding, and overconfidence have significant positive effect on the investment decisions. Rauf, Khurshid, and Afzal, (2018) explore the relationship of loss aversion and overconfidence with investment decisions and investment performance of equity investors. The findings show that loss aversion and overconfidence are significant predictors of investment decisions and investment performance of equity investors.

Parveen, and Siddiqui, (2018) clarify the mechanism by which disposition effect, anchoring, and overconfidence influence the investment return. The results show that anchoring and disposition effect has a positive effect on investment return and overconfidence has a negative influence on the investment returns. Another study conducted by Parveen, and Siddiqui, (2017) to find out the influence of heuristic biases on stock market returns. They used annual data for the period from 2005 to 2014 which was collected from the financial report of 184 non-financial companies listed at the PSX. Hypotheses were tested using logit regression. The results of the study demonstrate that heuristic-driven biases have a significant positive effect on the stock market return. Katper Azam, Karim, and Zia, (2019) study the influence of behavioural biases on the investment decisions by taking socio-demographic variables as a moderator. The finding suggests that behavioural biases significantly

associated with investment decisions and socio-demographic factors appear to moderate these relationships.

Javed et al ., (2017) also clarify the mechanism by which heuristic-driven biases influence the investment performance. The results demonstrate that heuristic-driven biases significant positive predictors of investment performance. Tin, and Hii, (2020) explore the influence of heuristic-driven biases on investment performance on debt securities and found that representativeness and availability have a significant impact on the investment performance and overconfidence and anchoring are the insignificant predictors of investment performance. Adielyani & Mawardi (2020) examined the impact of risk tolerance, herding behaviour, and overconfidence on Stock investment decisions and found that risk tolerance, herding behaviour, and overconfidence have a significant positive influence on the Stock investment decisions. Similarly, Afriani, & Halmawati, (2019) study the impact of herding, overconfidence, and cognitive dissonance on the stock investment decisions. The results suggest that herding, overconfidence and cognitive dissonance are the significant predictors of the stock investment decisions. Karimi, (2020) also documented that behavioural factors have a significant association with the financial decisions of investors.

A research study conducted by Sattar, Toseef, and Sattar, (2020) investigated the influence of behavioural biases on the investment decisions and found that behavioural biases are the significant predictors of investment decisions. Alrabadi et al., (2018) studied the link between psychological biases and investment performance of investors trading at the "Amman Stock Exchange". The outcomes intimate that behavioural biases namely herding, representativeness, availability, overconfidence, and familiarity have a significant positive influence on investment performance. Psychological biases such as loss aversion, disposition

effect, and confirmation also have a positive effect on the investment performance but the p-value did not reach a high significance value. Siraji, (2019) examine the correlation between heuristic-driven biases and investment performance of investor trading at the "Colombo Stock Exchange". The results of the study illustrate that representativeness, overconfidence, availability, and anchoring have a significant link with investment performance but gamblers fallacy has an insignificant connection with investment performance.

Raheja, and Dhiman (2019) study the effect of behavioural biases on investment decisions by taking risk tolerance as a mediator. The results suggest that behavioural biases are significantly related to investment decisions. Similarly, Malik, Hanif, and Azhar, (2019) explore the influence of overconfidence on investment decisions by taking risk tolerance as a mediator. The results of the study suggest that overconfidence positively influence investment decisions and risk tolerance appears to mediate this relationship. Ramalakshmi, Pathak, Jos, and Baiju, (2019) explore the mechanism by which cognitive biases influence investment decisions. The findings indicate that herding, representativeness, regret aversion, and overconfidence have a significant impact on investment decisions. Candraningrat, and Sakir (2019) investigate disposition effect and overconfidence and their influence on investment decisions. The findings demonstrate that disposition effect and overconfidence significantly related to investment decisions.

Some researchers disagree with the view that there is a positive relationship between heuristic-driven biases and the decisions and performance of individual investors. This school of thought is the motivating idea for this research. Individual investors who are suffering from heuristic-driven biases make trading mistakes or poor trading decisions, which lead them towards irrational behaviour. Several studies indicate that heuristic-driven biases

have a significant negative effect on the investment decision-making and performance of individual investors. The paper by Shah, Ahmad, and Mahmood (2018) explores the possible effects of heuristic-driven biases in investment decision making of individual investors. The results of their study suggested individual investors use cognitive heuristics i.e. overconfidence, representativeness, availability, and anchoring when trading stocks, resulting in irrational decisions. Another study on the topic by Ahmad, and Shah (2020) asserts that when individual investors use heuristics, their technical knowledge and reasoning faculties are impaired, leading to errors in judgment. As a result, investors make irrational decisions, which in turn adversely affect their investment performance. Dangol, and Manandhar, (2020) also assert that heuristic-driven biases such as representativeness, availability, overconfidence and anchoring, leads toward the irrational decision-making.

Furthermore, ul Abdin, Farooq, Sultana, and Farooq, (2017) seeks to highlight the consequence of heuristic-driven biases i.e. availability, representativeness, overconfidence and anchoring on investment decision and performance of individual investors. Overall results of their study indicate heuristics are the cause of stock market anomalies, resulting in irrational decision-making that affect the investment performance of investors negatively. Rasheed, Rafique, Zahid, & Akhtar, (2018), has also studied heuristic-driven biases and their influence on the investment decisions of individual investors. The results of their study divulge that the heuristic-driven biases significantly cause investors to deviate from rational decision-making. Similarly, Itzkowitz and Itzkowitz (2017) documented that during stocks trading investors use recognition-based heuristics such as name fluency (Green & Jame 2013; Anderson & Larkin 2012), name memorability (Grullon et al., 2004) and alphabetical ordering (Itzkowitz et al., 2015), consequently make irrational investment decisions.

According to Park et al. (2010), overconfidence negatively affects investment decisions and performance. Kengatharan and Kengatharan (2014) also suggest that overconfidence adversely affects investment-related choices and performance. Bashir et al. (2013) studied the impact of behavioural biases on investors' financial decision making and concluded that overconfidence bias has an impact on investors' financial decisions. Fagerstrom (2008) finds that the S&P 500 were inflated due to the problems of the overconfidence bias and the over-optimistic bias. Gervais, Simon and Odean (2001) have shown that both over-optimism, and overconfidence are personality traits which influence the decision-making process of individual investors. According to Seppala (2009) and Kafayat (2014), overconfidence bias negatively affects investors' ability to make rational decisions. Akhtar (2020) has pointed that overconfidence bias negatively associated with investment performance in the context of a developing market. Waseem-Ul-Hameed, Razzaq, and Humanyon, (2018) assert that due to overconfidence bias individual investor deviate from rational decision-making and take wrong investment decisions.

Chen et al. (2007) concluded that Chinese investors make trading mistakes or poor trading decisions due to representativeness bias. According to Lakonishok et al. (1994), companies engage in poor investments due to the problem of representativeness. Athur (2014) suggested that representativeness bias negatively affects investment decisions. Yaowen et al. (2015) also found that representativeness bias decreases decision-making. A study conducted by Onsomu (2014) describes how individual investors' decisions at the Nairobi Securities Exchange are affected by representativeness bias. Folks (1988) found that consumers' judgments of product performance were significantly influenced by the availability heuristic. A study conducted by Massa et al. (2005) indicated that individual stock picking decisions

are affected by availability bias. Shah et al. (2018), assert that Clark, who is an investment advisor, investigated how availability bias (How the news can hurt your investment decisions) affects investment decisions and suggested that availability bias negatively affects individuals' investment decisions. Afi, (2017) clarify the mechanism by which the disposition effect influences the trading volume stock volatility and stock return. The results of the study demonstrate that disposition effect negatively associated with trading volume stock volatility and stock return. Ahmad, (2020) investigate the herding behaviour and its influence on perceived market efficiency and investment management activities. The results suggest that individual investors who are suffering from herding behaviour intend to perceived that markets are inefficient, trade excessively in the stock market, and their investment performance affected adversely.

After reviewing the relevant literature in a similar domain, the author has concluded that the connection between heuristic-driven biases and investment management activities of individual investors appears to be quite controversial. Some researchers concluded that heuristic-driven biases had no correlation with investment management activities of individual investors, while some scholars demonstrated a positive relationship between heuristic-driven biases and investment management activities. Some scholars disagree with both the above views that heuristic-driven biases had no relationship and/or had a significant positive relationship with investment management activities of individual investors. This negating school of thought is also the motivating idea for this research. Several Scholars concluded that heuristic-driven biases had a significant negative association with the investment management activities. Based on the empirical literature following relationship is expected:

***Hypothesis 1**: The heuristic-driven biases have a significant negative influence on investment decisions of individual investors on the PSX*

***Hypothesis 2**: The heuristic-driven biases have a significant negative influence on the investment performance of individual investors on the PSX*

2.3.9 Heuristic-Driven Biases in Investment Decision-Making and Performance of Institutional Investors

Financial market behaviour is the aggregate of the behaviour of institutional and individual investors (Tuckett and Taffler, 2012). The main actors in financial markets are institutional investors (Gonnard et al., 2008), defined as "asset management companies, like investment funds, insurance companies, pension funds and other forms of institutional savings that principally work for their customers as agents" (Suto & Toshino, 2005). They are expected to be rational and to act professionally (Ahmad et al., 2017). Some researchers disagree with the view that institutional investors always make rational decisions and act professionally. This school of thought is the motivating idea for this research. Aren, Aydemir, and Şehitoğlu, (2016) presented a systematic synthesis of empirical studies conducted to clarify the impact of behavioural biases and their effect on the institutional investors' decision-making and performance. This paper explains that institutional investors exhibit behavioural biases which prevent them from acting rationally.

Another study by Ahmad, Ibrahim and Tuyon (2017) systematically reviewed quantitative investigations in order to synthesize empirical evidence on psychological factors of institutional investors in investment management activities. They have explained that behavioural forces are found to be significant among institutional investors. The behavioural biases of institutional investors in the Japan has been studied by Suto, and Toshino, (2005).

The results indicate that Japanese institutional investors exhibit some behavioural bias in the investment forecasting including, herding and excessive risk-aversion. As a result, institutional investors underperforming in corporate governance, which in turn adversely affect their investment performance.

The paper by Bouteska, & Regaieg, (2020) seeks to highlight the effect of the behavioural biases, i.e., overconfidence and loss aversion on the performance of US companies. The results of their study demonstrate that loss aversion bias has a significant influence on the performance of US companies in both sectors (industrial firms and service firms). On the other hand, the finding suggests that overconfidence bias has a significant positive effect on the performance of industrial firms but negatively influence the performance of service firms. Lowies, Hall, & Cloete (2016) have elucidated the impact of heuristic-driven biases namely, anchoring and adjustment and herding bias and their effect on the property fund manager's decision-making. The results are in the context of South Africa's property investment management, and it has revealed that anchoring bias has a significant influence on the investment decisions made by property fund managers while herding behaviour doesn't have any significant impact. By their paper Waweru, Munyoki and Uliana (2008) investigate the role of heuristic-driven biases in the investment decisions of institutional investors, actively trading on the Nairobi Stock Exchange and found that heuristic biases i.e. gamblers' fallacy, mental accounting, loss aversion, herding, regret aversion, representativeness, anchoring, overconfidence, availability affected the financial decisions of institutional investors on the "Nairobi Stock Exchange".

As Weiss-Cohen, Ayton, Clacher, & Thoma, (2019) identified that despite accumulating experience in financial markets and receiving training related to investment management,

institutional investors are unlikely to be immune from psychological biases namely herding behaviour. Moreover, Azimi, (2019) documented that institutional investors are suffering from behavioural biases, which adversely affect their investment performance. As Swedroe (2019) concluded that institutional investors namely professional fund managers are subject to the behavioural errors such as overconfidence bias and home bias which negatively influence their investment performance.

Koech, Koske, and Cheboi, (2020) clarify the mechanism by which representativeness influences the financial performance of SMEs by taking investment decisions as a moderator. The results of the study suggest that representativeness has a significant influence on the financial performance of SMEs and investment decisions appears to partially mediate this relationship. Nguyen, Dang, Pham, and Do, (2020) investigate the impact of CEOs overconfidence on the investment decisions. They used annual data for the period from 2014 to 2018 which was collected from the financial report of 480 companies listed at the "Vietnam Stock Exchange". Hypotheses were tested using an panel data regression model. The results of the study indicate that CEOs overconfidence has a significant positive effect on the investment decisions. Similarly, Hoang, Dang, and Tran, (2020) explore the effect of CEOs overconfidence on the dividend policy of firms listed at the "Vietnam Stock Exchange". They used annual data for the period from 2012 to 2018 which was collected from the financial report of 222 companies Hypotheses were tested using GLS model. The results the study suggest that CEO overconfidence has a positive impact on the dividend policy of firms.

Shah et al., (2019) investigate the role of herding in firm value in China. The results of the study show that herding behavioural has a significant effect on the firm values. Lamptey, and

Marsidi, (2020) examined the impact of anchoring on the working capital management and performance of SMEs and found that anchoring has a significant impact on the working capital management and performance of SMEs. Eshraghi, and Taffler, (2012) examined the influence of overconfidence on the investment performance of mutual fund managers and found that overconfidence of mutual fund manager is negatively associated with their investment performance. Chow et al., (2011) also documented that overconfidence of mutual fund manager hurt their investment performance.

Rzeszutek, and Szyszka, (2020) explored the influence of overconfidence on the IPO of corporate managers. The results of the investigation demonstrated that overconfidence corporate managers make irrational decisions related to IPO. Similarly, Rzeszutek, Godin, Szyszka, and Augier (2020) examine the managers' overconfidence in IPO decisions and it influences stock market volatility and financial stability. The results of the study exhibited that overconfident firms have better performance as compared to other firms but overconfidence is negatively related to financial stability.

After reviewing the literature in similar domain author observed that some investigations demonstrated that heuristic-driven biases positively influence the investment management activities of institutional investors, while number of studies have demonstrated adverse relationship between them, other researchers suggested that the impact is being conditional, weak and/or non-existing. Thus despite accumulating experience in financial markets and receiving training related to investment management activities, institutional investors are unlikely to be immune from heuristic-driven biases. They are sufferings from heuristic-driven biases which cause investors to deviate from rational decision-making and make

trading mistakes which is harmful to institutional investors. Based on pervious literature following relationship is expected.

***Hypothesis 3**: The heuristic-driven biases have a significant negative influence on investment decisions of institutional investors on the PSX.*

***Hypothesis 4**: The heuristic-driven biases have a significant negative influence on the investment performance of institutional investors on the PSX.*

2.3.10 Are Individual and Institutional Investors Equally Influenced by Heuristic-Driven Biases?

Generally, it has been shown that both novice and expert investors have different strategies, which result in differing outcomes (Schmeling, 2007). "Institutional and individual investors also differ in their risk perceptions, time horizon and profit goals" (George et al., 2005). Fisher and Statman (2002) "propounded that institutional investors, just like individual investors, were subject to behavioural biases and these biases had equal influences on both investor groups". Some researchers disagree with this view and this school of thought is the motivating idea for this research. Itzkowitz and Itzkowitz (2017) argue convincingly, all investors are not the same, as a result, heuristic-driven biases may not influence all the investors equally.

One of the factors that can lead to varying heuristic use is the level of investor knowledge. Because institutional investors have practiced skills of analysis and amplification, they are more aware of which data are relevant when making decisions, which may help protect them from influence of biases (Alba & Hutchinson, 1987). Institutional investors have a wide variety of trading experience and more training than individual investors. Thus, we can say that institutional investors to be less affected by heuristic biases than are individual investors

The paper by Khan, et al., (2017) seeks to highlight the effect of the heuristic biases, i.e. representativeness, anchoring and adjustment, and availability on the investors' stock buying decisions. The results are in the context of Pakistan and the Malaysian Stock Market, and it has proved that these heuristic biases have a significant impact on the investors' stock buying decisions. This paper shows that the heuristics effect similarly across the sample countries. This paper also explains that higher educated and more experienced investors are less likely to suffer from these heuristics. Itzkowitz and Itzkowitz (2017) studied the investment behaviour of individuals and institutional investors to discover the distinction in their behaviour and the impact of behavioural biases in their financial decision making. The results of their study indicate investors use heuristics when trading stocks, resulting in irrational decisions. The research also reveals that institutional investors are relatively immune to heuristic biases as compared to individual investors because both types of investor's process information differently as result heuristics may not affect all investors equally.

Similarly, another study on the topic by Chou and Wang (2011) asserts that institutional investors were less subject to behavioural bias as compared to individual investors. A qualitative approach has been employed by Jaiyeoba, Adewale, Haron, and Ismail, (2018) to understand behavioural biases and its influence on the investment decisions of individuals and institutional investors who are trading at Malaysian stock exchange. The results of the study revealed that Malaysian individual and institutional investors suffering from psychological biases. Moreover, the findings exhibited that individual investors are likely to be more influenced by the emotions and psychological biases as compared with institutional investors. Similarly, a study conducted by Chaudary, (2019) also highlighted that individual

investors suffering from salience heuristic more than institutional investors specifically for short-run investment choices.

Furthermore, Jaiyeoba, Abdullah, & Ibrahim, (2020) stated that institutional and individual investors of Malaysia were subject to psychological biases i.e. representativeness heuristic, anchoring bias, religious bias, herding bias, overconfidence bias, and these biases had equal influences on both investor groups except herding bias and religious bias. These groups of investors are differently influenced by herding bias and religious bias. They also argue convincingly institutional investors do not completely behave rationally during the investment decision-making process. As Li, Rhee, and Wang (2017) assert that both individual and institutional investors are suffering from herding behaviour. Additionally, they also highlight three important findings regarding the difference between institutional and individual investors. First, institutional investors which have better information trade more selectively in comparison to less-informed individual investors who allocate their investment across stocks evenly; second, while institutional investors rely on rational analysis for their trades, individual investors make investment decisions by using public information as they are influenced by attention-grabbing events and market sentiment; and third investors are less concerned with up- and down-market movements whereas institutional investors react asymmetrically to up- and down-market movements.

After reviewing the relevant literature, the author has identified that during stock trading it seems inconceivable to contend that institutional investors "completely" behave rationally. They deviate from rational decision-making during investment management because of heuristic-driven biases but less likely to be influenced by these heuristics in comparison to the individual investors. Based on the prior literature, the following relationship is expected.

Hypothesis 5: *Compared to individual investors, institutional investors are relatively immune to heuristic-driven biases in Pakistani context.*

2.3.11 Heuristic-Driven Biases and Market Efficiency

Many studies have been conducted on heuristic-driven biases and their effect on market efficiency; some of them found a positive relationship between heuristic-driven biases and market efficiency, which means that market efficiency increased due to heuristic biases. According to Ko and Huang (2007), irrational behaviour does not always decrease market efficiency. Several authors documented that overconfident investors believe that they can earn abnormally large returns by outperforming the market. Investors that are overconfident can help increase market efficiency because they spend enough time and resources collecting more and more information, which is why prices of securities are close to their fundamental value. Investors use their resources to collect new information; sometimes they underestimate information from others and try to get more and more information on their own behalf (Gruber, 1996; Malkiel, 1995; Elton et al., 1993).

Furthermore, Ko and Huang (2007) found that overconfidence bias improves market efficiency because overconfident investors bring more and more information into the market, so the chance of mispricing is very small as a result of a high level of rationality in the market. Thus in the studies concluding in favour of overconfidence bias and market efficiency, researchers argue that overconfident investors can help increase market efficiency because they spend time and resources' collecting more and more information and that is why the prices of securities are closer to their fundamental value as a result, the market becomes efficient.

Some researchers disagree with the view that there is positive relationship between heuristic-driven biases and market efficiency. This school of thought is the motivating idea for this research. The previous literature shows that behavioural biases can make financial markets less efficient by mispricing securities, even though there are rational arbitrageurs who bring security prices to their fundamental values (Kyle and Wang, 1997; Odean, 1998). The price of securities do not always hold with their fair value but can deviate from their fundamental value because of traders who are not fully rational (Barberis and Thaler, 2003). Shah et al. (2012) said that, due to heuristic biases and framing effects, the price of securities deviates from their fundamental value and, as a result, markets become inefficient. Hadi (2017) studies the effect of behavioural biases on the perceived market efficiency. The results show that financial markets move toward inefficiency due to behavioural biases i.e. illusion of control bias, and availability bias. Shah, Ahmad, and Mahmood (2018) have explained the impact of various heuristic biases and their effect on the investor decision-making and perceived market efficiency. The results are in the context of the PSX, and it has proved that when investors use heuristics, they reduce the mental effort in the decision-making process, but that leads to errors in judgment and, as a result, investors make incorrect investment decisions, which could lead to the market becoming inefficient.

According to Malkiel (2003), when investors experience success again and again, they suffer from overconfidence bias and become irrational in their decision-making, which leads to market inefficiency. Hirshleifer et al. (1994) conducted a study in which they found that overconfidence bias can lead to inefficient results. Overconfident investors in the market engage in excessive trading and, therefore, markets become inefficient (Debondt and Thaler, 1995; Statman et al., 2006). A study conducted by Inaishi et al. (2010) to investigate the

effect of overconfident investor behaviour on stock markets concluded that, due to increasingly overconfident investors, the market increases or rising trends occur in the market.

Several investors assert that the representativeness heuristic negatively affects perceived market efficiency, as people make probabilistic judgments using it (Tversky & Kahneman, 1973); the "positive feedback hypothesis" states that correct or incorrect information causes respectively positive or negative attitudes, that emphasize the impact of information on an asset's price. One particular form of representative heuristic operates when people over-emphasize their most recent experiences (Clapp & Tirtiroglu, 1994). This representative heuristic affects the market when investors are either over-optimistic due to their past successes, or over-pessimistic due to past losses; subsequently the price of securities deviates from their intrinsic or fair value (Chong et al., 2011) and, as a result, the market becomes inefficient. Individual investors believe that past returns are indicative of future returns (Chen et al., 2007), which reflects representativeness. According to DeBondt and Thaler (1985), over-optimism due to past successes and over-pessimism due to past losses could affect the decision-making of individual investors and subsequently prices deviate from their fundamental levels and the market becomes inefficient.

Tversky and Kahneman (1973) suggest that individuals determine the chances of an event by using the availability heuristic. In their study, they explain that, the availability heuristic causes individuals to suffer from "systematic biases," which leads them to overestimate the probability of an event being repeated. People use the availability heuristic in probabilistic situations to avoid risk, which then negatively affects their decision making (Keller et al., 2006) and, as a result, the market becomes inefficient. According to Clark (2014), when

individuals "hear dramatically bad news", they tend to overrate the chance of it repeating; this phenomenon is known as the availability heuristic or availability bias. He also explains that the availability bias negatively affects individuals' investment decisions and, as a result, markets become inefficient. Ali, (2019) examine overconfidence and self-attribution and their influence on perceived market efficiency. the results intimated that overconfidence and self-attribution negatively influence the perceived market efficiency.

After reviewing the literature in a similar domain the author observed that some investigations demonstrated that heuristic-driven biases positively influence the market efficiency which means market efficiency increases when investors excessively rely on fast and frugal heuristics. While a number of studies have demonstrated an adverse relationship between them, which means markets become inefficient, when investment strategies rely on the heuristic factors and this school of thought is the motivating idea for this research. Based on the empirical literature following relationship is expected.

***Hypothesis 6**: The heuristic-driven biases have a significant negative influence on perceived market efficiency of individual investors.*

***Hypothesis 7**: The heuristic-driven biases have a significant negative influence on perceived market efficiency of institutional investors.*

2.4 What are Anomalies About?

The literal meaning of an anomaly is an unusual event. According to Frankfurter, and McGoun, (2001) anomaly can be defined as "an irregularity, a deviation from the common or natural order, or an exceptional condition or circumstance". Anomaly is a generic term by its nature and applies to any fundamental novelty of reality or a new and unpredicted

phenomenon or surprise about any hypothesis, theory, and model (Frankfurter,& McGoun, 2001). If we talk about the stock market anomalies, it can be defined as an unusual occurrence or abnormality in a smooth pattern of the stock market. According to Tversky and Kahneman (1986), "an anomaly is a deviation from the presently accepted paradigms that are too widespread to be ignored, too systematic to be dismissed as a random error, and too fundamental to be accommodated by relaxing the normative system". According to conventional finance theory, a stock market anomaly is a situation in which a stock or group of stocks performance deviate from the assumptions of efficient market hypotheses. The up- and down-market movements that cannot be explained using efficient market hypotheses are known as stock market anomalies (Silver 2011). Thus anomalies refer to deviation from the normal situation. When the actual result is different from the expected result under a given set of assumptions this phenomenon is known as anomalous. As per Pompain (2006), these anomalies can be divided into three main categories: calendar, fundamental and technical.

Fundamental anomalies are the irregularities that emerge when stock prices are anticipated based on fundamental analysis. Investors consistently overestimate or underestimate the prospects of growth companies which lead to irregularities. Technical anomalies are the irregularities that emerge when stock prices are anticipated based on technical analysis. Calendar anomalies are the irregular behaviour of stock prices during certain time period. Pattern of stock return vary from year to year or from month to month. Example of calendar anomaly is "the January effect" (Pompain, 2006). According to behavioural scientists (i.e. Daniel, Hirshleifer and Subranmayam, 1998; Barber and Odean, 2008 etc.) some anomalies persist in the market that may affect the investment decisions and performance of finance practitioners and which produce market inefficiency. When investors used heuristics in order

to make their financial decisions, they reduce the mental effort in the decision-making process that lead to errors in judgement (Shah et al., 2018), as a results, anomalies arise in the market which in turn affect the investment management activities of investors and lead to market inefficiency. Several studies, however, have demonstrated that in reality markets are inefficient, because of behavioural biases that give rise to anomalies which in turn lead to market inefficiency (Ajmal, Mufti & Shah, 2011) and affect the investment decisions and performance of investors (Ul Abdin et al., (2017).

The paper by Abdin, Waqas, and Ahmad, (2019) empirically investigated whether behavioural biases namely loss aversion, regret aversion, mental accounting, and self-control are anyway related to the occurrences of stock market anomalies (i.e. calendar, fundamental and technical anomalies). The results revealed that mental accounting positively related to fundamental, technical and calendar anomalies and loss aversion has a significant positive influence on technical anomalies and Similarly, regret aversion is positively associated with fundamental anomalies on the other hand self-control biases insignificant of predictor calendar and technical anomalies and loss aversion also do not have a significant effect on calendar anomalies. Isidore and Christie, (2018) also assert that behavioural biases are the main reason for existence of anomalies in the stock market. As ul Abdin et al. (2017) argue convincingly only two anomalies namely, technical and fundamental mediate the relationships between heuristic biases and investment performance that is why the study has taken these two anomalies as mediator variables. How anomalies mediate the relationship between heuristics, investment decision, investment performance and market efficiency discussed below.

2.4.1 Mediating Role of Anomalies

A number of previous studies indicate that anomalies mediates the bivariate relationship. When investors used heuristics to make their financial decisions, they reduce the mental effort in the decision-making process that lead to errors in judgement (Shah et al., 2018), as a results, anomalies arise in the market which in turn affect the investment decisions and performance of investors and which could lead to the market becoming inefficient. ul Abdin, et al. (2017) finding shows that fundamental anomalies mediate the relationship between the heuristic-driven biases and investment performance. Psychologically, this all means that heuristic-driven biases are the causes of fundamental anomalies which ultimately affect the investment decisions and performance of investors. Every investor is guided by the divergent prospect and the paper by Abdin, et al., (2017) explored the different prospect (namely regret aversion, loss aversion, and mental accounting) of the individual investors who are operating on the PSX and their effect on investment decisions and performance with mediating role of stock market anomalies i.e. technical, fundamental, and calendar anomalies. The results indicate that calendar and fundamental anomalies mediate the relationship between certain prospect elements and investment decisions and investment performance of individual investors. Of these prospect elements, regret aversion was a significant predictor of investment decisions and performance, as mediated by calendar anomalies. It also has a significant influence on investment decisions and performance with the mediating role of fundamental anomalies.

Lazuarni, (2019) empirically investigated whether heuristic-driven biases such as hindsight representativeness and availability are anyway related to the occurrences of stock market anomalies (fundamental and technical anomalies) in the context of Indonesia. And also

examined the mediating effect of these anomalies between the relationship of heuristic-driven biases and the investment performance of individual investors who are treading at the Indonesia stock exchange. The findings suggest that heuristic biases namely hindsight and representativeness have a significant positive effect on fundamental and technical anomalies which means that hindsight and representativeness biases are reasons for the existence of the technical and fundamental anomalies in Indonesian stock market. The results of the study also revealed that the relationship between heuristic- driven biases (namely hindsight and representativeness biases) and the investment performance of individual investors is partially mediated by technical and fundamental anomalies and these anomalies do not have any mediating effect between the relationship of availability bias and the investment performance of individual investors.

After reviewing the literature in similar domain the author observed that some investigations demonstrated that due to heuristic-driven biases investors make errors in judgment, as a result, anomalies arise in the stock market which in turn affects the investment management activities of individual and intuitional investors and which could lead to the market becoming inefficient. Thus technical and fundamental anomalies meditate the relationships between heuristic-driven biases, perceived market efficiency and investment management activites. Based on previous literature following relationship is expected.

Hypothesis 8: *Fundamental and technical anomalies mediate the relationship between heuristics and investment decisions of individual investors on the PSX.*

Hypothesis 9: *Fundamental and technical anomalies mediate the relationship between heuristics and investment performance of individual investors on the PSX.*

Hypothesis 10: *Fundamental and technical anomalies mediate the relationship between heuristics and perceived market efficiency of individual investors on the PSX.*

Hypothesis 11*: Fundamental and technical anomalies mediate the relationship between heuristics and investment decisions of institutional investors on the PSX.*

Hypothesis 12: *Fundamental and technical anomalies mediate the relationship between heuristics and investment performance of institution investors on the PSX.*

Hypothesis 13: *Fundamental and technical anomalies mediate the relationship between heuristics and perceived market efficiency of institutional investors on the PSX.*

2.5 What is Financial Literacy About?

The terms financial knowledge, financial capacity, and financial literacy are often used synonymously. According to Noctor, et al., (1992), financial literacy is "the ability to make informed judgments and take effective decisions regarding the use and management of money." Financial literacy covers basic knowledge regarding financial instruments namely savings, budgeting, investments and risk management (Worthington, 2006). According to Huston (2010), financial literacy has two main dimensions: one is understanding or knowledge of personal finance and the second is using it. Similarly, Remund (2010) asserts that financial literacy is defined by two key components: how well an individual understands financial information, and how well an individual applies that information to manage their personal finances through long-term financial planning and short-term decision making. Servon and Kaestner (2008) define financial literacy as "a person's ability to understand and make use of financial concepts". So financial literacy means how well an individual can understand and use personal finance-related information.

Moreover Hung et al., (2009) assert that financial literacy is understood as "the ability to use knowledge and skills to manage financial resources effectively for a lifetime of financial well-being". Huhmann (2014) developed a conceptual model to recognize the factors of financial literacy and explain the mechanism for its development. According to this model, financial literacy contains three components: the first one is capacity – the individual's basic cognitive ability, the second is their prior knowledge, and the third is proficiency – the application of the financial knowledge to achieve the desired outcomes. Thus understanding of financial knowledge and the ability to use it is called financial literacy.

Financial literacy has become the phenomenon of interest for practitioners, policymakers, regulators, academicians, and researchers because of its relevance to financial management decisions (Aren & Aydemir, 2014). Financial literacy plays an important role in rational investment decisions and long-term financial stability. According to Agarwal et al. (2015) due to a lack of sufficient knowledge concerning financial concepts and instruments, investors fail to make rational choices about the use and management of money. Lusardi and Mitchell (2011) argue convincingly, financial literacy is prevalent all over the world, and knowledge relating to the stock market is exceptionally low. Also, as Van Rooij et al. (2011) added, individuals with a low level of financial literacy, particularly those who have less knowledge regarding bonds and stocks, partake less frequently in the stock market (B¨onte & Filipiak, 2012). Furthermore, Jureviciene and Jermakova, (2012) documented that lack of financial knowledge caused investors to stay away from investments. The literature also highlighted that financial literacy is associated with better financial planning. According to Lusardi and Mitchell, (2008) financial knowledge empowers investors to manage their investments and obtain the maximum return on investments. They additionally reported that

an increase in the level of financial literacy increases the likelihood of someone participating in the stock market. Rispens, (2013) avows that financial literacy has a real potential to modify the behaviour of investors. In order to make rational investment decisions, sufficient financial literacy is required (Mandell & Klein, 2009).

In addition to being important for financial behaviour, financial literacy is also associated with risk-taking behaviour. Kabra, Mishra, and Dash, (2010) state that financial literacy and risky behaviour are key determinants of investment decision-making. According to Diacon, (2004) financial experts and people with low levels of financial literacy differ in their financial risk perceptions. Financial experts prefer to invest in risky securities as compared to individuals who are not financially literate or having a lack of financial literacy. Furthermore B¨onte and Filipiak, (2012) also documented that individuals with lower level of financial literacy are less likely to participate in the stock market. Weber and Milliman (1997) found that investors who have more financial awareness, are less likely to perceive financial risk and have a higher intention toward the stock market investment. They also reported that investors financial risk perception determined their decision of holding assets. Similarly, another study by Wanyana, (2011) divulged that investors with financial expertise and knowledge has a lower risk perception and a higher level of intention to investments. In this current study we explore the effect of heuristic-driven biases on investment management activities and perceived market efficiency by taking financial literacy as moderating. The moderating effect of financial literacy are cited below.

2.5.1 Moderating Role of Financial Literacy

A number of previous studies indicate that financial literacy moderates the bivariate relationship. Hayat and Anwar (2016) document that the relationship between overconfidence and individual investment decisions is positively moderated by financial literacy. A study conducted by Ullah (2015) indicates that financial literacy positively moderates the relationship between self-serving attribution bias and individual investment decisions. He also states that the relationship between illusion of control bias and individual investment decisions is negatively moderated by financial literacy. Aren and Aydemir (2015) find that financial literacy moderates the relationship between individual factors and risky investment intention. Khan, (2020) investigated cognitive biases notably mental accountability, disposition effect, and herding bias of individual investors and their effect on investment decisions by taking financial literacy as a moderator. The results of the study revealed that financial literacy negatively moderates the relationship between cognitive biases (specifically mental accountability and herding) and investment decisions, on the other hand, the relationship between disposition effect and investment decisions is positively moderated by the financial literacy.

Additionally, Mehmood, Bashir, and Khan, (2019) explored the possible effect of heuristic-driven biases (namely anchoring and availability) and emotional-driven biases (notably Self-Control Bias) on investment decisions with moderating role of financial literacy. The findings suggest that financial literacy moderates the relationship between heuristic-driven biases and investment decisions and do not appears to moderate the relationship between emotional-driven biases and investment decisions.

Hadi, (2017) asserts that financial literacy enhances an investor's ability to control and manage his emotions, and thus enabling them to make successful investment decisions. A study conducted by Rasool, and Ullah, (2020) explore the mechanism by which financial literacy influences the behavioural biases of investors. The results of the study suggested that financial literacy has a significant negative effect on the behavioural biases of investors. Psychologically this means that, as financial literacy of individual investors increases, behavioural biases decrease. Niazi and Malik (2019) studies the impact of financial attitude on the investment decision-making with moderating role of financial literacy. The results of the study suggest that financial literacy appears to moderate the relationship between financial attitude and investment decision-making. The effect of overconfidence heuristic on the decisions and performance of individual investors, with the mediating role of risk perception and the moderating role of financial literacy studied by Ahmad, and Shah, (2020). The results conclude that risk perception fully mediates the relationships between the overconfidence heuristic on the one hand and investment decisions and performance on the other.

At the same time, financial literacy appears to moderate these relationships. According to them, overconfidence is a heuristic bias in which investors rely on ostensibly to reduce the risk of losses in unpredictable situations. When individual investors use heuristics, their technical knowledge and reasoning faculties are impaired, leading to errors in judgment. As a result, investors make irrational decisions, which in turn adversely affect their investment performance. They also argue convincingly, financial literacy plays an important role in overcoming the negative effect of heuristics factors. If investors used heuristics with the

inclusion of financial knowledge negative effect of heuristic factors will reduce as a result investors can be positively utilized heuristics in their investment management activities.

Rooij et al., (2011) show that financial literacy helps individuals in the investment decision-making process and assists them in making unbiased decisions. The paper by Baker, Kumar, Goyal, and Gaur, (2019) seeks to highlight the effect of financial literacy on behavioural biases of individual investors. The results reveal that financial literacy has a negative association with the herding bias and disposition effect, which means that, as increased investment literacy appears to be associated with reducing herding bias and disposition effect among the individual investors. Similarly, Ateş, et al. (2016) found that financial literacy has a markedly negative relationship with behavioural biases such as cognitive dissonance, loss aversion, overconfidence, and framing biases. This means that as an increased level of financial literacy tends to reduce these behavioural biases.

Furthermore, the findings of Dhar, and Zhu, (2006) show that professional and educated investors are less likely to be affected by the disposition effect and can more effectively rebalancing their portfolio (Calvet et al. 2009). As Jonsson, Söderberg, and Wilhelmsson, (2017) also found that financial literacy is negatively associated with the disposition effect, meaning that investors' who have sufficient knowledge regarding financial concepts, financial instruments and current market conditions (Agarwal et al., 2010) are less susceptible to the disposition effect (Leon & Pringganingrum, 2018).

Barno, Cheboi, and Muganda, (2020) examined the impact of overconfidence on the investment decisions among SMEs and Micro firm by taking financial literacy as a moderator. The finding show that overconfidence has a significant influence on the investment decision among SMEs and Micro firms and financial literacy appear to moderate

this relationship. Moreover, Novianggie, & Asandimitra, (2019) explore the mechanism by which behavioural biases namely emotional and cognitive biases influences investment decisions by taking financial literacy as a moderator. The results of the study suggest that representativeness, herding bias, and overconfidence significant predictors of investment decisions but financial literacy does not appear to moderate these relationships. Niazi, and Malik, (2019) argue conveniently, financial literacy appears to moderate the relationship between financial attitude and investment decisions of investors. Khalid, Javed, and Shahzad, (2018) explored the connection between behavioural biases and investment decisions by taking financial literacy as a moderator. The results reveal that herding and overconfidence are significant predictors of investment decisions and financial literacy positively moderate these relationships.

After reviewing the relevant literature in a similar domain, the author has concluded that the moderating effect of financial literacy between the relationship of heuristic-driven biases, perceived market efficiency and investment management activities appears to be quite controversial. Some researchers concluded that financial literacy appears to positively moderate the relationship between heuristic-driven biases and investment management activities, between heuristic-driven biases and perceived market efficiency, while some scholars demonstrated a negative moderating role of financial literacy between the relationship of heuristic-driven biases and investment management activities, between heuristic-driven biases and perceived market efficiency, other researchers suggested that financial literacy does not appears to moderate these relationships. Based on pervious literature following relationship is expected.

Hypothesis 14: *Financial literacy moderates the relationship between heuristic-driven biases and investment decisions of individual investors on the PSX.*

Hypothesis 15: *Financial literacy moderates the relationship between heuristic-driven biases and investment performance of individual investors on the PSX.*

Hypothesis 16: *Financial literacy moderates the relationship between heuristic-driven biases and investment decisions of institutional investors on the PSX.*

Hypothesis 17: *Financial literacy moderates the relationship between heuristic-driven biases and investment performance of institutional investors on the PSX.*

Hypothesis 18: *Financial literacy moderates the relationship between heuristic-driven biases and perceived market efficiency of individual investors.*

Hypothesis 19: *Financial literacy moderates the relationship between heuristic-driven biases and perceived market efficiency of institutional investors.*

2.6 Heuristic-Driven Biases in Short-Term and Long-Term Investment Decisions

Many studies have been conducted on heuristic-driven biases, short-term and long-term investment decisions; some of them found a positive relationship of heuristic-driven biased with both short-term and long-term investment decisions. The latest paper by Samra Chaudary, (2018) seeks to highlight the effect of Salience heuristic on short-term and long-term investment decisions. The results of their study suggested a significant positive impact of Salience heuristic on both short-term and long-term investment decisions. Some researchers disagree with the view that there is a positive relationship between heuristic-driven biases short-term and long-term investment decisions. This school of thought is the

motivating idea for this research. Heuristic-driven biases impair the quality of investment decisions both in the short and long run.

Heuristic-driven biases have very bad consequences on both short-term and long-term investment decision-making. A study conducted by the Pikulina et al., (2017) assert that under-confidence is associated with investment choices that are not value-maximizing: the participants in the highest underconfident individuals choose inappropriately low investments. Venkatapathy and Sultana, (2016) study the heuristics in decision making and concludes that heuristics highly influence short-term investors rather than long-term investors. The Bayesian approach is used by Guo, McAleer, Wong, and Zhu (2017) to study the "market anomalies, including short-term underreaction, long-term overreaction, and excess volatility, during financial crises". This paper explains that short-term underreaction exists due to conservative heuristics and long-term overreaction exist as a result of using representative heuristics. A research study conducted by Ahmad, (2020) to explore the mechanism by which underconfidence heuristic-driven bias influences the short-term and long-term investment decisions of individual investors. The results of study suggest that underconfidence bias has a markedly negative influence on the short-term and long-term decisions made by investors in an emerging markets.

After reviewing the literature in similar domain, the author observed that some investigations demonstrated that heuristic-driven biases positively influence the short-term investment decisions and long-term investment decisions, while number of studies have demonstrated adverse relationship between them, other researchers suggested that the impact is being conditional, weak and/or non-existing. Based on the empirical literature following relationship is expected.

***Hypothesis 20**: The heuristic biases have a significant negative influence on the long-term investment decisions.*

***Hypothesis 21**: The heuristic biases have a significant negative influence on the and short-term investment decisions.*

After reviewing the relevant literature in a similar domain, the author has concluded that the relationship between heuristic-driven biases, perceived market efficiency, and investment management activities, appears to be quite controversial. Some investigations demonstrated that heuristic-driven biases namely cognitive heuristic-driven biases and recognition based heuristic-driven biases positively influence the perceived market efficiency and investment management activities of institutional and individual investors. while number of studies have demonstrated adverse relationship between them, other researchers suggested that the impact is being conditional, weak and/or non-existing. The literature also show that during stock trading it seems inconceivable to contend that institutional investors "completely" behave rationally. They deviate from rational decision-making during investment management because of heuristic-driven biases but less likely to be influenced by these heuristics in comparison to the individual investors.

Thus heuristic-driven biases, such as cognitive heuristic biases and recognition heuristic biases, directly or indirectly affect market efficiency and investment decisions. Market efficiency depends on trading behaviour of investors, so these heuristic-driven biases cause markets to be inefficient. Investors who fell prey to heuristic-driven biases may take incorrect investment decisions due to bounded rationality, as a result anomalies persist in the market and these anomalies produce market inefficiency. Financial literacy plays an important role in overcoming the negative effect of heuristics factors. If investors used heuristics with the

inclusion of financial knowledge negative effect of heuristic factors will reduce as a result investors can be positively utilized heuristics in their investment management activities.

2.7 Research Model

The objective of this section is to develop the conceptual framework on the basis of literature review, observation and intuition, on which the whole research is based. It discusses the interrelations among the variable of interest to the study. According to Sekaran (2003) "it is logically developed, described and explained network of association among the variable deemed relevant to the problem situation and identified through such processes as an interview, observation, and literature survey. Experience and intuition also guide in developing the conceptual framework". With the help of a conceptual framework, the reader can easily understand the research phenomena.

As mentioned in the literature review, heuristics-driven biases undoubtedly impact the investment management activities of investors in the financial markets, especially in the stock markets, as well as having a significant effect on perceived market efficiency. Based on the gaps analysis theories and evidence, Figure 2.2 and 2.3 conceptual frameworks is derived to empirically examined the role of heuristic-driven biases in perceived market efficiency and investment management activities of investors with the mediating role of anomalies (fundamental and technical) and moderating role of financial literacy.

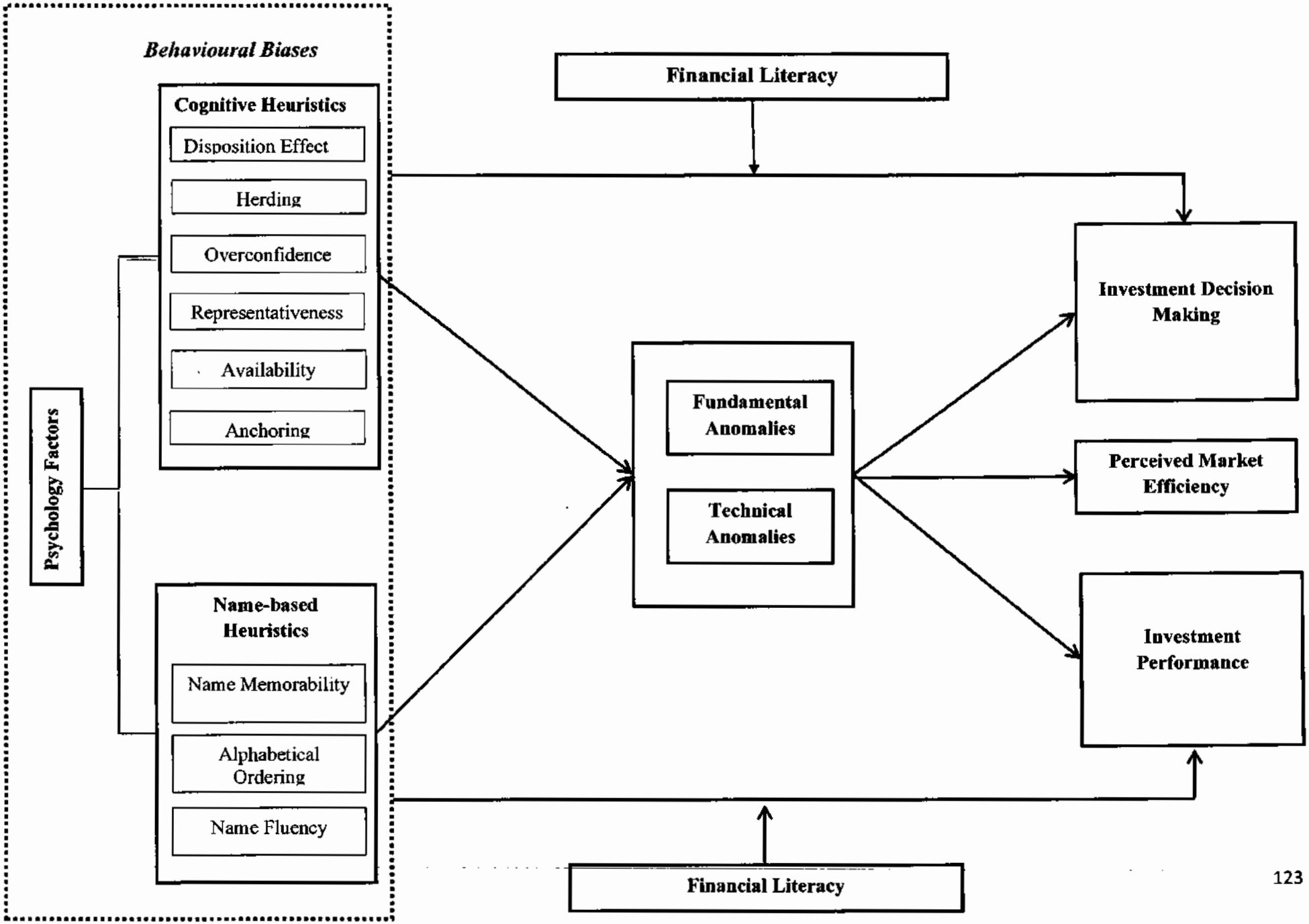

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Figure 2.3 Conceptual Framework 1

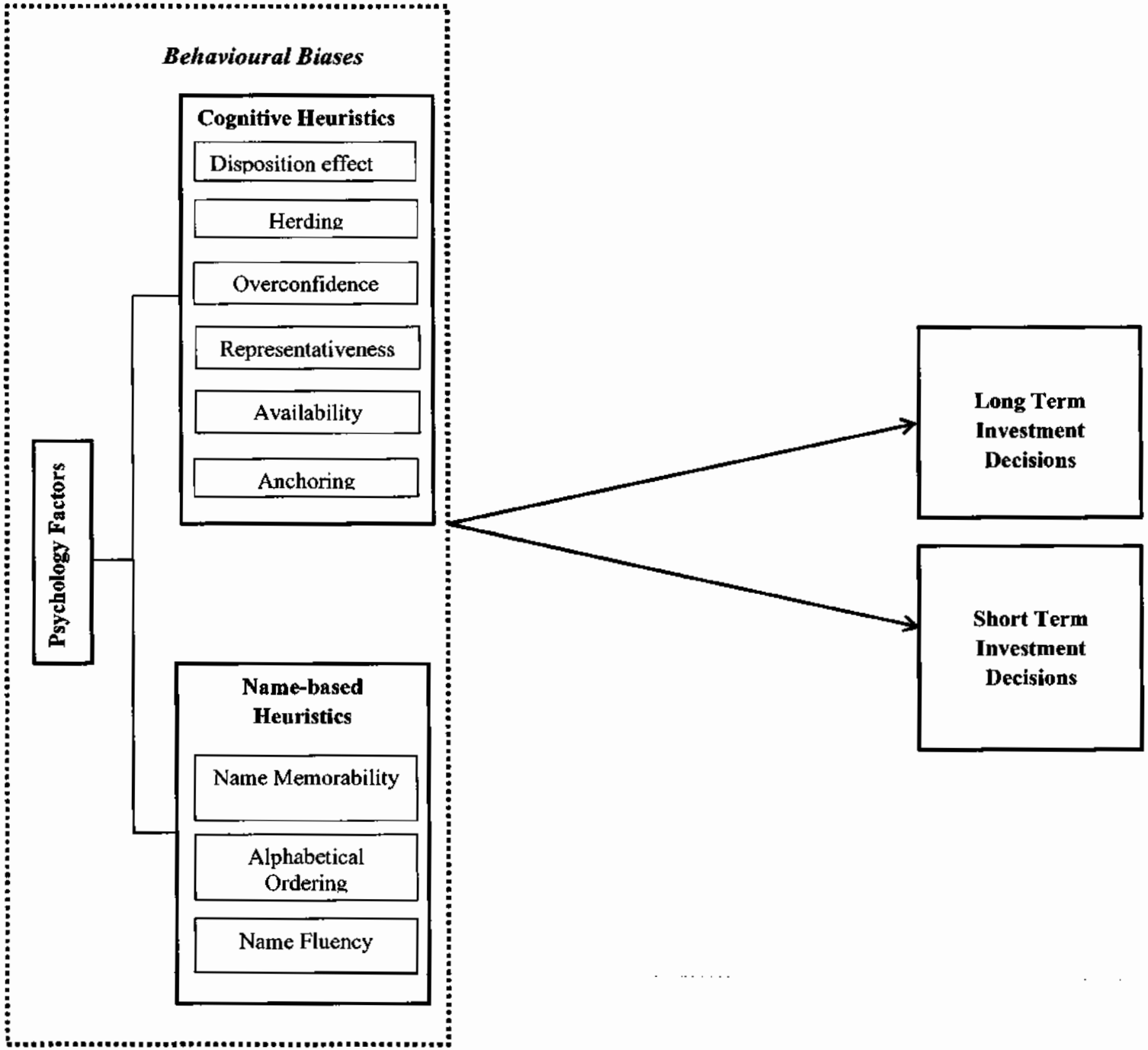

Figure 4 Conceptual Framework 1

Chapter Three

METHODOLOGY AND RESEARCH DESIGN

3.1 Introduction

This chapter explains the study's research methodology and research design; A "research methodology is an approach for problem-solving and arriving at new knowledge of the subject in question, including everything that contributes to achieving the goal" (Holme & Solvang, 1996). The research design furnishes the framework for collecting and analyzing the data (Bryman & Bell, 2007; Ghauri & Gronhaug, 2010). This chapter proceeds as follows: Section two is concerned with research philosophy, which consists of ontological and epistemological assumptions. Section three describes the research approach used to develop the study's theoretical framework. Section four describes the nature and type of research. Section five is devoted to the research strategy. In the sixth section, the researcher discusses the research design. Section seven concerns the choice of digital resources and literature search strings. In the eighth section, the author discusses the target population. Section nine is related to sampling and data collection. Section ten describes the instrument used to operationalize the variables. Section eleven contains interview guide questions. Section twelve is related to the data analysis method. Section thirteen is related to econometric equations.

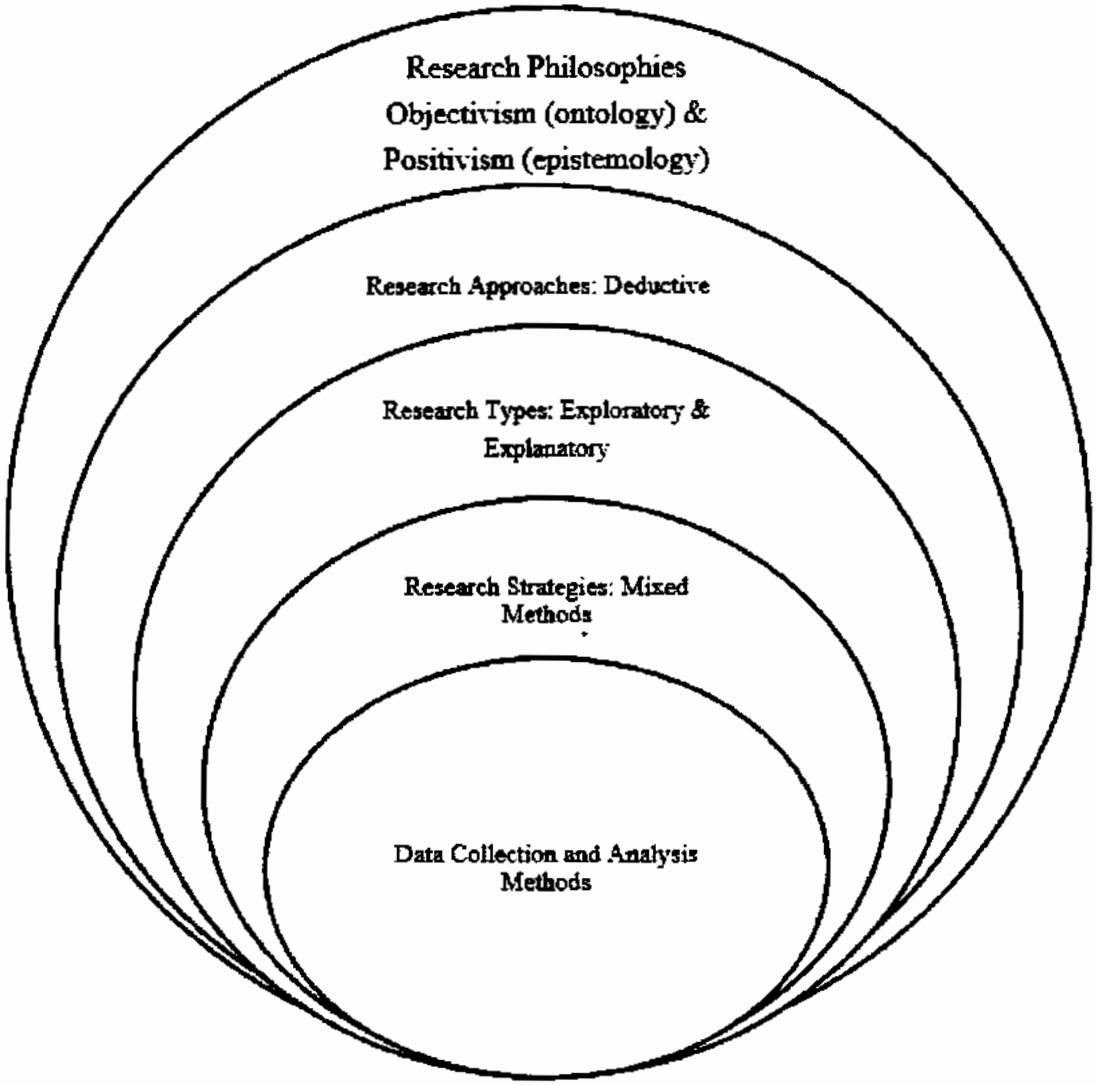

Figure 3.1. Research Design Process

3.2 Research Philosophy

Research is conducted on the basis of observation (data and information) and reasoning (theory); therefore, a philosophy of research helps to explain the research approach and research design, as well as methods of collecting and analyzing data (Blumberg, et al., 2005). When discussion concerns the research philosophy, epistemology, ontology and axiology are

the three main principles that should be considered. Ontology focuses on the nature of reality, epistemology is concerned with what constitutes acceptable knowledge, and axiology refers to the role of values (Collis & Hussey, 2009).

3.2.1 Ontological Assumption

The present study takes an objectivist approach with regard to ontological consideration. Objectivism states that social reality is a factor external factor to the researchers, meaning that it is independent of the researchers' minds. Additionally, social phenomena and their meanings exist independently of social actors (Bryman & Bell, 2007). This study aims to explore behavioural factors that influence investment management activities and the perceived market efficiency of investors actively trading on the PSX, which are considered to be external to the researchers and outside their minds. Thus an objective approach is more appropriate than a subjective approach. Subjectivism, or constructionism, asserts that social entities are constructed and malleable; consequently it is essential to investigate the subjective meanings driving the actors, keeping in mind the end goal of comprehending their behaviour and their causes (Saunders et al., 2009). In this present study, all the heuristic factors affecting perceived market efficiency, investors' decision-making and performance are considered to be unique and already existing "out there"; the goal is to study them.

3.2.2 Epistemological Assumption

With regard to epistemological assumptions, this study is based more on the positivist position, because it seeks to identify the factors that influence perceived market efficiency, investors' decision-making and performance, and then synthesize general rules for the entire

population, instead of trying to elucidate and interpret the meaning of those decisions. Indeed, epistemology (the theory of knowledge) reflects the procedure that must be adopted and the principles that should guide the study of reality with two opposing positions: interpretivism and positivism. According to Bryman and Bell (2007), positivism is adopted from the natural sciences to apply the methods of natural science to the study of social reality. As positivism represents the theory of natural science, emphasis is placed on the fact that reality exists objectively out there (Sarantakos, 1998; Blumberg et al., 2005). Saunders et al. (2009) assert that people can acquire knowledge concerning social entities only by following scientific methods, testing hypotheses developed from existing theories. The purpose of positivism is to develop general rules for behavioural forecasts (Fisher, 2010), which is consistent with the goals of understanding the behaviour of investors and financial markets for generalization and prediction. According to Le Luong and Thi Thu Ha (2011), researchers are expected to be neutral to the research object, which promotes a worthwhile approach to data collection and analysis. This means that the researchers do not influence and are not influenced by the research object (Saunders et al., 2009).

Based on the rationale above, the positivist approach is preferred in this research. So a self-completion questionnaire with structured questions was used and the research was conducted in a very neutral way. Respondents were not affected by the researchers, and vice-versa. All the assumptions, hypotheses, and the structure of the questions used in the questionnaire were based on existing literature and theories. The questions related to the interviews were also defined in the same way. The hypotheses were then tested through data collected from the survey, in compliance with what the positivist approach. However, some interviews were conducted with financial strategists and advisors at PSX, in order to clearly understand the

behaviour of investors and the markets. This is related to the interpretivist approach, which seeks to understand the social world from the perspective of the actors who are part of it (Saunders et al., 2009).

3.3 Research Approach

Generally, a theory is constructed and tested based on one of two different approaches: induction and deduction. When the deductive approach is used, researchers start with the existing theory and arrive at their "conclusion by logical generalization of known fact" (Sekaran, 2006). On the other hand, when the inductive approach is used, a theory is developed from the observation of certain phenomena and researchers generalize the significance of the result or findings for the theory that motivated the research (Kappeler et al., 2005; Bryman & Bell, 2007; Saunders et al., 2009; Ghauri & Gronhaug, 2010) or "logically established a general proposition based on observed fact" (Sekaran, 2006). The aim of this study is to explore the impact of heuristic-driven biases on perceived market efficiency, investment decisions, and the performance of individual and institutional investors, which are already "out there". Thus, a deductive approach was deemed to be more appropriate than the inductive approach for this study, as the research is based on the theoretical framework of behavioural finance.

The investigation starts by reviewing the theories and literature of behavioural finance in general and in the stock market in particular, to get the conceptual and theoretical context. Hypotheses and research models were proposed after identifying the empirical findings of previous research. Then, the questions utilized in interviews and the questionnaire were prepared to collect the information. The hypotheses were tested after collecting and

analyzing the data from the questionnaires and interviews. After that, the results of the current research were compared with existing theories in order to find the differences. This deductive approach is normally associated with quantitative research, which requires collecting quantitative data and analyzing statistical methods. On the other hand, the inductive approach is a process of inducting general explanations from a particular phenomenon. The role of "inductive research" is theory building and it is usually related to qualitative methods using interpretative methods (Bryman & Bell, 2007). The steps of the inductive and deductive processes are explained in figure 3.2 below.

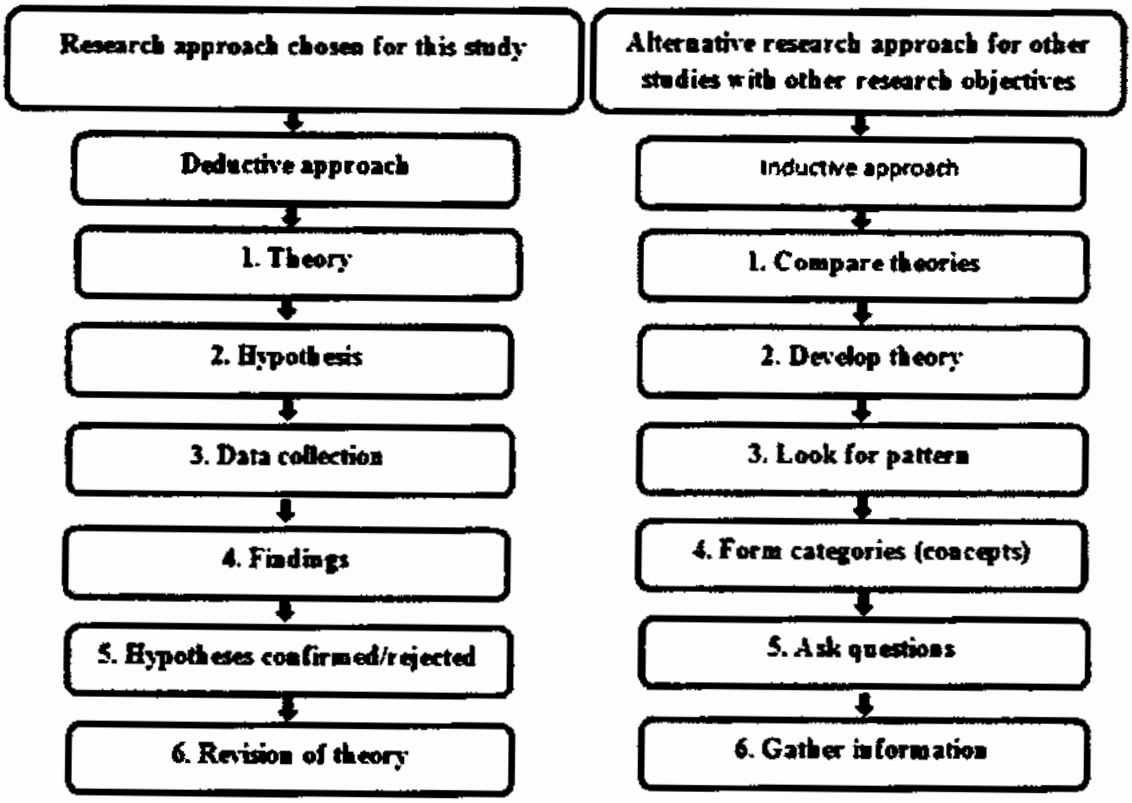

Figure 3.2 Steps in Deductive & Inductive Process (Bryman & Bell, 2007)

3.4 Type of Research

According to Saunders et al. (2009), research questions may lead to explanatory, exploratory, and descriptive answers. In 2002, Robson presented the concept of exploratory study, which is an the effective sources to acquire the knowledge of current happening, seeking new insights, generating ideas and hypotheses for new research (Sarma 2012). Many authors have recommended that exploratory research is useful when we have little information regarding problems (Ghauri & Gronhaug, 2010). Therefore, this type of research is the best choice in accordance with the aim of exploring the mechanism by which heuristic-driven biases influence the decisions and performance of investors actively trading on the PSX, and the perceived efficiency of the market, which seems to have been studied by only a few researchers. The exploratory research method has been used by researchers for more than two decades, but is quite new to the Pakistani stock market, so, the vast majority of individuals have only a very limited understanding of it. On the basis of the existing literature, some hypotheses were derived to investigate investors' behaviour at the PSX and to investigate the behaviour of Pakistani financial markets. A self-completion questionnaire was formulated to gather data to test these hypotheses.

As well as exploratory research, there are two other types, namely explanatory and descriptive. The descriptive research method is used to find out "who, what, where, when or how much" in order to solve the research problem, while the causal or explanatory research method is used to discover cause and effect relationships (Blumberg et al., 2005). This study also attempts to explain investors' behaviour and the behaviour of financial markets by interviewing financial strategists and advisors at PSX, so, it can be considered a combination

of both exploratory and explanatory research, while the descriptive approach was not appropriate.

3.5 Research Strategy

The research strategy is concerned with the practicalities of conducting research. The selection of a qualitative or quantitative research methodology depends on the philosophical underpinnings, available resources, and existing knowledge. Although this study is based on mixed methods for data collection, through questionnaires and interviews, it is more focused on quantitative research methods. According to Bryman and Bell (2007) and Collis and Hussey (2009), quantitative research is more concerned with positivism, objectivism and a deductive approach. It is fully compatible with the epistemological and ontological approaches described in the preceding sections. Furthermore, quantitative research is usually related to examining behaviour rather than meaning, which is appropriate for a behavioural finance topic. The main aim of this study is to explore the mechanism by which heuristic factors influence the decisions and performance of investors, who are operating at the PSX, and perceived market efficiency, which can be only done effectively by using a quantitative approach, because quantitative research is used to identify and describe the variables in order to determine their interrelationships (Garner, Wagner & Kawulich, 2009).

The validity, reliability and generalizability of the results can be achieved by using an adequate sample size. The quantitative approach helps analyze the results by applying different statistical methods using the latest statistical software (Sarantakos, 1998). The vast majority of studies published in leading journals have used quantitative strategies with advanced statistical models and data analysis (Kumar & Goyal, 2015). However, there is a

drawback to the quantitative research technique in that it is more focused on numbers and statistical values, so it may lose the qualitative aspects of people and institutions. Since it is scientifically proved, quantitative research is considered superficial and unable to connect life and research directly (Bryman & Bell, 2007). Therefore, to understand the results fully, both qualitative and quantitative methods were used. After having results from the data collected through questionnaires, this study continued to conduct interviews with experts, such as financial strategists/advisors, which may be considered a qualitative method, to gather further information from their words to learn more about the behaviour of investors and markets, as well as the reasons for such decisions and behaviour.

Both qualitative and quantitative research have their own advantages and disadvantages. In this current study, mixed methods were chosen to gain the benefits of the advantages and diminish the disadvantages. According to Bryman and Bell (2007), when using mixed methods, researchers can start with either qualitative or quantitative methods. The qualitative method can be used to pose hypotheses, which are then tested by a quantitative method or, on the contrary, a quantitative method can prepare the ground for a qualitative one (Bryman & Bell, 2007). In the current study, the hypotheses can be formulated based on existing theories of behavioural finance; the quantitative method was used first to test these hypotheses and then qualitative methods were utilized to analyze the results more deeply. Since behavioural finance is a complex area, research in this field requires the involvement of financial experts in order to make the appropriate deductions. In short, the author used a sequential explanatory design; see figure 3.3 to better understand the research strategy.

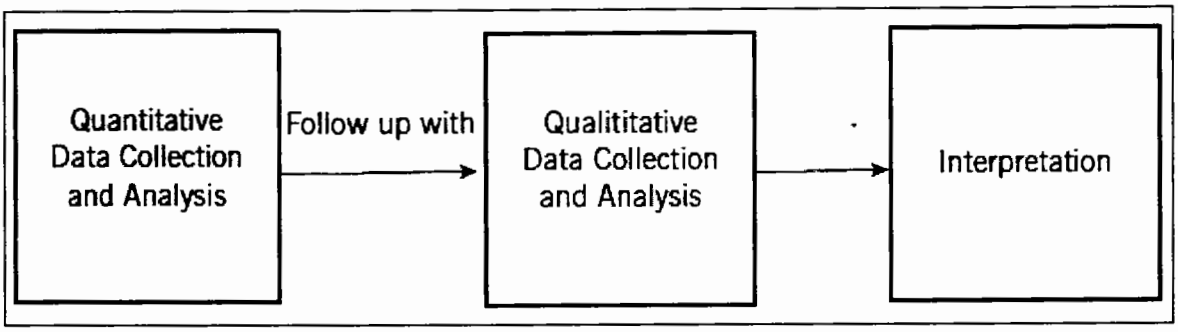

Figure 3.3 Sequential explanatory design (Terrell, 2016)

3.6 Research Design

The research design provides the framework for data collection and analysis (Ghauri & Gronhaug, 2010). To understand the common behaviour of investors and their perceptions of market efficiency, a cross-sectional design is more suitable than other research frameworks, such as case studies, experimental designs, or longitudinal designs. More specifically, longitudinal designs are often used to analyze progression and show causal influences over time (Collis & Hussey, 2009). Experimental designs are employed to explore the relationships between factors; experiments are used to investigate and clarify a particular issue (Saunders et al., 2009). A case study examines one single case (Collis & Hussey, 2009). The current study, however, needs to analyze a relatively large sample at one time. Consequently, a cross-sectional design is the most suitable for this study.

In cross-sectional research, data from more than one case at one single time is collected and analyzed. This is relevant to this study because it is appropriate for describing the trends of investors' behaviour rather than one specific case and, secondly, data in this study has not been collected in stages but was collected at a single time period. So the researcher has used a cross-sectional design for data collection to understand the behaviours of investors and their perceptions of market efficiency.

A cross-sectional design requires various research techniques and is helpful for this investigation as it allows the collection of both qualitative and quantitative data, which is appropriate for the chosen mixed methods approach, as portrayed in the preceding sections. The standard ways of gathering quantitative data in this type of approach are social survey research and structured observation of a sample simultaneously, while the typical ways of collecting qualitative data are interviews or focus groups at a single point in time (Bryman & Bell, 2007).

The core purpose of the study is testing hypotheses, because testing hypotheses "offers an enhanced understanding of the relationship that exists among variables" (Sekaran, 2006). This is a correlational study, which focuses on several factors, in order to discover how each factor affects the outcome or relates to the problem being studied.

3.7 Target Population

The population for this study was individual and institutional investors actively trading on the PSX, and the investment strategists (or advisors). The target population was located in the cities viz. Islamabad, Rawalpindi, Lahore, and Karachi. The institutional investors comprised the portfolio managers working in various organizations for instance mutual funds and banks. While this study was conducted in Pakistan's context and its focus is on the decisions and performance of individual and institutional investors in this market, it might have relevance to investors in many stock exchanges in other developing countries.

3.8 Sampling and Data Collection

The main objective of the research is to explore the mechanism by which heuristic biases influence anomalies, perceived market efficiency, the investment decisions, and investment performance of individual and institutional investors operating on the PSX, with the mediating role of fundamental anomalies, technical anomalies and the moderating role of financial literacy by using a mixed methods approach. The investors were deemed as one of the respondents of this study which included individual as well as institutional investors whereas investment advisors were also considered as the target respondents. In order to achieve the research objective, a total of 750 questionnaires were directly delivered to individual investors currently trading at PSX. Of these, 476 were returned, but only 307 questionnaires were fully completed by individual investors and used for analysis, representing a response rate of 40.93%.

Similarly, a total of 400 questionnaires were directly delivered to institutional investors trading at PSX. Of these, 279 were returned, but only 180 questionnaires were fully completed by institutional investors and used for analysis, representing a response rate of 45%. A review of previous research into similar topics carried out in different contexts confirmed that this sample size is large enough to fulfil all statistical requirements. In studies such as those of Waweru et al. (2008), Rasheed et al., (2018), Shah, Ahmad, and Mahmood (2018), Ahmad (2020) and several others, the sample size ranged from 143 to 230. Hair et al. (1998) documented that, in quantitative research, data collected from at least 100 respondents is needed in order to get reliable results from the statistical data analysis tools. A convenient purposively sampling technique was used to collect the data for this study rather than a random sampling technique, because data from the whole population are required for random

sampling (Sekaran, 2003). The Pakistani economy is a developing economy and, therefore, data are not available in standard form, which is why the researcher chose convenient sampling.

For the qualitative-based study, four interviews were conducted. A review of previous research into similar topics carried out in different contexts confirmed that a sample size of four is large enough to fulfil all the necessary statistical requirements for a qualitative-based study. In these studies, such as those of Le et al., (2011), Jaiyeoba and Haron (2016) and Jaiyeoba et al., (2018), the sample size ranged from two to eight. According to Malterud et al. (2015), just six to ten interviewees can provide sufficient information for an interview based study, if they cover a broad range of experiences. Dworkin (2012) identified that the number of participants needed in a qualitative study to achieve the saturation may range from 5 to 50. Thus a sample size of five is large enough to fulfil all the statistical requirements in a qualitative-based study.

There are various ways of collecting data, such as structured interviews, unstructured interviews, semi-structured interviews, observation and group discussions. One of the most common methods is the self-reported questionnaire, which was selected to gather quantitative data, and the semi-structured interview method was chosen to collect qualitative data for this study.

In self-reported questionnaires, respondents are asked to rate themselves on each item, on the extent to which it specifically describes their characteristics. This method for data collection was chosen for several reasons: firstly, the research questions are defined clearly, which makes the answers easy to analyze and process. Furthermore, this method is more time- and cost-effective than other methods, such as brain storming and video conferencing (Bryman &

Bell, 2007). Another reason is that, as the respondents are investors, they may have not much time for interviews, so using a questionnaire is a better way to gather information from them, because they can fill it in whenever they have the time. Questionnaires are also more convenient for respondents when they are asked to provide sensitive information; it has been shown that people are generally more truthful filling in a questionnaire than in an interview (Bryman & Bell, 2007).

According to Saunders et al. (2009), self-reported questionnaires can be divided into two groups by means of distribution: postal questionnaires, and delivery-collection questionnaires. Bryman and Bell (2007) agree on these two options for distribution. Postal questionnaires are mailed directly to selected respondents, who are asked either to send back the answers in the mail or to hand them to specific people at an agreed time and place (Bryman & Bell 2007). The second option is to deliver the questionnaire by hand to each respondent and then collect it when it has been completed (Saunders et al., 2009). The author chose the second option for this study.

After collecting and analyzing the data collected through these questionnaires, semi-structured interviews were conducted in order to expand the scope of the research. Interviews with investors provide deeper understanding of the results. In semi-structured interviews researchers have a list of topics to cover and questions to ask, but do not necessarily keep to them rigidly, giving the conversation freedom to develop naturally (Bryman & Bell, 2007).

In summary, the data for this research were collected by using both quantitative data synthesized from the questionnaires delivered to individual and institutional investors and qualitative data obtained from semi-structured interviews with investment strategists/advisors. The data collected from the questionnaires provide the basic

understanding of the heuristic factors affecting anomalies, market efficiency, investors' decisions and performance. The results of this analysis then guided the content of the interviews.

3.9 Operationalization of Variables

To achieve the research objective, a survey method was used and a questionnaire was developed, based on existing measurement instruments from the literature. Where necessary, the author modified the scales to make them more suitable to the context of Pakistani investors' decisions' relationship with heuristics. Some relevant studies consulted at this stage are: Luong and Ha (2011), Van et al., (2011), Lautiainen (2015), Mouna and Jarboui (2015), Jacobs and Hillert (2016), ul Abdin et al. (2017), Rasheed, et al. (2018), Shah et al., (2018), and Baker et al., (2019). For all multi-item construct measurements, the author used a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). All constructs were operationalized with reflective measurement models.

Simultaneously, five behavioural finance experts were engaged in the assessment of the questionnaire, specifically to ensure the validity and reliability of the instrument used for this study. Furthermore, a pilot test was conducted to fine-tune the questionnaire for reliable data collection. Further details related to the operationalization of the variables are discussed below.

3.9.1 Dependent Variables

The author uses perceived market efficiency, investment decisions, and investment performance as endogenous variables: Six questions were used to measure perceived market

efficiency, adopted from Shah, Ahmad, and Mahmood (2018). To measure perceived market efficiency, investors were asked to what extent they agree/disagree with *"You consider carefully the price changes of stocks that you intend to invest in"* and *"Market information is important for your stock investment"* etc. Investment decision-making was measured with five items, adapted from Rasheed, et al. (2018). To measure investment decision-making, respondents were asked to what extent they agree/disagree with *"When making an investment, you trust your inner feelings and reactions"* and *"When I make an investment, it is more important for me to feel the investment is right than have a rational reason for it"* etc. Three items were used to measure investment performance, adopted from ul Abdin, et al. (2017). To measure investment performance, respondents were asked to what extent they agree/disagree with *"The return rate of your recent stock investment meets your expectation"* and *"You feel satisfied with your investment decisions in the last year (including selling, buying, choosing stocks, and deciding the stock volumes)"* etc.

3.9.2 Independent Variables

The author uses cognitive heuristic-driven biases and recognition-based heuristic-driven biases as predictor variables: Twenty-five items were used to measure cognitive heuristic-driven biases. This study includes six components of cognitive heuristic-driven biases, namely overconfidence, representativeness, availability, anchoring, herding, and disposition effect. The items were adapted from Baker, Kumar, and Goyal (2019), Rasheed et al. (2018), ul Abdin, et al. (2017), Mouna, and Jarboui (2015), and Luong and Ha, (2011). To measure overconfidence, respondents were asked to what extent they agree/disagree with *"You believe that your skills and knowledge of stock market can help you to outperform the*

market" and *"You are confident of your ability to do better than others in picking stocks"* etc. To measure representativeness, respondents were asked to what extent they agree/disagree with *"You buy 'hot' stocks and avoid stocks that have performed poorly in the recent past"* and *"You consider the past performance of the stocks before investing in it"* etc. To measure availability, respondents were asked to what extent they agree/disagree with "*You prefer to invest in local stocks than international stocks because the information of local stocks is more available"* and *"You consider the information from your close friends and relatives as the reliable reference for your investment decisions" etc.* To measure anchoring, respondents were asked to what extent they agree/disagree with *"You rely on your previous experiences in the market for your next investment"* and *"You forecast the changes in stock prices in the future based on the recent stock prices"* etc. To measure herding, respondents were asked to what extent they agree/disagree with *"You rarely consult others before making stock purchases or sales"* and *"Other investors' decisions of buying and selling stocks impact your investment decisions"* etc. To measure disposition effect, respondents were asked to what extent they agree/disagree with *"You do not have any quick responses to good or bad news and tend to sell profitable stocks too early and sell losing stocks too late"* and *"You are often reluctant to realize losses"* etc.

Recognition-based heuristic-driven biases were measured with seven items. This study includes three components of recognition-based heuristic-driven biases, namely alphabetical ordering, name fluency, and name memorability. The items were adapted from Lautiainen (2015), and Jacobs and Hillert (2016). To measure alphabetical ordering, respondents were asked to what extent they agree/disagree with *"You are more likely to trade the stocks of firms beginning with letters appearing early in the alphabet than stocks beginning with later*

alphabet letters" and *"You would like to change your investment portfolio, but you feel stressed to put yourself into new ones options"* etc. To measure name fluency, respondents were asked to what extent they agree/disagree with *"You are more likely to trade the stocks of firms which names are easily pronounced than stocks of firms with difficult to pronounce names"* and *"You prefer to buy the stocks of firms having a short name as compared to stocks of firms having a long name".* To measure name memorability, respondents were asked to what extent they agree/disagree with *"You are more likely to trade the stocks of firms which names are easily remember than stocks of firms with difficult to remember names"* and *"You prefer to buy the stocks of firms that are highly advertising".* Operationalization of independent variables is consistent with Pandey and Jessica (2019), who also used four component of behavioural biases, namely anchoring, representativeness, availability bias and regret aversion to measure the behavioural biases variable.

3.9.3 Mediating Variables

Fundamental and technical anomalies were used as an intervening variable; fundamental anomalies were measured with four items, and technical anomalies were measured with two items, adopted from ul Abdin et al. (2017). To measure fundamental anomalies, investors were asked to what extent they agree/disagree with *"You consider carefully the price change of stocks that you intend to invest in"* and *"You study the market fundamental (economic indicators) of underlying stocks before making investment decisions"* etc. To measure technical anomalies, investors were asked to what extent they agree/disagree with *"Market information is important for your stock investment"* and *"You put the past trends of stocks under your consideration for your investment".*

3.9.4 Moderating Variable

The author uses financial literacy as a moderating variable. it was measured with five items, adopted from Van Rooij, Lusardi, and Alessie (2011). Sample items include: *"You are somewhat knowledgeable of stock market activities on the PSX"* and *"You usually follow the stock market through financial news on TV at least twice a week"* etc. Further details relating to the instrument used to operationalize the variables are provided in Appendix 1.

3.10 Instrumentation for Semi-Structured Interviews

As stated above, semi-structured interviews were used to collect qualitative data. This type of interviewing initially utilizes main questions, probing and follow-up questions, which may vary from interviewee to interviewee, depending on the specific responses given and themes introduced during the interview (Rubin & Rubin, 2011). The interview guide was developed based on the quantitative data analysis results. The interview instrument contained seven guided questions, which were:

1. Investors often utilize heuristics, causing several heuristic-driven biases when trading in the stock market, specifically: recognition-based heuristics namely alphabetical ordering of firm names, name memorability, name fluency, and cognitive heuristics, such as herding behaviour, disposition effect, anchoring and adjustment, repetition, overconfidence, and availability biases. These biases lead investors to make sub-optimal decisions when managing their investments. Due to these heuristic-driven biases, investors tend to perceive that markets are inefficient, trade excessively in the stock market, and their investment performance affected adversely. What is your opinions about the results?

2. Heuristic-driven biases of individual and institutional investors give rise to anomalies (fundamental and technical anomalies) in the stock market and, due to these anomalies, investors tend to perceive that markets are inefficient, so they make irrational investment decisions, and their investment performance is reduced. What is your opinions about the results?

3. Individual and institutional investors are equally prone to heuristic-driven biases, such as cognitive and recognition heuristic-driven biases. What is your opinions about the results?

4. Investors who are suffering from heuristic-driven biases tend to engage in excessively high investment in the stock market in both the short and long run. What is your opinions about the results?

5. Financial literacy appears to moderate the relationships between heuristic-driven biases and perceived market efficiency, between heuristic-driven biases and investment management activities of institutional investors but financial does not appears to moderate these relationships in case of individual investors. What is your opinions about the results?

6. What are the factors causing an increased use of heuristic variables by individual and institutional investors?

7. Any suggestions concerning how to overcome the negative effect of heuristic-driven biases so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic factors?

3.11 Data Analysis Method

The data gathered through the survey were examined by utilizing SPSS and Amos graphics software. Firstly, a pilot test was conducted to check the validity and reliability of the

instrument. Then confirmatory factor analysis (CFA) was run to confirm the factor structure, evaluate the convergent validity of the study constructs, and remove the items with low standardized factor loading. Statistical techniques used in order to achieve the research objectives include a correlation analysis structural equation modelling (SEM) technique and multigroup analysis. The statistical techniques which were used are consistent with various studies conducted on similar topics in different environments, such as those of Rasheed et al. (2018), Chaudary, (2019), Ahmad, (2020), and several others which used the same methodology. The results of mediation and moderation were also authenticated through the PROCESS methods. The results obtained from the quantitative analysis were also authenticated through the qualitative data.

3.12 Econometric Models

The general form of econometric equation can be stated as:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \qquad (1)$$

Where,

Y is the dependent variable which is a measure of the perceived market efficiency, investment decision-making, investment performance, short-term investment decision-making and long-term investment decision-making. β_o is an intercept, β_1, β_2 are the Slopes, and X_1, X_2 are the explanatory variables that are a measure of the heuristic-driven biases namely cognitive heuristic biases and recognition heuristic biases. Here, ε is an error term. The expanded models for this study is stated as follows:

Econometric equations for conceptual framework 1

$$PME = \beta_o + \beta_1 CHDB + \beta_2 RBHDB + \varepsilon \quad (2)$$

$$IDM = \beta_o + \beta_1 CHDB + \beta_2 RBHDB + \varepsilon \quad (3)$$

$$IP = \beta_o + \beta_1 CHDB + \beta_2 RBHDB + \varepsilon \quad (4)$$

Where,

β_0 is the constant term, β_1 is the coefficients of the cognitive heuristic-driven biases, β_2 is e coefficients of the recognition heuristic-driven biases, PME is perceived market ficiency, IDM is investment decision-making, IP is investment performance, CHDB is gnitive heuristic-driven biases, RBHDB is recognition based heuristic-driven biases and ε the error term.

Econometric equations for mediation effect

$$PME = \beta_o + \beta_1 FA + \beta_2 TA + \beta_3 CHDB + \beta_4 RBHDB + \varepsilon \quad (5)$$

$$IDM = \beta_o + \beta_1 FA + \beta_2 TA + \beta_3 CHDB + \beta_4 RBHDB + \varepsilon \quad (6)$$

$$IP = \beta_o + \beta_1 FA + \beta_2 TA + \beta_3 CHDB + \beta_4 RBHDB + \varepsilon \quad (7)$$

Where,

β_0 is the constant term, β_1, β_2 is the coefficients of the mediator variables namely ndamental anomalies and technical anomalies, β_3 is the coefficients of the cognitive uristic-driven biases, β_4 is the coefficient of recognition based heuristic-driven biases, ME is perceived market efficiency, IDM is investment decision-making, IP is investment erformance, FA is the fundamental anomalies, TA is the technical anomalies, CHDB is cognitive heuristic-driven biases, RBHDB is recognition based heuristic-driven biases and ε is the error term.

Econometric equations for moderation effect

$$PME = \beta_o + \beta_1 FA + \beta_2 TA + \beta_3 CHDB + \beta_4 RBHDB + \varepsilon \quad (8)$$

$$IDM = \beta_o + \beta_1 FA + \beta_2 TA + \beta_3 CHDB + \beta_4 RBHDB + \varepsilon \quad (9)$$

$$IP = \beta_o + \beta_1 FA + \beta_2 TA + \beta_3 CHDB + \beta_4 RBHDB + \varepsilon \quad (10)$$

Where,

β_0 is the constant term, β_1, β_2 is the coefficients of the mediator variables namely fundamental anomalies and technical anomalies, β_3 is the coefficients of the cognitive heuristic-driven biases, β_4 is the coefficient of recognition based heuristic-driven biases, PME is perceived market efficiency, IDM is investment decision-making, IP is investment performance, FA is the fundamental anomalies, TA is the technical anomalies, CHDB is cognitive heuristic-driven biases, RBHDB is recognition based heuristic-driven biases and ε is the error term.

Econometric equations for moderation effect

$$PME = \beta_o + \beta_1 CHDB + \beta_2 RBHDB + \beta_3 FL + \beta_4 (CHDBXFL) + \beta_5 (RBHDBXFL) + \varepsilon \quad (11)$$

$$IDM = \beta_o + \beta_1 CHDB + \beta_2 RBHDB + \beta_3 FL + \beta_4 (CHDBXFL) + \beta_5 (RBHDBXFL) + \varepsilon \quad (12)$$

$$IP = \beta_o + \beta_1 CHDB + \beta_2 RBHDB + \beta_3 FL + \beta_4 (CHDBXFL) + \beta_5 (RBHDBXFL) + \varepsilon \quad (13)$$

Where,

β_0 is the constant term, β_1 is the coefficients of the cognitive heuristic-driven biases, β_2 is the coefficients of the recognition based heuristic-driven biases, β_3 is the coefficients of the moderator variable such as financial literacy, β_4 is the coefficient of the interaction term of cognitive heuristic-driven biases and financial literacy, β_5 is the coefficient of the interaction term of recognition based heuristic-driven biases and financial literacy, PME is perceived market efficiency, IDM is investment decision-making, IP is investment performance, CHDB is cognitive heuristic-driven biases, RBHDB is recognition based heuristic-driven biases,

CHDBXFL is the interaction term of cognitive heuristic-driven biases and financial literacy, RBHDBXFL is the interaction term of recognition based heuristic-driven biases and financial literacy, and Ɛ is the error term.

Econometric equations for conceptual framework 2

$$\boldsymbol{STIDM} = \boldsymbol{\beta_o} + \boldsymbol{\beta_1 CHDB} + \boldsymbol{\beta_2 RBHDB} + \varepsilon \qquad (14)$$

$$\boldsymbol{LTIDM} = \boldsymbol{\beta_o} + \boldsymbol{\beta_1 CHDB} + \boldsymbol{\beta_2 RBHDB} + \varepsilon \qquad (15)$$

Where,

β_0 is the constant term, β_1 is the coefficients of the cognitive heuristic-driven biases, β_2 is the coefficients of the recognition heuristic-driven biases, STIDM is short-term investment decision-making, LTIDM is long-term investment decision-making, CHDB is cognitive heuristic-driven biases, RBHDB is recognition based heuristic-driven biases and Ɛ is the error term.

Chapter four

EMPIRICAL FINDINGS

4.1 Introduction

This chapter aims to report the empirical findings obtained from the statistical techniques and based on these findings accept or reject the hypotheses which were displayed in Chapter 2. This chapter proceeds as follows: Section two is related to the pilot test which tells about the reliability of the instrument. Cronbach's Alpha was used to test the reliability of items included in the instrument which were adopted with the help of literature. Section three is related to empirical findings that are related to individual investors and Section four is related to empirical findings that are related to institutional investors. In these section firstly, the author reported results of confirmatory factor analysis which was run to evaluate the convergent validity, discriminant validity, and internal consistency reliability of the study constructs as well as removing the items having low standardized factor loading. Secondly, the results of common method bias were reported. After that statistics for demographic variables was described to have an overview of the sample surveyed. Then, the results of correlations among the variables were reported which provides preliminary support for the anticipated hypothesis. Subsequently, the results of structural equation models were presented which demonstrate the role of heuristic-driven biases in perceived market efficiency and investment management activities of individuals and institutional investors with mediating role of technical and fundamental anomalies and moderating role of financial literacy. In the end on both sections results of robustness tests were reported for the endorsement of mediation and moderation results.

Section five is related to multigroup analysis that was performed in order to check whether the individual and institutional investors were equally immune to the heuristic-driven biases. Sections six demonstrate the role of heuristic-driven biases in short-term and long-term investment decision-making. In section seven the results of qualitative data collected from brokers who are maintaining the accounts of investors and investment strategists/advisors through a semi-structured interview. The results obtained from the qualitative data were used for the endorsement of results obtained from the quantitative analysis. With help of qualitative data the researchers also highlighted some factors causing an increased use of heuristic variables by individual and institutional investors and discussed practical approaches to overcoming the negative effects of heuristics factors so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic biases.

4.2 Pilot Testing

A pilot study was conducted to find out the reliability of items included in the instrument, using data collected from 83 investors. For pilot testing, 150 questionnaires were delivered by hand to individual and institutional investors and collected right after they completed it. Only 105 were returned, from which 83 questionnaires were useable, representing an effective response rate of 55.33 percent. The Cronbach's Alpha coefficient estimated the degree of the variables consistence. The initially Cronbach's Alpha value of cognitive heuristic-driven biases was 0.453, which suggesting that questionnaire of this variable cannot be used for data collection. In order to improving the quality of questionnaire the author have removed six questions of cognitive heuristic-driven biases. After removing six items of cognitive heuristic-driven biases questionnaire, overall the variables presented

values ranging between 0.697-0.937 and the F test is significant (See Table 4.1), thus being classified as satisfactory. Therefore, the estimation of all components incorporated into the variables provided a good representation of each one of the variables under study, thus allowing proceeding with further analysis (correlation analysis and Structural Equation Modelling).

Table 4.1. Analysis of Variables Reliability Using the Cronbach's Alpha

Variables	Cronbach's Alpha	F(sig)
Cognitive Heuristic Biases	0.813	17.385(0.000)
Recognition Heuristic Biases	0.937	8.842(0.001)
Perceived Market Efficiency	0.752	5.658(0.022)
Investment Decisions	0.869	4.690(0.000)
Investment Performance	0.824	7.852(0.001)
Fundamental Anomalies	0.705	5.946(0.000)
Technical Anomalies	0.681	6.583(0.041)
Financial Literacy	0.837	12.327(0.000)
Short-term Investment Decisions	0.746	6.418(0.001)
Long-term Investment Decisions	0.872	3.269(0.000)

4.3 Empirical Results for Individuals Investors

This section aims to report the empirical findings related to individual investors, clarify the mechanism by which heuristic-driven biases influences the perceived market efficiency and investment management activities of individual investors with the mediating role of fundamental and technical anomalies and moderating role of financial literacy.

4.3.1 Confirmatory Factor Analysis (CFA)

CFA was run in AMOS 24 to authenticate the factor structure, evaluate the convergent validity, discriminant validity, and internal consistency reliability of the study constructs as well as removing the items having low standardized factor loading. In order to test the

validity and reliability of the constructs, the measurement model was performed which is shown in Figure 4.1. A satisfactory model fit was accomplished by following the model modifications tactics proposed by Hair et al. (2014), after dropping a few items that either had high error terms cross-loading or weak factor loadings.

The values regarding model fit indices (See Table 4.2) were found within the accepted thresholds where CMIN/DF = 1.159, CF1 = 0.988, NFI = 0.919, TLI = 0.987 represent good model fit values. Similarly, RMSEA = 0.023, SRMR = 0.031, and PCLOSE = 1.000 indicated good model fitness as per the recommended thresholds of previous studies (Hair et al., 2014; Vieira, 2011; Hu & Bentler,1999; Tanaka, 1993). The factor loadings for each latent construct ranging from 0.815 to 0.905 and were found to be statistically significant (See Table 4.2).

Additionally, the measurement model was approved by establishing convergent validity, discriminant validity, and internal reliability of the study constructs. To evaluate convergent validity, the average variances extracted (AVE) for each set of measures were computed. The results, reported in Table 4.3, divulge that AVE values ranging from 0.692-0.757 for the constructs which are above the minimum thresholds of 0.50. Thus results suggesting that convergent validity was accomplished. Similarly, to assess discriminant validity, square root of AVE values for each set of measures were computed which are above the benchmark of 0.70 (See Table 4.3) suggesting that every construct is different from one another (Hair et al., 2014; Hu & Bentler, 1999). Furthermore, the value of the square root of AVE is higher than the highest square correlation of the construct with any other latent construct which confirms that acceptable discriminant validity was attained. Moreover, the composite reliability (CR) values were utilized to evaluate the internal consistency reliability of the study constructs. the

CR values, as reported in Table 4.3, are all above the benchmark of 0.70 (Bagozzi & Yi, 2012) which reveal that the scales had good internal consistency. Hence, the achievement of all the criteria for fitness of measurement allowed to proceed to structural equation modelling testing.

Table 4.2. Goodness of Fit Statistics for Individual Investors

Models	CMIN	DF	CMIN/DF	NFI	CFI	SRMR	TLI	PCLOSE	RMSEA
Measurement	1219.509	1052	1.159	0.919	0.988	0.031	0.987	1.000	0.023
Structural Model1	913.271	623	1.466	0.925	0.975	0.052	0.973	1.000	0.039
Structural Model2	533.957	401	1.332	0.944	0.985	0.039	0.984	1.000	0.033
Structural Model3	283.776	146	1.944	0.943	0.971	0.041	0.966	0.145	0.056
Structural Model4	1101.796	844	1.305	0.920	0.980	0.036	0.979	1.000	0.032
Acceptable range	-	-	1–3	>0.90	>0.95	< 0.08	> 0.90	> 0.05	< 0.06

Table 4.3. Factor Loadings, Validity and Reliability for Individual Investors

Construct	Indicator	Factor Loadings	CR	AVE	√AVE
Cognitive Heuristic-Driven Biases	CHDB1	0.868***	0.982	0.748	0.865
	CHDB2	0.860***			
	CHDB3	0.866***			
	CHDB5	0.860***			
	CHDB6	0.865***			
	CHDB7	0.864***			
	CHDB8	0.863***			
	CHDB9	0.856***			
	CHDB10	0.861***			
	CHDB11	0.867***			
	CHDB12	0.875***			
	CHDB13	0.868***			
	CHDB14	0.857***			
	CHDB16	0.875***			
	CHDB17	0.855***			
	CHDB18	0.854***			
	CHDB19	0.878***			
	CHDB20	0.871***			
Recognition Based Heuristic-Driven Biases	RBHDB1	0.855***	0.947	0.748	0.865
	RBHDB3	0.875***			
	RBHDB4	0.854***			

	RBHDB5	0.865***			
	RBHDB6	0.870***			
	RBHDB7	0.870***			
Investment Decisions	IDM1	0.859***	0.922	0.746	0.864
	IDM2	0.871***			
	IDM3	0.851***			
	IDM5	0.875***			
Investment Performance	IP1	0.862***	0.903	0.757	0.870
	IP2	0.858***			
	IP3	0.889***			
Perceived Market Efficiency	PME1	0.878***	0.949	0.755	0.869
	PME2	0.861***			
	PME3	0.880***			
	PME4	0.871***			
	PME5	0.869***			
	PME6	0.853***			
Fundamental Anomalies	FA1	0.874***	0.920	0.743	0.862
	FA2	0.860***			
	FA3	0.874***			
	FA4	0.839***			
Technical Anomalies	TA1	0.827***	0.858	0.752	0.867
	TA2	0.905***			
Financial Literacy	FL1	0.813***	0.918	0.692	0.832
	FL2	0.859***			
	FL3	0.851***			
	FL4	0.820***			
	FL5	0.815***			

CR = composite reliability; **AVE** = average variance extracted; ***$p < 0.001$

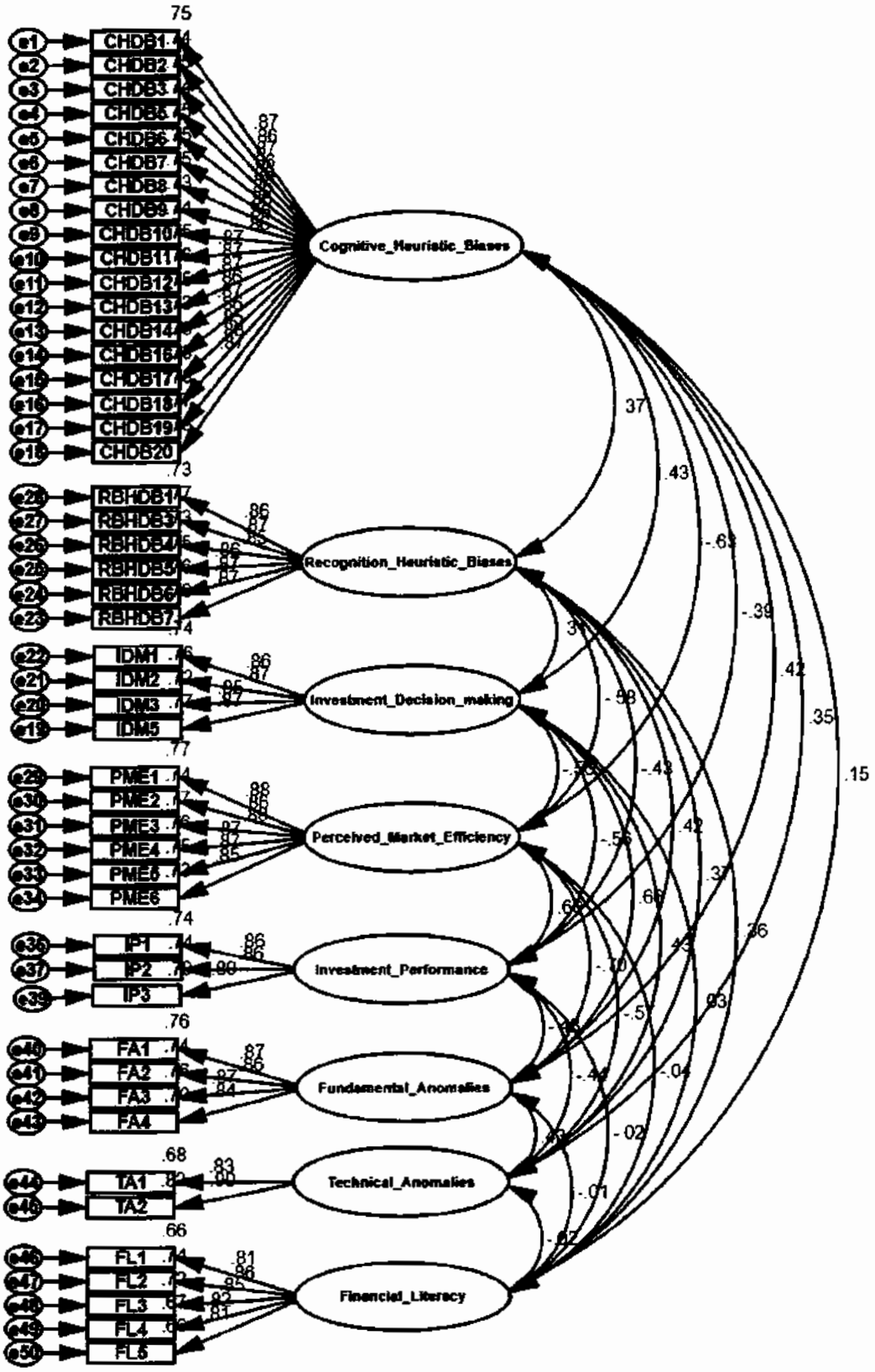

Figure 4.1. Measurement Model 1 for Individual Investors

4.3.2 Common Method Bias

The problems of common method bias (CMB) may arise when cross-sectional data were used to achieve the research objectives, which may badly affect statistical results (Podsakoff and Organ, 1986). A cross-sectional design was used in this present study, thus CMB was tested by executing Harman's single-factor test using SPSS through principle component analysis as an extraction method. The output of the analysis shows eight factors with eigenvalues greater than 1 of which the first factor explains only 46.613 percent variation of total variance explained which is less than 50 percent. This confirms that there is no threat of CMB affecting the statistical results.

4.3.3 Statistics for Demographic Variables for Individual Investors

Table 4.4 displayed Statistics for demographic characteristics of the sample used for analysis. The sample for the study was composed of 85.7% male and 14.3% female investors. This composition of sample symbolizes the social and cultural norms of Pakistan. In terms of age groups, the major portion of the sample (about 40.1%) lied within the age level of 41-50 years, while 31.3% representing 30-40 years, 16.9% representing below 30 years and 11.7% lied within the age level 50 above. The sample for research included 80.8% married, 15.0% single and 4.2% divorced participant. In terms of qualification, 57.0% held a master's degree 26.7% held a bachelor's degree, 7.8% of the investors had done MS/MPhil, while 2.3% of the investors had done Intermediate and 6.2% investors have other qualification. The sample for the study included 35.5% investors having investment experience less than 5 years, 30.6 % investors have investment experience from 5 to 10 years, 25.4% investors have investment

experience from 11-20 years as well as 8.5% investors having investment experience 15 year above for attending the stock market.

Table 4.4. Statistics for Demographic Variables for Individual Investors

Category		Frequency	Percentage
Gender	Male	263	85.7
	Female	44	14.3
Age	Below 30 years	52	16.9
	30-40 years	96	31.3
	41-50 years	123	40.1
	50 years above	36	11.7
Qualification	Intermediate	07	2.3
	Bachelors	82	26.7
	Masters	175	57.0
	MS/MPhil	24	7.8
	Others	19	6.2
Marital Status	Single	46	15.0
	Married	248	80.8
	Divorced	13	4.2
Investment Experience	Less than 5 years	109	35.5
	5-10 years	94	30.6
	11-15 years	78	25.4
	15 years above	26	8.5

4.3.4 Correlation Analysis for Individual Investors

Table 4.5 presents descriptive statistics and correlations among the variables. It provides preliminary support for anticipated hypothesis related to individual investors in the study. The results also shows cogitative heuristic biases are negatively related to perceived market efficiency, with a Pearson's correlation coefficient of $r = -0.608$, which is significant at $p < 0.01$, and investment performance of individual investors with a Pearson's correlation coefficient of $r = -0.369$, which is significant at $p < 0.01$. This means that, as cognitive

heuristic biases increases, the perceived market efficiency and investment performance of individual investors decrease. Cognitive heuristic biases are positively related to investment decision-making of individual investors with a Pearson's correlation coefficient of $r = 0.410$, which is significant at $p < 0.01$. Psychologically this means that, as cognitive heuristic biases increases, investment of individual investors in the stock market also increases.

The results of the study also show that the recognition heuristic biases are negatively related to perceived market efficiency, with a Pearson's correlation coefficient of $r = -0.547$, which is significant at $p < 0.01$, and investment performance of individual investors with a Pearson's correlation coefficient of $r = -0.401$, which is significant at $p < 0.01$. This means that, as recognition heuristic biases increases, the perceived market efficiency and investment performance of individual investors decreases. Recognition heuristic biases are positively related to investment decision-making of individual investors with a Pearson's correlation coefficient of $r = 0.289$, which is significant at $p < 0.01$. Psychologically this means that, as recognition heuristic biases increases, investment of individual investors in the stock market also increases.

Cognitive heuristic biases are positively associated with fundamental anomalies with a Pearson's correlation coefficient of $r = 0.397$, which is significant at $p < 0.01$.and technical anomalies with a Pearson's correlation coefficient of $r = 0.316$, which is significant at $p < 0.01$. Similarly, a positive correlation of recognition heuristic biases were found for fundamental anomalies with a Pearson's correlation coefficient of $r = 0.391$, which is significant at $p < 0.01$.and technical anomalies with a Pearson's correlation coefficient of $r = 0.374$, which is significant at $p < 0.0001$. Psychologically this means that, as heuristic-driven biases namely recognition and cognitive heuristic biases increases, fundamental and technical

anomalies in the stock market also increases. Fundamental anomalies are negatively correlated with perceived market efficiency ($r = -0.653$, $p < 0.01$) and investment performance ($r = -.437$, $p < 0.01$) of individual investors. This means that, due to the fundamental anomalies, the perceived market efficiency and investment performance of individual investors decrease. Similarly, technical anomalies are negatively associated with perceived market efficiency ($r = -0.510$, $p < 0.01$) and investment performance ($r = -.386$, $p < 0.01$) of individual investors. Psychologically this means that, as technical anomalies increases perceived market efficiency and investment performance of individual investors decreases. The results also show that fundamental anomalies are positively related to investment decision-making of individual investors with a Pearson's correlation coefficient of $r = 0.608$, which is significant at $p < 0.01$, which means that, due to fundamental anomalies investment of individual investors in the stock market increases. Similarly, positive correlation of technical anomalies were found for investment decision making of individual investors suggesting that as technical anomalies increases the investment of individual investors in the stock market also increases.

Table 4.5. Means, Standard Deviations and Pearson Correlation for Individual Investors

ariables	Mean	SD	1	2	3	4	5	6	7	8
Cognitive Heuristic Biases	**3.1861**	**1.08497**	**1**							
Recognition Heuristic Biases	**2.2013**	**0.95663**	**0.362****	**1**						
Perceived Market Efficiency	**3.0611**	**1.08859**	**-0.608****	**-0.547****	**1**					
Investment Decisions	**2.9667**	**0.81884**	**0.410****	**0.289****	**-0.523****	**1**				
Investment Performance	**2.3400**	**0.93717**	**-0.369****	**-0.401****	**0.598*****	**-0.511****	**1**			
Fundamental Anomalies	**3.2083**	**1.06965**	**0.397****	**0.391****	**-0.653****	**0.608****	**-.437****	**1**		
Technical Anomalies	**2.1383**	**0.71092**	**0.316****	**0.374*****	**-0.510****	**0.384****	**-.386****	**-.006**	**1**	
Financial Literacy	**3.1947**	**1.03036**	**0.138***	**0.358****	**-0.039**	**0.599**	**.609**	**0.712**	**0.510**	**1**

Note: N = 307; ***p < 0.001 **p < 0.01; *p < 0.05

4.3.5 Structural Equation Models for Individual Investors

The study hypotheses related to individual investors were tested through structural equation models. Structural equation model 1 (See Figure 4.2) was performed to test the influence of cognitive heuristic-driven biases and recognition based heuristic-driven biases on the investment management activities (investment decisions and investment performance) and perceived market efficiency of individual investors, actively trading on the PSX. Acceptable model fits values were found for the SEM1 as shown in Table 4. which reveals CMIN/DF = 1.466, NFI = 0.925, CF1 = 0.925, TLI = 0.973, RMSEA = 0.039, PCLOSE = 1.000 and SRMR 0.052. All these parameters are within the minimum thresholds suggested by Hair et al. (2014), Hu & Bentler (1999), Tanaka (1993). Table 4.6 presents the results of SEM1.

Perceived market efficiency. The hypotheses predicted that heuristic-driven biases namely cognitive and recognition based heuristic biases would be negatively associated with perceived market efficiency of individual investors. To test these predictions, the researcher regressed perceived market efficiency on cognitive and recognition based heuristic biases (see Figure 4.2). The results of SEM1 show that cognitive heuristic biases ($\beta = -0.526$, $p < 0.001$) have a significant negative influence on the perceived market efficiency of individual investors. Similarly, a significant negative relationship with the perceived market efficiency of individual investors was found for the recognition heuristic biases ($\beta = -0.437$, $p < 0.001$). These results suggest that individual investors who are suffering from cognitive heuristic biases and recognition heuristic biases intend to perceived that markets are inefficient. These findings lend support to H6: The heuristic-driven biases have a significant negative influence on perceived market efficiency of individual investors.

Investment decisions. The hypotheses predict that heuristic-driven biases such as cognitive and recognition based heuristic biases are negatively related to investment decisions of individual investors. The results reported in Table 4.6 show that, cognitive heuristic biases ($\beta = 0.378$, $p < 0.001$) and recognition heuristic biases ($\beta = 0.196$, $p < 0.001$) were related to investment decisions, but in directions opposing to those anticipated in H1. These results suggest that individual investors who fell prey to heuristic-driven biases intend to engage in excessively high investment or overinvestment behaviours. These findings fail to support H1. Though not hypothesized, a positive relationship of heuristic-driven biases emerged for investment decisions.

Investment performance. The hypotheses predicted that heuristic-driven biases namely cognitive and recognition based heuristic biases would be negatively related to the investment performance of individual investors. The results presented in Table 4.6 show that cognitive heuristic biases ($\beta = -0.280$, $p < 0.001$) have a significant negative effect on investment performance. Similarly, a significant negative relationship was found between recognition heuristic biases ($\beta = -0.362$, $p < 0.001$) and investment performance. These results demonstrate that heuristic-driven biases reduce the investment performance of individual investors. These findings support to H2: the heuristic-driven biases have a significant negative influence on the investment performance of individual investors on the PSX. Overall the results of the analysis suggest that individual investors who are suffering from heuristic-driven biases intend to perceived that markets are inefficient as a result they engage in excessive trading which in turn adversely affects their investment performance.

Table 4.6. Results of Structural Equation Model 1

		Estimates	S.E.	C.R.	P-value
Relationships: (unstandardized)					
Perceived Market Efficiency	<--- Cognitive Heuristic Biases	-0.522	0.051	-10.207	***
Investment Decisions	<--- Cognitive Heuristic Biases	0.404	0.062	6.477	***
Investment Performance	<--- Cognitive Heuristic Biases	-0.279	0.057	-4.895	***
Perceived Market Efficiency	<--- Recognition Heuristic Biases	-0.424	0.049	-8.610	***
Investment Decisions	<--- Recognition Heuristic Biases	0.205	0.060	3.418	***
Investment Performance	<--- Recognition Heuristic Biases	-0.352	0.058	-6.106	***
Relationships: (standardized)					
Perceived Market Efficiency	<--- Cognitive Heuristic Biases	-0.526***			
Investment Decisions	<--- Cognitive Heuristic Biases	0.378***			
Investment Performance	<--- Cognitive Heuristic Biases	-0.280***			
Perceived Market Efficiency	<--- Recognition Heuristic Biases	-0.437***			
Investment Decisions	<--- Recognition Heuristic Biases	0.196***			
Investment Performance	<--- Recognition Heuristic Biases	-0.362***			

Note: N= 307; ***p < 0.001

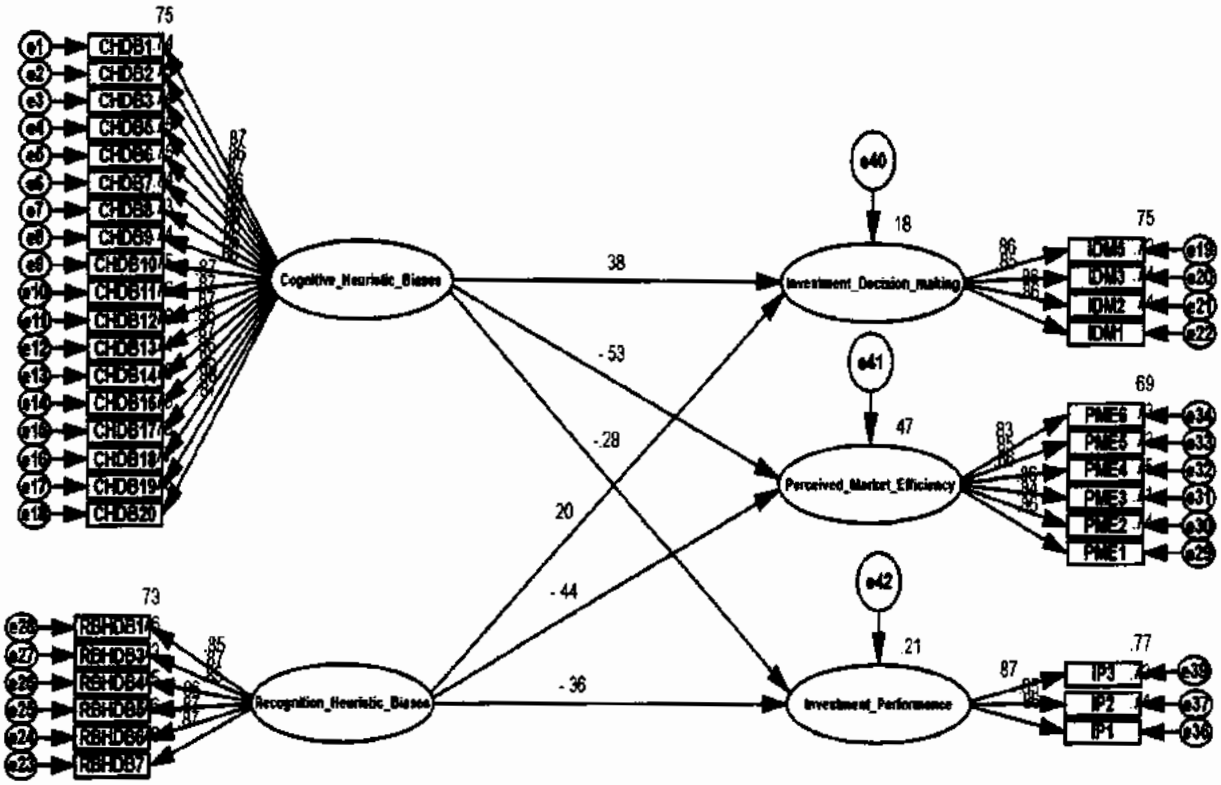

Figure 4.2. Structural Equation Model 1

4.3.6 Mediation Analyses for Individual Investors

Mediation analysis was conducted to explore the mediation effects of fundamental and technical anomalies between the relationship of heuristic-driven biases and investment management activities (investment decisions and investment performance) of individual investors and between the relationship of heuristic-driven biases and perceived market efficiency of individual investors. In this study, the researcher followed Baron and Kenny's (1986) steps for mediation analysis, which is consistent with Ahmad and Shah (2020) who

also used the Baron and Kenny method to test the mediation effect of risk perception between overconfidence bias and investment management activities.

The first condition of the mediation process was tested through SEM1in which direct effect the influence of independent variables (heuristic-driven biases) on dependent variables (investment management activities and perceived market efficiency) were checked shown in Figure 4.2. The results of analysis (See Table 4.6) demonstrate that heuristic-driven biases have a significant effect on investment decisions, investment performance, and perceived market efficiency of individual investors. Thus, the first condition of the mediation process was duly met.

The second condition of the mediation process was tested through structural equation model 2 that was exhibited in Figure 4.3. In this model, the influence of independent variables (heuristic-driven biases) was checked on mediating variables (fundamental and technical anomalies). Adequate model fits were accomplished with best fitted values as presented in Table 4.1. The table demonstrating CMIN/DF = 1.332, NFI = 0.944, CF1 = 0.985, TLI = 0.984, RMSEA = 0.033, PCLOSE = 1.000 and SRMR 0.039 duly fulfil the model fit benchmarks of Hair et al. (2014), Hu & Bentler (1999), and Tanaka (1993). The results reported in Table 4.7 show that cognitive heuristic biases ($\beta = 0.322$, $p < 0.001$) and recognition heuristic biases ($\beta = 0.320$, $p < 0.001$), have a significant positive effect on fundamental anomalies. Similarly, a significant positive relationship with technical anomalies was found for the cognitive heuristic biases (0.253, $p < 0.001$) and recognition heuristic biases (0.294, $p < 0.001$). These results reveal that fundamental and technical anomalies arise due to heuristic-driven biases of individual investors. Hence, the second condition of the mediation process was also met.

Table 4.7. Results of Structural Equation Model 2

		Estimates	S.E.	C.R.	p-value
Relationships: (unstandardized)					
Fundamental Anomalies	<--- Cognitive Heuristic Biases	0.327	0.058	5.640	***
Technical Anomalies	<--- Cognitive Heuristic Biases	0.245	0.062	3.980	***
Fundamental Anomalies	<--- Recognition Heuristic Biases	0.317	0.058	5.505	***
Technical Anomalies	<--- Recognition Heuristic Biases	0.279	0.063	4.445	***
Relationships: (standardized)					
Fundamental Anomalies	<--- Cognitive Heuristic Biases	0.322***			
Technical Anomalies	<--- Cognitive Heuristic Biases	0.253***			
Fundamental Anomalies	<--- Recognition Heuristic Biases	0.320***			
Technical Anomalies	<--- Recognition Heuristic Biases	0.294***			

Note: N= 307; ***p < 0.001

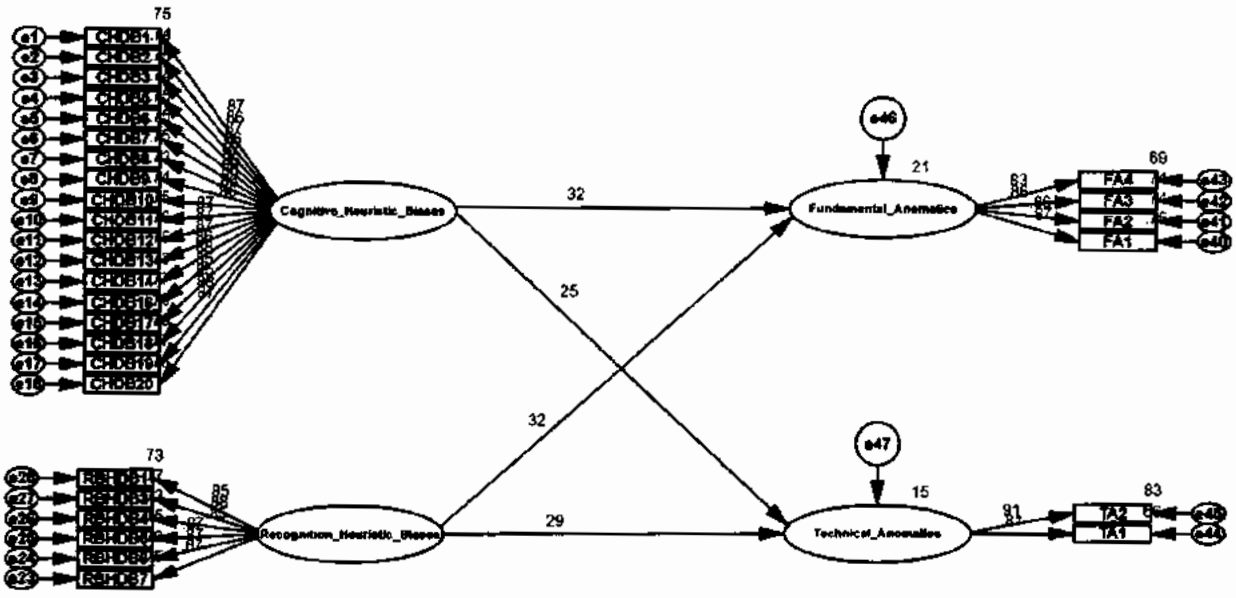

Figure 4.3. Structural Equation Model 2

Structural equation model 3 (See Figure 4.4) was performed to check the impact of mediating variables (fundamental and technical anomalies) on dependent variables

(investment decisions, investment performance and perceived market efficiency) for meeting third condition of mediation process. Satisfactory model fits was attained as shown in Table 4.1 showing CMIN/DF = 1.944, NFI = 0.943, CF1 = 0.971, TLI = 0.966, RMSEA = 0.056, PCLOSE = 0.145 and SRMR 0.041 duly fulfil the model fit minimum thresholds recommended by Hair et al. (2014), Hu & Bentler (1999), and Tanaka (1993). The results presented in Table 4.8 demonstrate that fundamental anomalies (β = -0.625, $p < 0.001$) and technical anomalies (β = -0.382, $p < 0.001$), have a significant negative effect on perceived market efficiency of individual investors. Similarly, a significant negative relationship with investment performance of individual investors was found for fundamental anomalies (β = -0.418, $p < 0.001$) and technical anomalies (β = -0.330, $p < 0.001$). The results of analysis also show that fundamental anomalies (β = 0.621, $p < 0.001$) and technical anomalies (β = 0.225, $p < 0.001$) were positively related to investment decisions of individual investors in emerging market. These findings suggest that due to anomalies (fundamental and technical) individuals investors perceived that markets are inefficient as a results generates high treading volume which in turn reduce their investment performance. So all the three conditions were met, it was confirmed that fundamental and technical anomalies mediates the relationship between heuristic-driven biases and perceived market efficiency and between heuristic-driven biases and investment management activities of individual investors in emerging market. Thus next step was to test whether fundamental and technical anomalies plays a partial or full mediating role between heuristic-driven biases and perceived market efficiency and between heuristic-driven biases and investment management activities of individual investors.

Table 4.8. Results of Structural Equation Model 3

		Estimates	S.E.	C.R.	p-value
Relationships: (unstandardized)					
Perceived Market Efficiency	<--- Fundamental Anomalies	-0.592	0.051	-11.666	***
Investment Decisions	<--- Fundamental Anomalies	0.625	0.057	10.897	***
Investment Performance	<--- Fundamental Anomalies	-0.389	0.055	-7.077	***
Perceived Market Efficiency	<--- Technical Anomalies	-0.374	.051	-7.361	***
Investment Decisions	<--- Technical Anomalies	0.234	.055	4.222	***
Investment Performance	<--- Technical Anomalies	-0.318	.058	-5.442	***
Relationships: (standardized)					
Perceived Market Efficiency	<--- Fundamental Anomalies	-0.625***			
Investment Decisions	<--- Fundamental Anomalies	0.621***			
Investment Performance	<--- Fundamental Anomalies	-0.418***			
Perceived Market Efficiency	<--- Technical Anomalies	-0.382***			
Investment Decisions	<--- Technical Anomalies	0.225***			
Investment Performance	<--- Technical Anomalies	-0.330***			

Note: N = 307; ***p < 0.001

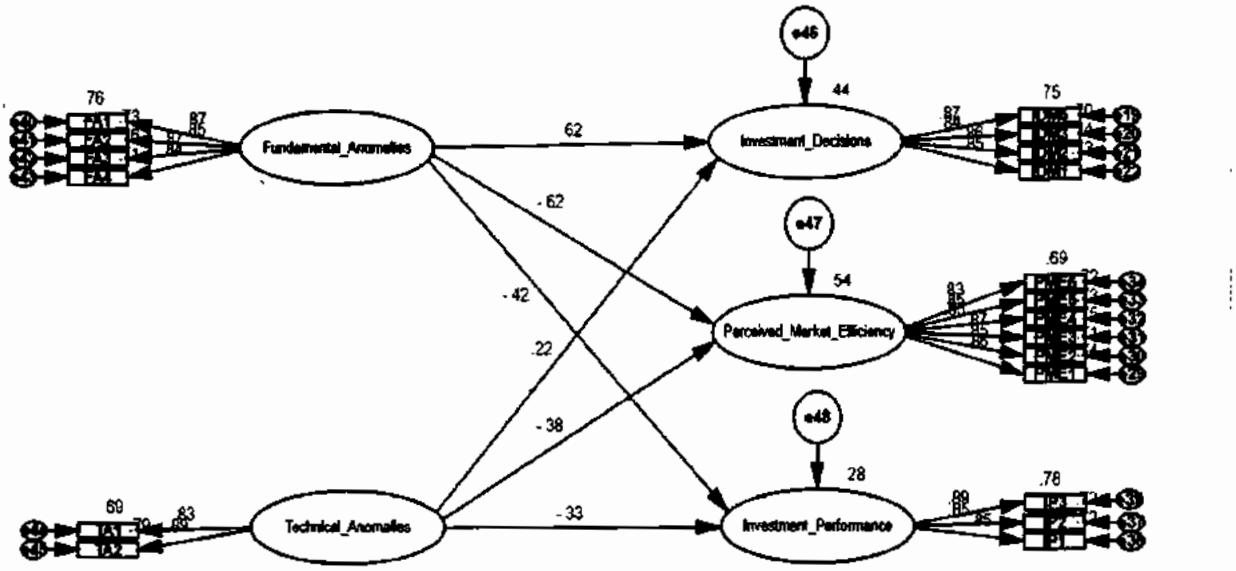

Figure 4.4. Structural Equation Model 3

In order to check the partial or full mediating role of fundamental and technical anomalies structural equation model 4 was performed as shown in Figure 4.5. Table 4.2 reveals acceptable model fits values were found as CMIN/DF = 1.305, NFI = 0.920, CFI = 0.980, TLI = 0.979, RMSEA = 0.032, PCLOSE = 1.000 and SRMR 0.036. Thus, model fit minimum thresholds recommended by Hair et al. (2014), Hu and Bentler (1999), and Tanaka (1993) were duly fulfilled. The results reported in Table 4.6 indicate that the direct impact of the cognitive heuristic biases on the perceived market efficiency (β = -0.526, $p < 0.001$), investment decision-making (β = 0.378, $p < 0.001$) and investment performance (β = -0.280, $p < 0.001$) of individual investors, without a mediator was significant. After including mediating variables in the model a significant relationship with perceived market efficiency(β = -0.338, $p < 0.001$), investment decision-making(β = 0.158, $p < 0.01$) and investment performance (β = -0.127, $p<0.05$) of individual investors was also found for the cognitive heuristic biases, likewise the value of beta was also reduced (See Figure 4.9). Therefore, these findings suggest that fundamental and technical anomalies partially

mediated the relationship between heuristic-driven biases and perceived market efficiency and between heuristic-driven biases and investment management activities (investment decision-making and investment performance) of individual investors.

The results also indicate that the recognition heuristic biases was a significant predictor of perceived market efficiency ($\beta = -0.437$, $p < 0.001$), investment decision-making ($\beta = 0.196$, $p < 0.001$) and investment performance of individual investors ($\beta = -0.362$, $p < 0.001$) before mediating variables including in the model (See Figure 4.6). After including mediating variables in the model results reported in Table 4.9 shows that recognition heuristic biases was significantly related to perceived market efficiency ($\beta = -0.233$, $p < 0.001$), and investment performance ($\beta = -0.194$, $p < 0.01$) but an insignificant predictor of investment decision-making ($\beta = -0.194$, $p > 0.05$) of individual investors. Thus, these findings suggest that fundamental and technical anomalies partially mediated the relationship between recognition heuristic biases and perceived market efficiency and between recognition heuristic biases and investment performance and fully mediated the relationship between recognition heuristic biases and investment decision-making of individual investors. Overall these findings lend support to H8, H9, and H10

Table 4.9. Results of Structural Equation Model 4

		Estimates	S.E.	C.R.	p-value
Relationships: (unstandardized)					
Perceived Market Efficiency	<--- Cognitive Heuristic Biases	**-0.330**	0.044	-7.431	***
Investment Decisions	<--- Cognitive Heuristic Biases	**0.159**	0.054	2.938	**.003**
Investment Performance	<--- Cognitive Heuristic Biases	**-0.124**	0.058	-2.154	**.031**
Perceived Market Efficiency	<--- Recognition Heuristic Biases	**-0.222**	0.043	-5.115	***

Investment Decisions	<--- Recognition Heuristic Biases	**-0.044**	0.054	-.809	**.418**
Investment Performance	<--- Recognition Heuristic Biases	**-0.185**	0.059	-3.149	**.002**
Fundamental Anomalies	<--- Cognitive Heuristic Biases	0.314	0.056	5.625	***
Technical Anomalies	<--- Cognitive Heuristic Biases	0.249	0.060	4.133	***
Fundamental Anomalies	<--- Recognition Heuristic Biases	0.304	0.055	5.492	***
Technical Anomalies	<--- Recognition Heuristic Biases	0.283	0.061	4.678	***
Perceived Market Efficiency	<--- Fundamental Anomalies	-0.420	0.050	-8.439	***
Investment Decisions	<--- Fundamental Anomalies	0.572	0.065	8.810	***
Investment Performance	<--- Fundamental Anomalies	-0.290	0.064	-4.528	***
Perceived Market Efficiency	<--- Technical Anomalies	-0.239	0.047	-5.134	***
Investment Decisions	<--- Technical Anomalies	0.187	0.059	3.187	**
Investment Performance	<--- Technical Anomalies	-0.235	0.063	-3.725	***

Relationships: (standardized)

Perceived Market Efficiency	<--- Cognitive Heuristic Biases	**-0.338** ***
Investment Decisions	<--- Cognitive Heuristic Biases	**0.158** **
Investment Performance	<--- Cognitive Heuristic Biases	**-0.127** *
Perceived Market Efficiency	<--- Recognition Heuristic Biases	**-0.233** ***
Investment Decisions	<--- Recognition Heuristic Biases	**-0.045**
Investment Performance	<--- Recognition Heuristic Biases	**-0.194** **
Fundamental Anomalies	<--- Cognitive Heuristic Biases	0.323 ***
Technical Anomalies	<--- Cognitive Heuristic Biases	0.253 ***
Fundamental Anomalies	<--- Recognition Heuristic Biases	0.321 ***
Technical Anomalies	<--- Recognition Heuristic Biases	0.296 ***
Perceived Market Efficiency	<--- Fundamental Anomalies	-0.418 ***

Investment Decisions	<--- Fundamental Anomalies	0.553 ***
Investment Performance	<--- Fundamental Anomalies	-0.288 ***
Perceived Market Efficiency	<--- Technical Anomalies	-0.241 ***
Investment Decisions	<--- Technical Anomalies	0.182 **
Investment Performance	<--- Technical Anomalies	-0.236 ***

Note: N = 307; ***p < 0.001; **p < 0.01

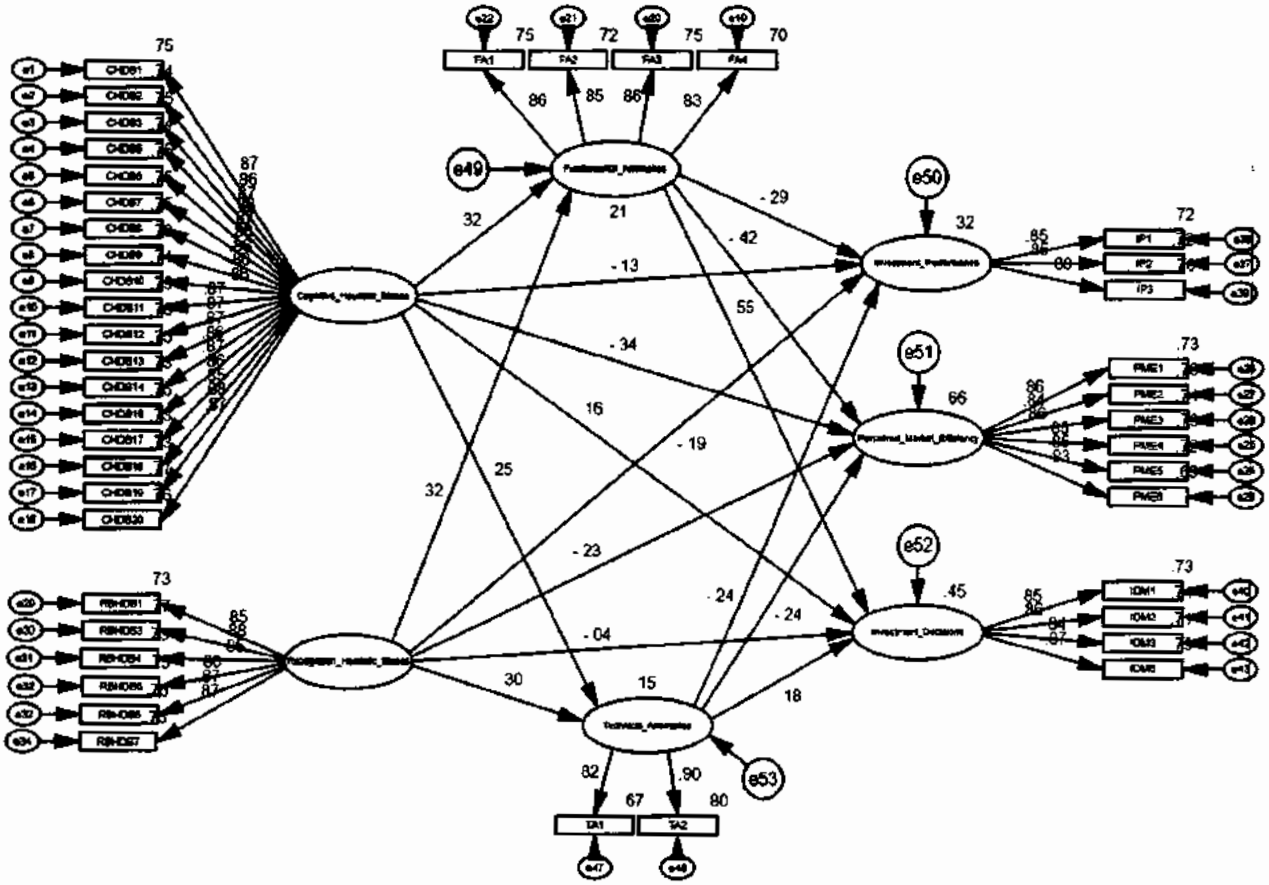

Figure 4.5. Structural Equation Model 4

4.3.7 Moderation Analyses for Individual Investors

Moderation analysis was used to investigate the interactive effects of heuristic-driven biases and financial literacy on perceived market efficiency, investment decision-making and investment performance of individual investors. Barren and Kenny's (1986) method was used for moderation analysis. Two interaction terms were created in the data set, first, by multiplying the cognitive heuristic biases with the financial literacy (CHDB × FL) and, second, by taking the product of the recognition heuristic biases and the financial literacy (RBHDB × FL). The results of moderation analysis presented in Table 4.10 show that the cognitive heuristic biases (β = -0.617, $p < 0.001$) was a significant predictor of perceived market efficiency and financial literacy (β = 0.065, p = 0.671) was not significantly related with perceived market efficiency. The relationship between the interaction term (β = -0.005, p = 0.909) and perceived market efficiency was also found insignificant, showing that the relationship between cognitive heuristic biases and perceived market efficiency of individual investors is not being moderated by the financial literacy. The cognitive heuristic biases (β = 0.111, p = 0.028) and financial literacy (β = -0.362, p = 0.043) were significantly associated with investment decision-making of individual investors. The interaction term of both variables was also significant (β = 0.103, p = 0.040), demonstrating that the connection between cognitive heuristic biases and investment decision-making is not being moderated by the financial literacy. The effects of cognitive heuristic biases (β = -0.172, p = 0.046) on the investment performance of individual investors was found significant and the influence of financial literacy (β = 0.266, p = 0.053) on the investment performance of individual investors was found insignificant. The interaction term (β = -0.072, p = 0.186) of these

variables was also insignificant, negating any moderating connection of the financial literacy between cognitive heuristic biases and investment performance of individual investors.

Similarly, the results reported in Table 4.10 also show that a significant relationship of recognition heuristic biases (β = -0.450, p = 0.003) and financial literacy (β = -.342, p = 0.036) was found for perceived market efficiency but the interaction term (β = -0.051, p = 0.276) of these variables was insignificant predictor of perceived market efficiency. These findings suggest that financial literacy does not moderate the relationship between recognition heuristic biases and perceived market efficiency. The recognition heuristic biases (β = 0.269, p = 0.136) and financial literacy (β = 0.142, p = 0.066) were not significantly connected with investment decision-making of individual investors. The interaction term (β = -0.018, p = 0.745) of both variables is also insignificant predictor of investment decision-making. The results suggesting that the relationship between recognition heuristic biases and investment decision-making of individual investors is not being moderated by financial literacy. The effects of recognition heuristic biases (β = -0.103, p = 0.554) on the investment performance of individual investors was found insignificant and the influence of financial literacy (β = 0.535, p = 0.004) on the investment performance of individual investors was found significant. The effects of interaction term (β = -0.119, p = 0.026) of these variables was significant. These findings suggesting that the financial literacy moderate the relationship between recognition heuristic biases and investment performance of individual investors. Overall these findings fail to support H14, H15, and H18.

Table 4.10. Results of Moderation Analyses for Individual Investors

		Estimates	S.E.	C.R.	P-value
Relationships: (unstandardized)					
Perceived Market Efficiency	<--- Cognitive Heuristic Biases	-0.617	0.150	-4.121	***
Perceived Market Efficiency	<--- Financial Literacy	0.065	0.153	0.425	0.671
Perceived Market Efficiency	**<--- CHBXFL**	**-0.005**	**0.045**	**-0.114**	**0.909**
Investment Decisions	<--- Cognitive Heuristic Biases	0.111	0.176	0.631	0.028
Investment Decisions	<--- Financial Literacy	-0.362	0.179	-2.021	0.043
Investment Decisions	**<--- CHBXFL**	**0.103**	**0.053**	**1.963**	**0.040**
Investment Performance	<--- Cognitive Heuristic Biases	-0.172	0.183	-0.942	0.046
Investment Performance	<--- Financial Literacy	0.266	0.186	1.429	0.053
Investment Performance	**<--- CHBXFL**	**-0.072**	**0.055**	**-1.322**	**0.186**
Perceived Market Efficiency	<--- Recognition Heuristic Biases	-.450	.151	-2.979	.003
Perceived Market Efficiency	<--- Financial Literacy	.342	.163	2.094	.036
Perceived Market Efficiency	**<--- RHBXFL**	**-0.051**	**0.047**	**-1.090**	**0.276**
Investment Decisions	<--- Recognition Heuristic Biases	0.269	0.180	1.492	0.136
Investment Decisions	<--- Financial Literacy	0.142	0.195	0.729	0.066
Investment Decisions	**<---RHBXFL**	**0.018**	**0.056**	**0.325**	**0.745**
Investment Performance	<--- Recognition Heuristic Biases	-0.103	0.173	-0.592	0.554
Investment Performance	<--- Financial Literacy	0.535	0.187	2.862	0.004
Investment Performance	**<--- RHBXFL**	**-0.119**	**0.053**	**-2.227**	**0.026**

Note: N = 307; ***p < 0.001

4.3.8 Robustness Tests

Endorsement of mediation and moderation results through PROCESS. The author applied SPSS version of PROCESS to validate mediation effects of fundamental and technical anomalies between heuristic-driven biases and perceived market efficiency and between heuristic-driven biases and investment management activities (investment decisions and investment performance) of individual investors. The results were reported in Table 4.11.

The mediation effect of the fundamental anomalies between cognitive heuristic biases and perceived market efficiency was run through the PROCESS method. The results indicate that the direct effect of cognitive heuristic biases on the perceived market efficiency is -0.43 which is statistically significant at P = 0.0000. Its indirect effect on the perceived market efficiency is negative (β = -0.19) and is also statistically significant (the upper and lower bounds are -0.1350 and -0.2753 with 95% bootstrapping confidence interval). The Sobel's test (normal theory test) results Z= -6.29 P=0.0000 also validates that the indirect effect is statistically significant. Hence, the researcher concludes with 95% confidence that fundamental anomalies were partially mediate the relationship between cognitive heuristic biases and perceived market efficiency of individual investors. Similarly, Mediation effect of the technical anomalies between cognitive heuristic biases and perceived market efficiency was run through the PROCESS method. The results show that the direct effect of cognitive heuristic biases on the perceived market efficiency is -0.51 which is statistically significant at P = 0.0000. The indirect effect (β = -0.12) is also statistically significant (the lower and upper bounds are -0.0677 and -0.1767 with 95% bootstrapping confidence interval). The Sobel's test results (Z= -4.65 P=0.0000) also approve that the indirect effect of cognitive heuristic biases on perceived market efficiency is statistically significant. Thus, the researcher concludes that

the partial mediation effect of technical anomalies exists between cognitive heuristic biases and perceived market efficiency of individual investors.

The mediation effect of the fundamental anomalies between cognitive heuristic biases and investment decision-making was also run through the PROCESS method. The results divulge that the direct effect of cognitive heuristic biases on the investment decision-making is 0.21 which is statistically significant at P = 0.0001. Its indirect effect on the investment decision-making (β = 0.22) is also statistically significant (the upper and lower bounds are 0.3029and 0.1540 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z= 6.13 P=0.0000) which confirms that the indirect effect is statistically significant. Therefore, the researcher concludes that the fundamental anomalies play a partial mediating role between cognitive heuristic biases and investment decision-making of individual investors. The PROCESS method was also used to endorse the mediation effects of technical anomalies between cognitive heuristic bias and investment decision-making. The results demonstrate that the direct effect of cognitive heuristic biases on the investment decision-making is 0.34 which is statistically significant at P = 0.0000. Its indirect effect on the investment decision-making (β = 0.10) is also statistically significant (the upper and lower bounds are 0.1635 and 0.0495 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z= 3.86 P=0.0001) which supports that the indirect effect is statistically significant. Thus, the researcher concludes that the partial mediation effect of technical anomalies exists between cognitive heuristic biases and investment decision-making of individual investors.

The author also applied the SPSS version of PROCESS to validate the mediation effects of fundamental anomalies between cognitive heuristic biases and investment performance. The

results show that the direct effect of cognitive heuristic biases on the investment performance is -0.25 which is statistically significant at P = 0.0000. Its indirect effect on the investment performance (β = -0.15) is also statistically significant (the upper and lower bounds are -0.0946 and -0.2157 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z= -4.77 P=0.0000) which confirms that the indirect effect is statistically significant. Hence, the researcher concludes that the fundamental anomalies play a partial mediating role between cognitive heuristic biases and investment performance of individual investors. Similarly, the mediation effect of the technical anomalies between cognitive heuristic biases and investment performance was run through the PROCESS method. The results display that the direct effect of cognitive heuristic biases on the investment performance is -0.29 which is statistically significant at P = 0.0000. Its indirect effect on the investment performance (β = -0.10) is also statistically significant (the upper and lower bounds are -0.0576 and -0.1620 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z= -3.96 P=0.0001) which confirms that the indirect effect is statistically significant. Therefore, the researcher concludes that the partial mediation effect of technical anomalies exists between cognitive heuristic biases and investment performance of individual investors.

SPSS version of the PROCESS method was also used to validate the mediation effects of fundamental anomalies between recognition heuristic biases and perceived market efficiency. The results illustrate that the direct effect of recognition heuristic biases on the perceived market efficiency (β = -0.35 P = 0.0000) is statistically significant. Its indirect effect on the perceived market efficiency is -0.20 which is also statistically significant (the upper and lower bounds are -0.1400 and -0.2832 with 95% bootstrapping confidence interval) and the

value of beta was also reduced. This is also validated through Sobel's test (Z= -6.23 P=0.0000) which confirms that the indirect effect is statistically significant. Hence, the researcher concludes that the partial mediation effect of fundamental anomalies exists between recognition heuristic biases and perceived market efficiency of individual investors. Similarly, the mediation effect of the technical anomalies between recognition heuristic biases and the perceived market efficiency was run through the PROCESS method. The results explain that the direct effect of recognition heuristic biases on the perceived market efficiency (β = -0.42 P = 0.0000) is statistically significant. Its indirect effect on the perceived market efficiency is -0.13 which is also statistically significant (the upper and lower bounds are -0.0762 and -0.1887 with 95% bootstrapping confidence interval) and the value of beta was also reduced. This is also validated through Sobel's test (Z= -4.83 P=0.0000) which confirms that the indirect effect is statistically significant. So, the researcher concludes that the technical anomalies play a partial mediating role between recognition heuristic biases and perceived market efficiency of individual investors.

The mediation effects of fundamental anomalies between recognition heuristic biases and investment decision-making were run through the PROCESS method to validate the mediation effects of fundamental anomalies. The results show that the direct effect of recognition heuristic biases on investment decision-making (β = 0.07 P = 0.2249) is insignificant. But its indirect effect on the investment decision-making is 0.24 which is statistically significant (the upper and lower bounds are 0.3146 and 0.1630 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z= 6.20 P=0.0000) which confirms that the indirect effect is statistically significant. Thus, the researcher concludes that the fundamental anomalies fully mediated the relationship between

recognition heuristic biases and investment decision-making of individual investors. Similarly, the SPSS version of the PROCESS method was also used to validate the mediation effect of the technical anomalies between recognition heuristic biases and investment decision-making. The results elucidate that the direct effect of recognition heuristic biases on the investment decision-making (β = 0.19 P = 0.0014) is statistically significant. Its indirect effect on the investment decision-making is 0.11 which is also statistically significant (the upper and lower bounds are 0.1777 and 0.0633 with 95% bootstrapping confidence interval) and the value of beta was also reduced. This is also validated through Sobel's test (Z= 4.19 P=0.0000) which confirms that the indirect effect is statistically significant. So, the researcher concludes that the technical anomalies play a partial mediating role between recognition heuristic biases and investment decision-making of individual investors.

The mediation effect of the fundamental anomalies between recognition heuristic biases and investment performance was run through the PROCESS method to validate the mediation effects of fundamental anomalies. The results divulge that the direct effect of recognition heuristic biases on the investment performance is -0.28 which is statistically significant at P = 0.0000. Its indirect effect on the investment performance (β = -0.14) is also statistically significant (the upper and lower bounds are -0.0862 and -0.2057 with 95% bootstrapping confidence interval). The results of Sobel's test (Z= -4.63 P=0.0000) also validates that the indirect effect is statistically significant. Thus, the researcher concludes with 95% confidence that fundamental anomalies were partially mediated the relationship between recognition heuristic biases and investment performance of individual investors. Similarly, the mediation effect of the technical anomalies between recognition heuristic biases and investment performance was run through the PROCESS method to validate the mediation effects of

technical anomalies. The results show that the direct effect of recognition heuristic biases on the investment performance is -0.32 which is statistically significant at P = 0.0000. The indirect effect (β = -0.10) is also statistically significant (the lower and upper bounds are -0.0559 and -0.1616 with 95% bootstrapping confidence interval). The Sobel's test results (Z= -3.97 P=0.0001) also approve that the indirect effect of recognition heuristic biases on investment performance is statistically significant. Thus, the researcher concludes that the technical anomalies play a partial mediating role between recognition heuristic biases and investment performance of individual investors. All these findings endorse the results of SEM.

Table 4.11. Validation of Mediation Results for Individual Investors using Process Method

	Indirect effect results by using Sobel test				**Indirect effect results by using Bootstrapping method**			**Direct effect results**	
	β	SE	P	z	Indirect effect	95%-LLCI	95%-ULCI	Direct effect	p-value
B➡FA➡PME	-0.19	0.04	0.000	-6.29	-0.19	-0.2753	-0.1350	-0.43	0.0000
B➡TA➡PME	-0.12	0.03	0.000	-4.65	-0.12	-0.1767	-0.0677	-0.51	0.0000
B➡FA➡IDM	0.22	0.04	0.000	6.13	0.22	0.1540	0.3029	0.21	0.0001
B➡TA➡IDM	0.10	0.03	0.0001	3.86	0.10	0.0495	0.1635	0.34	0.0000
B➡FA➡IP	-0.15	0.04	0.0000	-4.77	-0.15	-0.2157	-0.0946	-0.25	0.0000
B➡TA➡IP	-0.10	0.03	0.0001	-3.96	-0.10	-0.1620	-0.0576	-0.29	0.0000
B➡FA➡PME	-0.20	0.3	0.0000	-6.23	-0.20	-0.2832	-0.1400	-0.35	0.0000
B➡TA➡PME	-0.13	0.03	0.0000	-4.83	-0.13	-0.1887	-0.0762	-0.42	0.0000
B➡FA➡IDM	0.24	0.4	0.0000	6.20	0.24	0.1630	0.3146	0.07	0.2249
B➡TA➡IDM	0.11	0,02	0.0000	4.19	0.11	0.0633	0.1777	0.19	0.0014
B➡FA➡IP	-0.14	0.03	0.0000	-4.63	-0.14	-0.2057	-0.0862	-0.28	0.0000
B➡TA➡IP	-0.10	0.02	0.0001	-3.97	-0.10	-0.1616	-0.0559	-0.32	0.0000

The results of moderation were also authenticated through the PROCESS method. Results that were reported in Table 4.12 show that cognitive heuristic biases (β = -0.6168 , P=0.0001) was a significant predictor of perceived market efficiency of individual investors and financial literacy (β= 0.0648, P = 0.6730) was an insignificant predictor of perceived market efficiency. the interaction term (β=-0.005, P=0.9098) of these variables also has an insignificant effect on perceived market efficiency. These results also confirm that moderation effect of financial literacy does not exist between the relationship of cognitive heuristic biases and perceived market efficiency of individual investors. An insignificant association was found between the cognitive heuristic biases (β = 0.1109, P = 0.5307) and investment decision-making of individual investors and financial literacy (β = -0.3622, P = 0.0453) has a significant relationship with investment decision-making of individual investors. The interaction term (β = 0.1032, P = 0.0417) of both variables was also significantly associated with the investment decision-making of individual investors. These results confirm that moderation effect of financial literacy exist between the relationship of cognitive heuristic biases and investment decision making of individual investors. The effects of cognitive heuristic biases (β = -0.1722, P = 0.3492) and financial literacy (β = -0.2662, P = 0.1562) on investment performance of individual investors was found insignificant and the influence of interaction terms (β = -0.0722, P = 0.1893) of both variables on investment performance of individual investors was also insignificant. These results confirm that moderation effect of financial literacy does not exist between the relationship of cognitive heuristic biases and investment performance of individual investors.

The results of the study also reveal that recognition heuristic biases (β = -0.4496, P = 0.0033) and financial literacy (β = 0.3418, P = 0.0380) were a significant predictor of perceived market efficiency of individual investors but the interaction term (β = -0.0509, P = 0.2788) of these variables also has an insignificant effect on perceived market efficiency. These results confirm that moderation effect of financial literacy does not exist between the relationship of recognition heuristic biases and perceived market efficiency of individual investors. Similarly, the interaction term was an insignificant predictor of investment decision-making but has a significant effect on the investment performance of individual investors. These findings confirm that moderation effect of financial literacy does not exist between the relationship of recognition heuristic biases and investment decision-making of individual investors and moderate the relationship between recognition heuristic biases and investment performance of individual investors. All these findings endorse the results of path analysis.

Table 4.12. Validation of Moderation Results for Institutional Investors using Process Method

	Perceived Market Efficiency		Investment Decisions		Investment Performance	
Predictors	**β**	**P-value**	**β**	**P-value**	**β**	**P-value**
Cognitive Heuristic Biases	-0.6168	0.0001	0.1109	0.5307	-0.1722	0.3492
Financial Literacy	0.0648	0.6730	-0.3622	0.0453	0.2662	0.1562
Int_1	**-0.0051**	**0.9098**	**0.1032**	**0.0417**	**-0.0722**	**0.1893**
Recognition Heuristic Biases	-0.4496	0.0033	0.2692	0.1387	-0.1025	0.5560
Financial Literacy	0.3418	0.0380	0.1422	0.0689	0.5353	0.0047
Int_2	**-0.0509**	**0.2788**	**0.0182**	**0.7463**	**0.1191**	**0.0274**

Note: N = 307; Int_1= CHBXFL, Int_2= RHBXFL

4.4 Empirical Results for Institutional Investors

This section aims to report the empirical findings related to institutional investors, clarify the mechanism by which heuristic-driven biases influences the perceived market efficiency and

investment management activities of institutional investors with the mediating role of fundamental and technical anomalies and moderating role of financial literacy.

4.4.1 Confirmatory Factor Analysis (CFA)

Firstly, CFA was run in AMOS 24 to authenticate the factor structure, evaluate the convergent validity, discriminant validity, and internal consistency reliability of the study constructs as well as removing the items having low standardized factor loading. The measurement model 2 was performed in order to test the validity and reliability of the constructs which is shown in Figure 4.6. A satisfactory model fit was accomplished by following the model modifications tactics proposed by Hair et al. (2014), after dropping a few items that either had high error terms cross-loading or weak factor loadings.

Table 4.14 divulges that the factor loadings for each latent construct ranging from 0.851 to 0.904 and were found to be statistically significant, signalling that all the observed factors illustrate the latent variables significantly. The fitness of model was examined with the help of CMIN/DF, which is 1.126, and was found within the accepted thresholds of 1−3 (See Table 4.13). To confirm further the fitness of model, measures namely RMSEA, SRMR, TFI, PCLOSE, CFI, and NFI were used. The values regarding model fit indices (See Table 4.13) were found within the accepted thresholds where CF1 = 0.985, NFI = 0.981, TLI = 0.984 represent good model fit values. Similarly, RMSEA = 0.027, SRMR = 0.035, and PCLOSE = 1.000 indicated good model fitness as per the recommended thresholds of previous studies (Hair et al., 2014; Vieira, 2011; Hu & Bentler,1999; Tanaka, 1993).

Furthermore, the measurement model was approved by establishing convergent validity, discriminant validity, and internal reliability of the study constructs. To evaluate convergent

validity, the average variances extracted (AVE) for each set of measures were computed. The results, reported in Table 4.14 divulge that AVE values ranging from 0.682-0.797 for the constructs which are above the minimum thresholds of 0.50. Researchers. Thus results suggesting that convergent validity was accomplished. Similarly, to assess discriminant validity, square root of AVE values for each set of measures were computed which are above the benchmark of 0.70 (See Table 4.14) suggesting that every construct is different from one another (Hair et al., 2014; Hu & Bentler, 1999). Additionally, the composite reliability (CR) values were utilized to evaluate the internal consistency reliability of the study constructs. the CR values, as reported in Table 4.14, are all above the benchmark of 0.70 (Bagozzi & Yi, 2012) which reveal that the scales had good internal consistency. Hence, the achievement of all the criteria for fitness of measurement allowed to proceed to structural equation modelling testing.

Table 4.13. Goodness of Fit Statistics for Institutional Investors

Models	CMIN	DF	CMIN/DF	NFI	CFI	SRMR	TLI	PCLOSE	RMSEA
Measurement2	1184.307	1052	1.126	0.981	0.985	0.035	0.984	1.000	0.027
Structural Model5	836.704	623	1.343	0.894	0.971	0.052	0.969	0.912	0.044
Structural Model6	512.309	401	1.278	0.917	0.981	0.049	0.979	0.964	0.039
Structural Model7	188.913	146	1.294	0.941	0.986	0.056	0.983	0.829	0.041
Structural Model8	1014.291	844	1.202	0.931	0.979	0.041	0.978	1.000	0.034
Acceptable range	-	-	1–3	>0.90	>0.95	< 0.08	> 0.90	> 0.05	< 0.06

Table 4.14. Factor Loadings, Validity and Reliability for Institutional Investors

Construct	Indicator	Factor Loadings	CR	AVE	√AVE
Cognitive Heuristic-Driven Biases	CHDB1	0.861***	0.937	0.714	0.844
	CHDB2	0.867***			
	CHDB3	0.878***			
	CHDB4	0.864***			
	CHDB5	0.865***			
	CHDB6	0.851***			
	CHDB7	0.883***			
	CHDB8	0.889***			

	CHDB9	0.863***			
	CHDB10	0.867***			
	CHDB11	0.873***			
	CHDB12	0.858***			
	CHDB13	0.872***			
	CHDB14	0.851***			
	CHDB15	0.871***			
	CHDB16	0.852***			
	CHDB17	0.898***			
	CHDB18	0.857***			
Recognition Based Heuristic-Driven Biases	RBHDB1	0.894***	0.856	0.682	0.826
	RBHDB2	0.872***			
	RBHDB3	0.880***			
	RBHDB4	0.874***			
	RBHDB5	0.903***			
	RBHDB6	0.880***			
Investment Decisions	IDM1	0.901***	0.927	0.760	0.872
	IDM2	0.854***			
	IDM3	0.872***			
	IDM4	0.860***			
Investment Performance	IP1	0.868***	0.862	0.749	0.865
	IP2	0.855***			
	IP3	0.874***			
Perceived Market Efficiency	PME1	0.900***	0.919	0.797	0.893
	PME2	0.904***			
	PME3	0.877***			
	PME4	0.876***			
	PME5	0.911***			
	PME6	0.887***			
Fundamental Anomalies	FA1	0.835***	0.818	0.737	0.882
	FA2	0.858***			
	FA3	0.874***			
	FA4	0.867***			
Technical Anomalies	TA1	0.869***	0.875	0.778	0.858
	TA2	0.895***			
Financial Literacy	FL1	0.851***	0.924	0.708	0.841
	FL2	0.833***			
	FL3	0.833***			
	FL4	0.844***			
	FL5	0.844***			

CR = Composite Reliability; **AVE** = Average Variance Extracted; ***p < 0.001

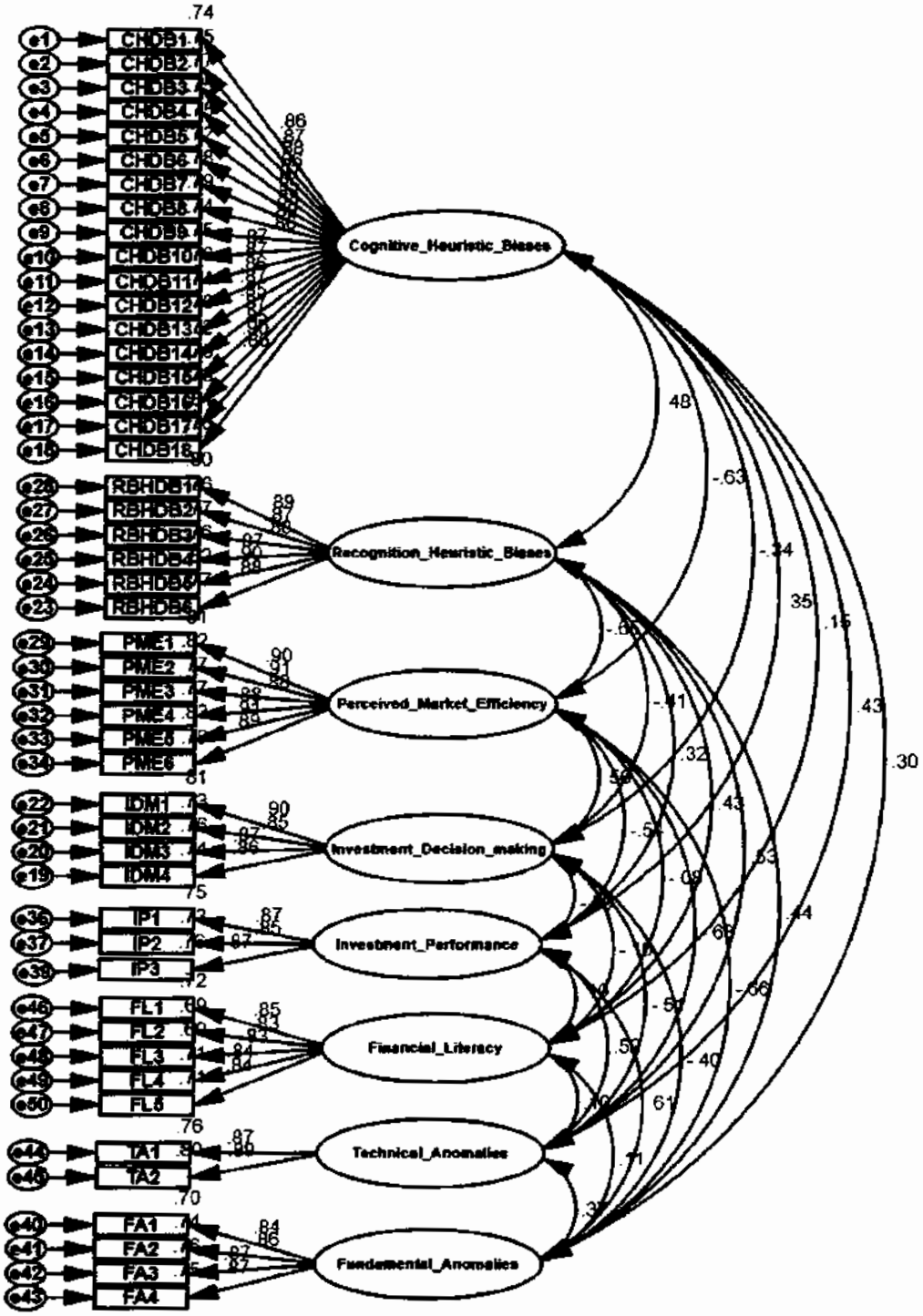

Figure 4.6. Measurement Model 2 for Institutional Investors

4.4.2 Common Method Bias

CMB was also tested for institutional data set by executing Harman's single-factor test using SPSS through principle component analysis as an extraction method. The output of the analysis shows eight factors with eigenvalues greater than 1 of which the first factor explains only 31.103 percent variation of total variance explained which is less than 50 percent. This confirms that there is no threat of CMB affecting the statistical results.

4.4.3 Statistics for Demographic Variables for Institutional Investors

Table 4.15 displayed statistics for demographic characteristics of the sample of institutional investors used for analysis. The sample for the study was composed of 93.3% male and 6.7% female investors. This composition of sample symbolizes the social and cultural norms of Pakistan. In terms of age groups, the major portion of the sample (about 58.9%) lied within the age level of 41-50 years, while 26.1% representing 30-40 years, 2.8% representing below 30 years and 12.2% lied within the age level 50 above. The sample for research included 91.7% married, 5.0% single and 3.3% divorced participant. In terms of qualification, 77.2% held a master's degree 11.1% held a graduate degree, 10.0% of the investors had done MS/MPhil, while 1.7% institutional investors have other qualification. The sample for the study included 32.2% investors having investment experience less than 5 years, 40.0% investors have investment experience from 5 to 10 years, 21.7% investors have investment experience from 11-15 years as well as 6.1% investors having investment experience 15 year above for attending the stock market.

Table 4.15. Statistics for Demographic Variables for Institutional Investors

Category		Frequency	Percentage
Gender	Male	168	93.3
	Female	12	6.7
Age	Below 30 years	5	2.8
	30-40 years	47	26.1
	41-50 years	106	58.9
	50 years above	22	12.2
Qualification	Graduate	20	11.1
	Masters	139	77.2
	MS/MPhil	18	10.0
	Others	3	1.7
Marital Status	Single	9	5.0
	Married	165	91.7
	Divorced	5	3.3
Investment Experience	Less than 5 years	58	32.2
	5-10 years	72	40.0
	11-15 years	39	21.7
	15 years above	11	6.1

4.4.4 Correlation Analysis for Institutional Investors

Pearson correlations among the variables are displayed in Table 4.16. It provides preliminary support for anticipated hypothesis related to institutional investors in the study. The results also shows cognitive heuristic biases are negatively related to perceived market efficiency, with a Pearson's correlation coefficient of $r = -0.606$, which is significant at $p < 0.01$, and investment performance of institutional investors with a Pearson's correlation coefficient of $r = -0.321$, which is significant at $p < 0.01$. This means that, as cognitive heuristic biases increases, the perceived market efficiency and investment performance of institutional decrease. Cognitive heuristic biases are positively related to investment decision-making of

institutional investors with a Pearson's correlation coefficient of r = 0.334, which is significant at p < 0.01. Psychologically this means that, as cognitive heuristic biases increases, investment of institutional investors in the stock market also increases.

The results of the study also show that the recognition heuristic biases are negatively related to perceived market efficiency, with a Pearson's correlation coefficient of r = -0.621, which is significant at p < 0.01, and investment performance of institutional investors with a Pearson's correlation coefficient of r = -0.379, which is significant at p < 0.01. This means that, as recognition heuristic biases increases, the perceived market efficiency and investment performance of institutional investors decreases. Recognition heuristic biases are positively related to investment decision-making of institutional investors with a Pearson's correlation coefficient of r = 0.301, which is significant at p < 0.01. Psychologically this means that, as recognition heuristic biases increases, investment of institutional investors in the stock market also increases. Cognitive heuristic biases are positively associated with fundamental anomalies with a Pearson's correlation coefficient of r = 0.286, which is significant at p < 0.01.and technical anomalies with a Pearson's correlation coefficient of r = 0.397, which is significant at p < 0.01. Similarly, a positive correlation of recognition heuristic biases were found for fundamental anomalies with a Pearson's correlation coefficient of r = 0.415, which is significant at p < 0.01.and technical anomalies with a Pearson's correlation coefficient of r = 0.484, which is significant at p < 0.0001. Psychologically this means that, as heuristic-driven biases namely recognition and cognitive heuristic biases increases, fundamental and technical anomalies in the stock market also increases. Fundamental anomalies are negatively correlated with perceived market efficiency (r = -0.620, p < 0.01) and investment performance (r = -.356, p < 0.01) of institutional investors. This means that, due to the

fundamental anomalies, the perceived market efficiency and investment performance of institutional investors decrease. Similarly, technical anomalies are negatively associated with perceived market efficiency ($r = -0.472$, $p < 0.01$) and investment performance ($r = -0.446$, $p < 0.01$) of institutional investors. Psychologically this means that, as technical anomalies increases perceived market efficiency and investment performance of institutional investors decreases.

The results also show that fundamental anomalies are positively related to investment decision-making of institutional investors with a Pearson's correlation coefficient of $r = 0.341$, which is significant at $p < 0.05$, which means that, due to fundamental anomalies investment of institutional investors in the stock market increases. Similarly, positive correlation of technical anomalies were found for investment decision making of institutional investors with a Pearson's correlation coefficient of $r = 0.575$, which is significant at $p < 0.01$, suggesting that as technical anomalies increases the investment of institutional investors in the stock market also increases. Financial literacy of institutional investors is negatively correlated with cognitive heuristic biases ($r = -0.144$, $p < 0.05$) and recognition heuristic biases ($r = -0.404$, $p < 0.01$) which means as financial literacy increases the heuristic-driven biases namely cognitive heuristic biases and recognition heuristic biases decreases. Similarly, a significant positive correlation of financial literacy was found for perceived market efficiency and investment performance of institutional investors which means that due to financial literacy perceived market efficiency and investment performance of institutional investors increases.

Table 4.16. Means, Standard Deviations and Pearson Correlation for Institutional Investors

ıriables	Mean	SD	1	2	3	4	5	6	7	8
Cognitive Heuristic Biases	3.1847	1.10058	1							
Recognition Heuristic Biases	2.6746	0.91972	0.490**	1						
Perceived Market Efficiency	2.3212	1.15872	-0.606**	-0.621**	1					
Investment Decisions	2.7962	1.03072	0.334**	0.301**	-0.514**	1				
Investment Performance	2.6053	0.92930	-0.321**	-0.379**	0.513**	-0.547**	1			
Fundamental Anomalies	2.7077	0.94353	0.286**	0.415**	-0.620**	0.575**	-.356**	1		
Technical Anomalies	2.2628	0.97600	0.397**	0.484**	-0.472**	0.341*	-.446**	.333**	1	
Financial Literacy	3.0542	0.94075	-0.144*	-0.404**	0.286*	0.275	0.218*	0.173	0.206	1

Note: N = 180; **p < 0.01; *p < 0.05

4.4.5 Structural Equation Models for Institutional Investors

The study hypotheses related to institutional investors were also tested through structural equation models. Structural equation model 5 (See Figure 4.7) was performed to test the influence of cognitive heuristic-driven biases and recognition based heuristic-driven biases on the investment management activities (investment decisions and investment performance) and perceived market efficiency of institutional investors, trading on the PSX.

To confirm the fitness of model 5, measures namely CMIN/DF, RMSEA, SRMR, TFI, PCLOSE, CFI, and NFI were used. Acceptable model fits values were found for the SEM 5 as shown in Table 4.13 which reveals CMIN/DF = 1.343, NFI = 0.894, CF1 = 0.971, TLI = 0.969, RMSEA = 0.044, PCLOSE = 0.912 and SRMR 0.052. All these parameters are within the minimum thresholds suggested by Hair et al. (2014), Hu & Bentler (1999), Tanaka (1993). The results of SEM 5 reported in Table 4.17.

Perceived market efficiency. The hypotheses predicted that heuristic-driven biases such as cognitive and recognition based heuristic biases would be negatively associated with perceived market efficiency of institutional investors. To test these predictions, the researcher regressed perceived market efficiency on cognitive and recognition based heuristic biases

(See Figure 4.7). The results of SEM show that cognitive heuristic biases (β = -0.459, $p < 0.001$) have a significant negative influence on the perceived market efficiency of institutional investors. Similarly, a significant negative relationship with the perceived market efficiency of institutional investors was found for the recognition heuristic biases (β = -0.509, $p < 0.001$). These results suggest that institutional investors who are suffering from cognitive heuristic biases and recognition heuristic biases intend to perceived that markets are inefficient. These findings lend support to H7: The heuristic-driven biases have a significant negative influence on perceived market efficiency of institutional investors.

Investment decisions. The hypotheses predict that heuristic-driven biases such as cognitive and recognition based heuristic biases are negatively related to investment decisions of institutional investors. The results reported in Table 4.17 show that, cognitive heuristic biases (β = 0.263, $p < 0.001$) and recognition heuristic biases (β = 0.225, $p < 0.01$) were related to investment decisions of institutional investors, but in directions opposing to those anticipated in H3. These results suggest that individual investors who fell prey to heuristic-driven biases intend to engage in excessively high investment or overinvestment behaviours. These findings fail to support H3. Though not hypothesized, a positive relationship of heuristic-driven biases emerged for investment decisions.

Investment performance. The hypotheses predicted that heuristic-driven biases i.e. cognitive and recognition based heuristic biases would be negatively related to the investment performance of institutional investors. The results presented in Table 4.17 show that cognitive heuristic biases (β = -0.197, $p < 0.01$) have a significant negative effect on investment performance of institutional investors. Similarly, a significant negative relationship was found between recognition heuristic biases (β = -0.343, $p < 0.001$) and

investment performance of institutional investors. These results demonstrate that heuristic-driven biases reduce the investment performance of individual investors. These findings support to H4: the heuristic-driven biases have a significant negative influence on the investment performance of institutional investors on the PSX. Overall the results of the analysis suggest that institutional investors who are suffering from heuristic-driven biases intend to perceived that markets are inefficient as a result they engage in excessive trading which in turn adversely affects their investment performance.

Table 4.17. Results of Structural Equation Model 5

		Estimates	S.E.	C.R.	P-value
Relationships: (unstandardized)					
Perceived Market Efficiency	<--- Cognitive Heuristic Biases	-0.476	0.066	-7.191	***
Investment Decisions	<--- Cognitive Heuristic Biases	0.273	0.079	3.465	***
Investment Performance	<--- Cognitive Heuristic Biases	-0.216	0.082	-2.651	.008
Perceived Market Efficiency	<--- Recognition Heuristic Biases	-0.471	0.060	-7.877	***
Investment Decisions	<--- Recognition Heuristic Biases	0.209	0.071	2.945	.003
Investment Performance	<--- Recognition Heuristic Biases	-0.337	0.075	-4.493	***
Relationships: (standardized)					
Perceived Market Efficiency	<--- Cognitive Heuristic Biases	-0.459***			
Investment Decisions	<--- Cognitive Heuristic Biases	0.263***			
Investment Performance	<--- Cognitive Heuristic Biases	-0.197**			
Perceived Market Efficiency	<--- Recognition Heuristic Biases	-0.509***			
Investment Decisions	<--- Recognition Heuristic Biases	0.225**			
Investment Performance	<--- Recognition Heuristic Biases	-0.343***			

Note: N= 180; ***p < 0.001; **p < 0.01

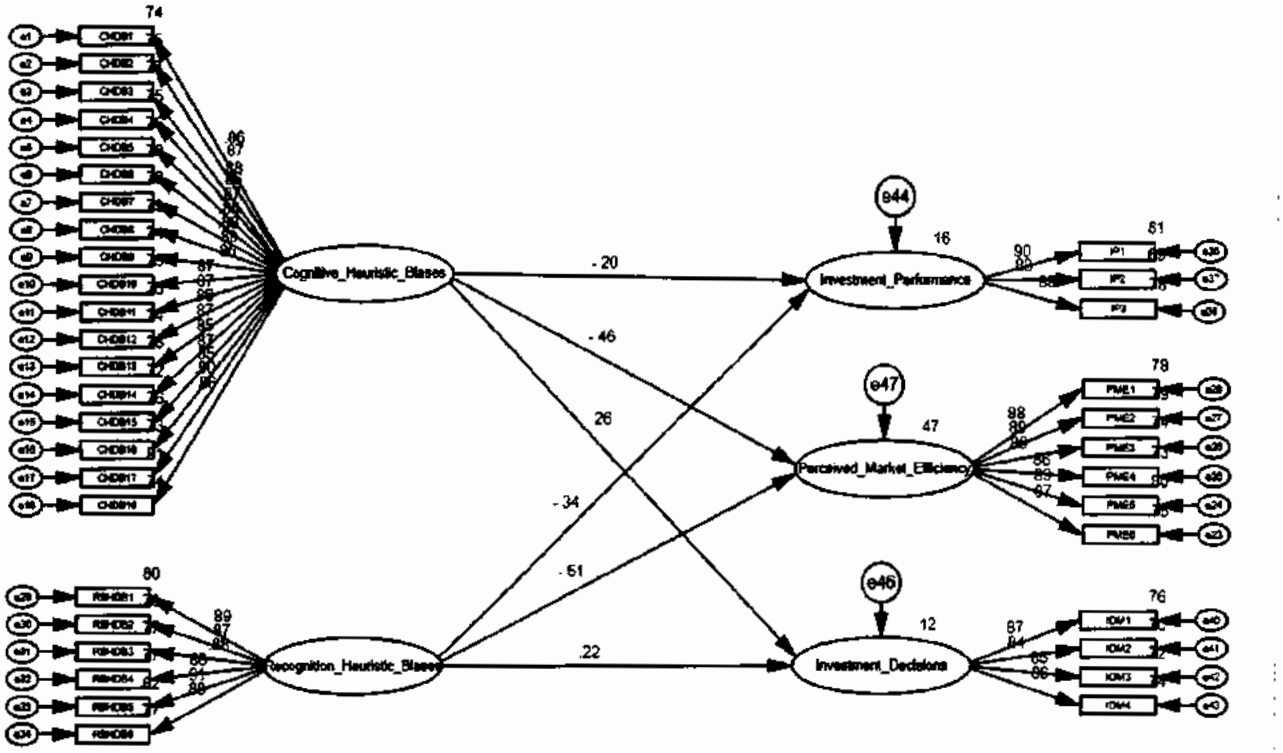

Figure 4.7. Structural Equation Model 5

4.4.6 Mediation Analyses for Institutional Investors

The mediation analysis is considered in order to understand the complexities of the relationship between heuristic biases, investment management activities and perceived market efficiency. Mediation analysis was conducted to explore the mediation effects of fundamental and technical anomalies between the relationship of heuristic-driven biases and investment management activities (investment decisions and investment performance) of institutional investors and between the relationship of heuristic-driven biases and perceived market efficiency of institutional investors. The researcher followed Baron and Kenny's (1986) steps for mediation analysis, which is consistent with Ahmad and Shah (2020) who

also used the Baron and Kenny method to test the mediation effect of risk perception between overconfidence bias and investment management activities.

The first condition of the mediation process was tested through SEM 5 in which direct effect the influence of independent variables (heuristic-driven biases) on dependent variables (investment management activities and perceived market efficiency) were checked shown in Figure 4.7. The results of analysis (See Table 4.17) demonstrate that heuristic-driven biases have a significant effect on investment decisions, investment performance, and perceived market efficiency of institutional investors. Thus, the first condition of the mediation process was duly met.

The second condition of the mediation process was tested through structural equation model 6 that was exhibited in Figure 4.8. In this model, the influence of independent variables (heuristic-driven biases) was checked on mediating variables (fundamental and technical anomalies). Adequate model fits were accomplished with best fitted values as presented in Table 4.13. The table demonstrating CMIN/DF = 1.278, NFI = 0.917, CF1 = 0.981, TLI = 0.979, RMSEA = 0.039, PCLOSE = 0.964 and SRMR 0.049 duly fulfil the model fit benchmarks of Hair et al. (2014), Hu & Bentler (1999), and Tanaka (1993). The results reported in Table 4.18 show that cognitive heuristic biases ($\beta = 0.129$, $p < 0.05$) and recognition heuristic biases ($\beta = 0.395$, $p < 0.001$), have a significant positive effect on fundamental anomalies. Similarly, a significant positive relationship with technical anomalies was found for the cognitive heuristic biases (0.251, $p < 0.001$) and recognition heuristic biases (0.438, $p < 0.001$). These outcomes divulge that fundamental and technical anomalies arise due to heuristic-driven biases of institutional investors. Hence, the second condition of the mediation process was also met.

Table 4.18. Results of Structural Equation Model 6

		Estimates	S.E.	C.R.	p-value
Relationships: (unstandardized)					
Fundamental Anomalies	<--- Cognitive Heuristic Biases	0.121	0.068	1.771	0.046
Technical Anomalies	<--- Cognitive Heuristic Biases	0.238	0.071	3.354	***
Fundamental Anomalies	<--- Recognition Heuristic Biases	0.328	0.064	5.116	***
Technical Anomalies	<--- Recognition Heuristic Biases	0.370	0.068	5.429	***
Relationships: (standardized)					
Fundamental Anomalies	<--- Cognitive Heuristic Biases	0.129*			
Technical Anomalies	<--- Cognitive Heuristic Biases	0.251***			
Fundamental Anomalies	<--- Recognition Heuristic Biases	0.395***			
Technical Anomalies	<--- Recognition Heuristic Biases	0.438***			

Note: N= 180; ***p < 0.001; *p < 0.05

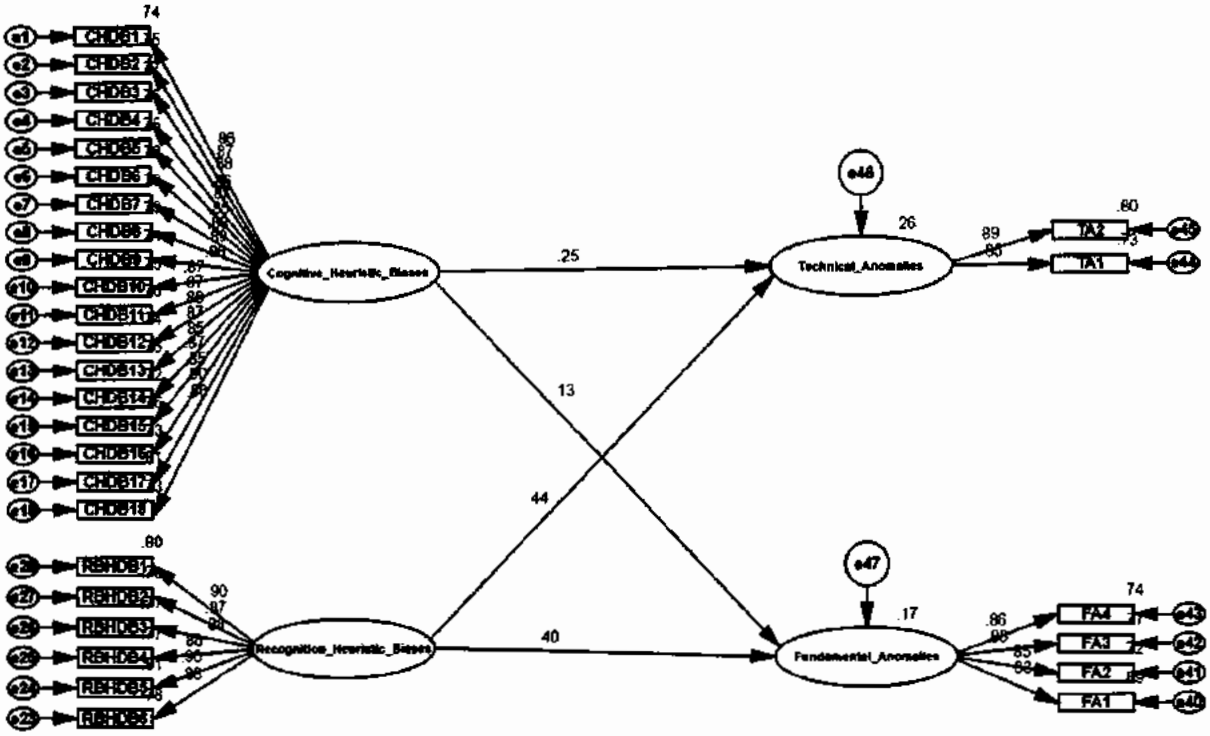

Figure 4.8. Structural Equation Model 6

Structural equation model 7 (See Figure 4.9) was performed to check the impact of mediating variables (fundamental and technical anomalies) on dependent variables (investment decisions, investment performance and perceived market efficiency) for meeting third condition of mediation process. Satisfactory model fits was attained as shown in Table 4.13 showing CMIN/DF = 1.294, NFI = 0.941, CF1 = 0.986, TLI = 0.983, RMSEA = 0.041, PCLOSE = 0.829 and SRMR 0.056 duly fulfil the model fit minimum thresholds recommended by Hair et al. (2014), Hu & Bentler (1999), and Tanaka (1993).

The results presented in Table 4.19 demonstrate that fundamental anomalies (β = -0.552, $p < 0.001$) and technical anomalies (β = -0.506, $p < 0.001$), have a significant negative effect on perceived market efficiency of institutional investors. Similarly, a significant negative relationship with investment performance of institutional investors was found for fundamental anomalies (β = -0.283, $p < 0.001$) and technical anomalies (β = -0.457, p <

0.001). The results of analysis also show that fundamental anomalies ($\beta = 0.545$, $p < 0.001$) and technical anomalies ($\beta = 0.387$, $p < 0.001$) were positively related to investment decisions of institutional investors. These findings suggest that due to anomalies (fundamental and technical) institutional investors perceived that markets are inefficient as a results generates high treading volume which in turn reduce their investment performance. So all the three conditions were met, it was confirmed that fundamental and technical anomalies mediates the relationship between heuristic-driven biases and perceived market efficiency and between heuristic-driven biases and investment management activities of institutional investors. Hence next step was to test whether fundamental and technical anomalies plays a partial or full mediating role between heuristic-driven biases and perceived market efficiency and between heuristic-driven biases and investment management activities of institutional investors.

Table 4.19. Results of Structural Equation Model 7

		Estimates	S.E.	C.R.	P-value
Relationships: (unstandardized)					
Perceived Market Efficiency	<--- Fundamental Anomalies	-0.616	0.074	-8.286	***
Investment Decisions	<--- Fundamental Anomalies	0.559	0.076	7.371	***
Investment Performance	<--- Fundamental Anomalies	-0.325	0.084	-3.849	***
Perceived Market Efficiency	<--- Technical Anomalies	-0.537	0.070	-7.646	***
Investment Decisions	<--- Technical Anomalies	0.377	0.069	5.469	***
Investment Performance	<--- Technical Anomalies	-0.499	0.085	-5.865	***
Relationships: (standardized)					
Perceived Market Efficiency	<--- Fundamental Anomalies	-0.552 ***			
Investment Decisions	<--- Fundamental Anomalies	0.545 ***			

Investment Performance	<--- Fundamental Anomalies	-0.283 ***
Perceived Market Efficiency	<--- Technical Anomalies	-0.506 ***
Investment Decisions	<--- Technical Anomalies	0.387 ***
Investment Performance	<--- Technical Anomalies	-0.457 ***

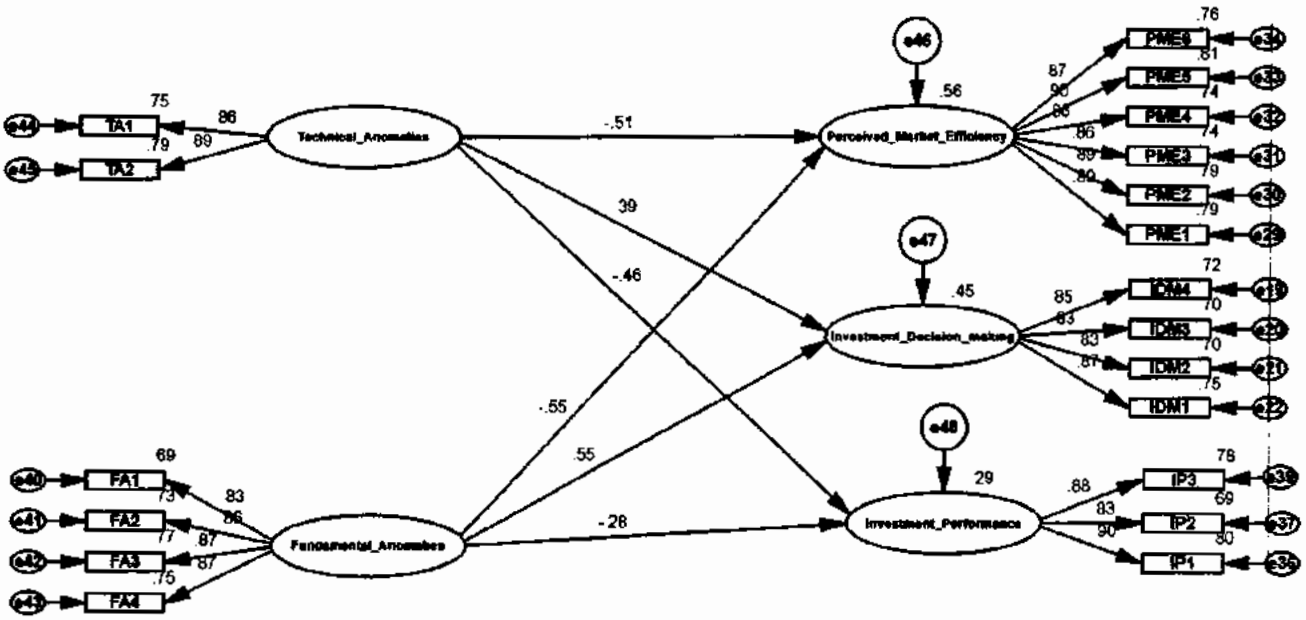

Figure 4.9. Structural Equation Model 7

In order to check the partial or full mediating role of fundamental and technical anomalies structural equation model 8 was performed as shown in Figure 4.10. The Table 4.13 reveals acceptable model fits values were found as CMIN/DF = 1.202, NFI = 0.931, CFI = 0.979, TLI = 0.978, RMSEA = 0.034, PCLOSE = 1.000 and SRMR 0.041. Thus, model fit minimum thresholds recommended by Hair et al. (2014), Hu and Bentler (1999), and Tanaka (1993) were duly fulfilled. The results reported in Table 4.17 show that the direct impact of the cognitive heuristic biases on the perceived market efficiency (β = -0.459, $p < 0.001$), investment decision-making (β = 0.263, $p < 0.001$) and investment performance (β = -0.197,

$p < 0.01$) of institutional investors, without a mediator was significant. After including mediating variables in the model results reported in Table 4.20 shows cognitive heuristic biases were significantly related to perceived market efficiency ($\beta = -0.339$, $p < 0.001$), but an insignificant predictor of investment decision-making ($\beta = 0.101$, $p > 0.05$) and investment performance ($\beta = -0.079$, $p > 0.05$) of institutional investors, likewise the value of beta was also reduced (See Figure 4.10). Therefore, these findings suggest that fundamental and technical anomalies partially mediated the relationship between cognitive heuristic biases and perceived market efficiency and fully mediated the relationship between cognitive heuristic biases and investment decision-making of institutional investors and between cognitive heuristic biases and investment performance of institutional investors.

The results also show that the recognition heuristic biases was a significant predictor of perceived market efficiency ($\beta = -0.509$, $p < 0.001$), investment decision-making ($\beta = 0.225$, $p < 0.01$) and investment performance of institutional investors ($\beta = -0.343$, $p < 0.001$) before mediating variables including in the model (See Table 4.17). The results reported in Table 4.20 divulges that after including mediating variables in the model a significant relationship with perceived market efficiency ($\beta = -0.215$, $p < 0.001$), investment decision-making ($\beta = -0.180$, $p < 0.05$) of institutional investors was also found for the recognition heuristic biases, likewise the value of beta was also reduced (See Figure 4.9) but recognition heuristic biases were an insignificant predictor of investment performance ($\beta = -0.074$, $p > 0.05$) of institutional investors. Thus, these findings suggest that fundamental and technical anomalies partially mediated the relationship between recognition heuristic biases and perceived market efficiency and between recognition heuristic biases and investment decision-making of institutional investors and fully mediated the relationship between recognition heuristic

biases and investment performance of institutional investors. Overall these findings lend support to H11, H12, and H13

Table 4.20. Results of Structural Equation Model 8

		Estimates	S.E.	C.R.	P-value
Relationships: (unstandardized)					
Perceived Market Efficiency	<--- Cognitive Heuristic Biases	-0.349	0.056	-6.218	***
Investment Decisions	<--- Cognitive Heuristic Biases	0.103	0.067	1.534	0.125
Investment Performance	<--- Cognitive Heuristic Biases	-0.086	0.080	-1.075	0.283
Perceived Market Efficiency	<--- Recognition Heuristic Biases	-0.198	0.057	-3.505	***
Investment Decisions	<--- Recognition Heuristic Biases	-0.164	0.071	-2.297	0.022
Investment Performance	<--- Recognition Heuristic Biases	-0.072	0.085	-0.856	0.392
Fundamental Anomalies	<--- Cognitive Heuristic Biases	0.128	0.072	1.770	0.047
Technical Anomalies	<--- Cognitive Heuristic Biases	0.239	0.070	3.414	***
Fundamental Anomalies	<--- Recognition Heuristic Biases	0.350	0.068	5.162	***
Technical Anomalies	<--- Recognition Heuristic Biases	0.374	0.066	5.672	***
Perceived Market Efficiency	<--- Fundamental Anomalies	-0.441	0.062	-7.083	***
Investment Decisions	<--- Fundamental Anomalies	0.570	0.080	7.152	***
Investment Performance	<--- Fundamental Anomalies	-0.254	0.088	-2.885	0.004
Perceived Market Efficiency	<--- Technical Anomalies	-0.304	0.069	-4.436	***
Investment Decisions	<--- Technical Anomalies	0.421	0.088	4.790	***
Investment Performance	<--- Technical Anomalies	-0.425	0.103	-4.111	***
Relationships: (standardized)					
Perceived Market Efficiency	<--- Cognitive Heuristic Biases	-0.339 ***			
Investment Decisions	<--- Cognitive Heuristic Biases	0.101			

Investment Performance	<--- Cognitive Heuristic Biases	-0.079
Perceived Market Efficiency	<--- Recognition Heuristic Biases	-0.215 ***
Investment Decisions	<--- Recognition Heuristic Biases	-0.180*
Investment Performance	<--- Recognition Heuristic Biases	-0.074
Fundamental Anomalies	<--- Cognitive Heuristic Biases	0.129*
Technical Anomalies	<--- Cognitive Heuristic Biases	0.252***
Fundamental Anomalies	<--- Recognition Heuristic Biases	0.395***
Technical Anomalies	<--- Recognition Heuristic Biases	0.441***
Perceived Market Efficiency	<--- Fundamental Anomalies	-0.425***
Investment Decisions	<--- Fundamental Anomalies	0.553***
Investment Performance	<--- Fundamental Anomalies	-0.231**
Perceived Market Efficiency	<--- Technical Anomalies	-0.280***
Investment Decisions	<--- Technical Anomalies	0.392***
Investment Performance	<--- Technical Anomalies	-0.371***

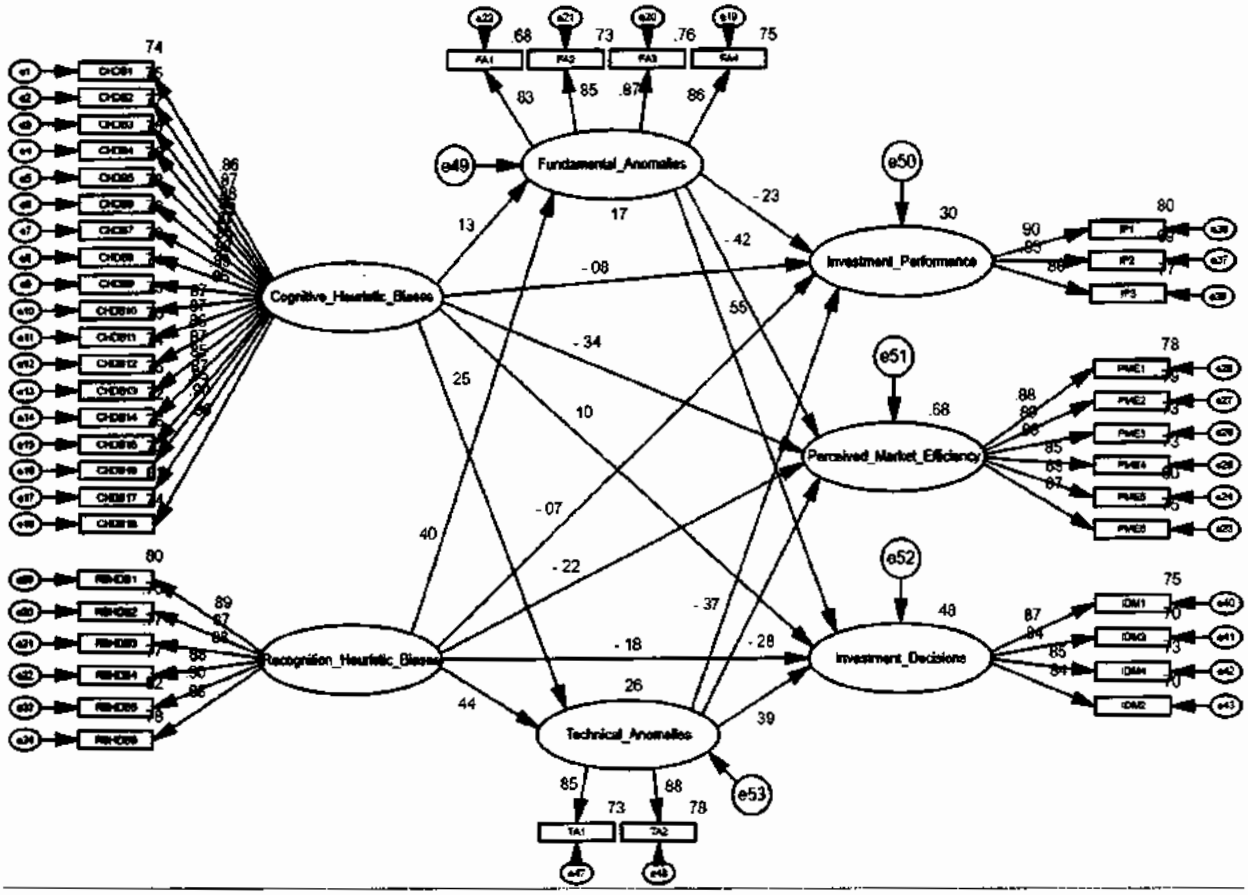

Figure 4.10. Structural Equation Model 8

4.4.7 Moderation Analyses for Institutional Investors

Moderation analysis was used to investigate the interactive effects of heuristic-driven biases and financial literacy on perceived market efficiency, investment decision-making and investment performance of institutional investors. . Barren and Kenny's (1986) method was used for moderation analysis. Two interaction terms were created in the data set, first, by multiplying the cognitive heuristic biases with the financial literacy (CHDB × FL) and, second, by taking the product of the recognition heuristic biases and the financial literacy (RBHDB × FL). The results of moderation analysis presented in Table 4.21 show that the cognitive heuristic biases (β = -0.458, p = 0.018) was a significant predictor of perceived

market efficiency and financial literacy (β = 0.259, p = 0.229) was not significantly related with perceived market efficiency. The interaction term (β = -0.174, p = 0.071) tends improve the perceived market efficiency, but the p-value did not reach a high significance value. These result suggesting that the relationship between cognitive heuristic biases and perceived market efficiency of institutional investors is not being moderated by the financial literacy. The cognitive heuristic biases (β = 0.085, p = 0.682) and financial literacy (β = 0.394, p = 0.088) were nor significantly related with investment decision-making of institutional investors. But he interaction term (β = -0.138, p = 0.038) of both variables was significantly associated with investment decision-making of institutional investors, demonstrating that the connection between cognitive heuristic biases and investment decision-making of institutional investors is being moderated by the financial literacy. The effects of cognitive heuristic biases (β = -0.104, p = 0.513) and financial literacy (β = -0.427, p = 0.062) on the investment performance of institutional investors were found insignificant. But the interaction term (β = 0.149, p = 0.024) of these variables was significant predictor of investment performance of institutional investors, showing that financial literacy moderating the relationship between cognitive heuristic biases and investment performance of institutional investors.

Similarly, the results reported in Table 4.21 also show that a significant relationship of recognition heuristic biases (β = -0.697, p < 0.001) and financial literacy (β = 0.538, p = 0.008) was found for perceived market efficiency and the interaction term (β = 0.121, p = 0.046) of these variables was also significant predictor of perceived market efficiency. These findings suggest that financial literacy moderate the relationship between recognition heuristic biases and perceived market efficiency of institutional investors. The recognition

heuristic biases (β = 0.166, p = 0.050) and financial literacy (β = 0.667, p = 0.003) were significantly connected with investment decision-making of institutional investors. The interaction term (β = -0.190, p = 0.010) of both variables is also significant predictor of investment decision-making of institutional investors. The results suggesting that the relationship between recognition heuristic biases and investment decision-making of institutional investors is being moderated by financial literacy. The effects of recognition heuristic biases (β = 0.129, p = 0.041) on the investment performance of institutional investors was found significant and the influence of financial literacy (β = 0.299, p = 0.214) on the investment performance of institutional investors was found insignificant. The effects of interaction term (β = 0.213, p = 0.026) of these variables was significant. These findings suggesting that the financial literacy moderate the relationship between recognition heuristic biases and investment performance of institutional investors. Overall these findings lend support to H16, H17, and H19.

Table 4.21. Results of Moderation Analyses for Institutional Investors

	Estimates	S.E.	C.R.	P-value
Relationships: (unstandardized)				
Perceived Market Efficiency <--- Cognitive Heuristic Biases	-0.458	0.193	-2.371	0.018
Perceived Market Efficiency <--- Financial Literacy	0.259	0.215	1.203	0.229
Perceived Market Efficiency <--- CHBXFL	**0.174**	**.062**	**2.806**	**0.071**
Investment Decisions <--- Cognitive Heuristic Biases	0.085	0.208	0.409	0.682
Investment Decisions <--- Financial Literacy	0.394	0.231	1.706	0.088
Investment Decisions <--- CHBXFL	**-0.138**	**0.067**	**-2.080**	**0.038**
Investment Performance <--- Cognitive Heuristic Biases	-0.104	0.206	-0.506	0.513

Investment Performance	<--- Financial Literacy	-0.427	0.229	-1.867	0.062
Investment Performance	**<--- CHBXFL**	**0.149**	**0.066**	**2.259**	**0.024**
Perceived Market Efficiency	<--- Recognition Heuristic Biases	-0.697	0.202	-3.461	***
Perceived Market Efficiency	<--- Financial Literacy	0.538	0.202	2.665	0.008
Perceived Market Efficiency	**<--- RHBXFL**	**0.121**	**0.065**	**1.862**	**0.046**
Investment Decisions	<--- Recognition Heuristic Biases	0.166	0.227	0.731	0.050
Investment Decisions	<--- Financial Literacy	0.667	0.227	2.935	0.003
Investment Decisions	**<---RHBXFL**	**-0.190**	**0.073**	**-2.581**	**0.010**
Investment Performance	<--- Recognition Heuristic Biases	0.129	0.241	0.537	0.041
Investment Performance	<--- Financial Literacy	0.299	0.241	1.242	0.214
Investment Performance	**<--- RHBXFL**	**0.213**	**0.078**	**2.859**	**0.026**

4.4.8 Robustness Tests

Endorsement of mediation and moderation results through PROCESS. The author also applied SPSS version of PROCESS to validate mediation effects of fundamental and technical anomalies between heuristic-driven biases and perceived market efficiency and between heuristic-driven biases and investment management activities (investment decisions and investment performance) of institutional investors. The results were reported in Table 4.22.

The mediation effect of the fundamental anomalies between cognitive heuristic biases and perceived market efficiency was run through the PROCESS method. The results indicate that the direct effect of cognitive heuristic biases on the perceived market efficiency is -0.50 which is statistically significant at P = 0.0000. Its indirect effect on the perceived market efficiency is negative (β = -0.14) and is also statistically significant (the upper and lower

bounds are --0.0714 and -0.2685 with 95% bootstrapping confidence interval). The Sobel's test (normal theory test) results Z= -3.67 P = 0.0002 also validates that the indirect effect is statistically significant. Hence, the researcher concludes with 95% confidence that fundamental anomalies were partially mediate the relationship between cognitive heuristic biases and perceived market efficiency of institutional investors. Similarly, Mediation effect of the technical anomalies between cognitive heuristic biases and perceived market efficiency was run through the PROCESS method. The results show that the direct effect of cognitive heuristic biases on the perceived market efficiency is -0.48 which is statistically significant at P = 0.0000. The indirect effect (β = -0.17) is also statistically significant (the lower and upper bounds are -0.1013 and -0.2698 with 95% bootstrapping confidence interval). The Sobel's test results (Z= -4.42 P=0.0000) also approve that the indirect effect of cognitive heuristic biases on perceived market efficiency is statistically significant. Thus, the researcher concludes that the partial mediation effect of technical anomalies exists between cognitive heuristic biases and perceived market efficiency of institutional investors.

The mediation effect of the fundamental anomalies between cognitive heuristic biases and investment decision-making was also run through the PROCESS method. The results divulge that the direct effect of cognitive heuristic biases on the investment decision-making is 0.19 which is statistically insignificant at P = 0.0838. Its indirect effect on the investment decision-making (β = 0.15) is statistically significant (the upper and lower bounds are 0.3115 and 0.0610 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z= 3.58 P = 0.0003) which confirms that the indirect effect is statistically significant. Therefore, the researcher concludes that the fundamental anomalies play a full mediating role between cognitive heuristic biases and investment decision-making of institutional investors.

The PROCESS method was also used to endorse the mediation effects of technical anomalies between cognitive heuristic bias and investment decision-making. The results demonstrate that the direct effect of cognitive heuristic biases on the investment decision-making is 0.18 which is statistically insignificant at P = 0.0752. Its indirect effect on the investment decision-making of institutional investors ($\beta = 0.16$) is also statistically significant (the upper and lower bounds are 0.2836 and 0.0847 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z = 4.01 P=0.0001) which supports that the indirect effect is statistically significant. Thus, the researcher concludes that the full mediation effect of technical anomalies exists between cognitive heuristic biases and investment decision-making of institutional investors.

The author also applied the SPSS version of PROCESS to validate the mediation effects of fundamental anomalies between cognitive heuristic biases and investment performance of institutional investors. The results show that the direct effect of cognitive heuristic biases on the investment performance of institutional investors is -0.25 which is statistically insignificant at P = 0.2310. Its indirect effect on the investment performance ($\beta = -0.09$) is also statistically significant (the upper and lower bounds are -0.0347 and -0.1753 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z= -2.80 P = 0.0051) which confirms that the indirect effect is statistically significant. Hence, the researcher concludes that the fundamental anomalies play a full mediating role between cognitive heuristic biases and investment performance of institutional investors. Similarly, the mediation effect of the technical anomalies between cognitive heuristic biases and investment performance of institutional investors was run through the PROCESS method. The results display that the direct effect of cognitive heuristic biases on the investment

performance of institutional is -0.18 which is statistically significant at P = 0.0194. Its indirect effect on the investment performance (β = -0.16) is also statistically significant (the upper and lower bounds are -0.0900 and -0.2536 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z= --3.85 P=0.0001) which confirms that the indirect effect is statistically significant. Therefore, the researcher concludes that the partial mediation effect of technical anomalies exists between cognitive heuristic biases and investment performance of institutional investors.

SPSS version of the PROCESS method was also used to validate the mediation effects of fundamental anomalies between recognition heuristic biases and perceived market efficiency. The results illustrate that the direct effect of recognition heuristic biases on the perceived market efficiency (β = -0.44 P = 0.0000) is statistically significant. Its indirect effect on the perceived market efficiency is -0.18 which is also statistically significant (the upper and lower bounds are -0.1074 and -0.2879 with 95% bootstrapping confidence interval) and the value of beta was also reduced. This is also validated through Sobel's test (Z= -4.78 P=0.0000) which confirms that the indirect effect is statistically significant. Hence, the researcher concludes that the partial mediation effect of fundamental anomalies exists between recognition heuristic biases and perceived market efficiency of institutional investors. Similarly, the mediation effect of the technical anomalies between recognition heuristic biases and the perceived market efficiency was run through the PROCESS method. The results explain that the direct effect of recognition heuristic biases on the perceived market efficiency (β = -0.45 P = 0.0000) is statistically significant. Its indirect effect on the perceived market efficiency is -0.17 which is also statistically significant (the upper and lower bounds are -0.1059 and -0.2803 with 95% bootstrapping confidence interval) and the

value of beta was also reduced. This is also validated through Sobel's test (Z= -4.59 P=0.0000) which confirms that the indirect effect is statistically significant. So, the researcher concludes that the technical anomalies play a partial mediating role between recognition heuristic biases and perceived market efficiency of institutional investors.

The mediation effects of fundamental anomalies between recognition heuristic biases and investment decision-making of institutional investors were run through the PROCESS method to validate the mediation effects of fundamental anomalies. The results show that the direct effect of recognition heuristic biases on investment decision-making of institutional investors (β = 0.09 P = 0.2648) is insignificant. But its indirect effect on the investment decision-making is 0.22 which is statistically significant (the upper and lower bounds are 0.3176 and 0.1331 with 95% bootstrapping confidence interval). This is also validated through Sobel's test (Z = 4.84, P=0.0000) which confirms that the indirect effect is statistically significant. Thus, the researcher concludes that the fundamental anomalies fully mediated the relationship between recognition heuristic biases and investment decision-making of institutional investors. Similarly, the SPSS version of the PROCESS method was also used to validate the mediation effect of the technical anomalies between recognition heuristic biases and investment decision-making of institutional investors. The results elucidate that the direct effect of recognition heuristic biases on the investment decision-making of institutional investors (β = 0.10 P = 0.2090) is statistically insignificant. Its indirect effect on the investment decision-making of institutional investors is 0.20 which is also statistically significant (the upper and lower bounds are 0.3058 and 0.1153 with 95% bootstrapping confidence interval) and the value of beta was also reduced. This is also validated through Sobel's test (Z= 4.46 P=0.0000) which confirms that the indirect effect is

statistically significant. So, the researcher concludes that the technical anomalies play a full mediating role between recognition heuristic biases and investment decision-making of institutional investors.

The mediation effect of the fundamental anomalies between recognition heuristic biases and investment performance of institutional investors was run through the PROCESS method to validate the mediation effects of fundamental anomalies. The results divulge that the direct effect of recognition heuristic biases on the investment performance of institutional investors is -0.27 which is statistically significant at P = 0.0002. Its indirect effect on the investment performance (β = -0.10) is also statistically significant (the upper and lower bounds are -0.0363 and -0.1907 with 95% bootstrapping confidence interval). The results of Sobel's test (Z= -2.83-2.83 P=0.0047) also validates that the indirect effect is statistically significant. Thus, the researcher concludes with 95% confidence that fundamental anomalies were partially mediated the relationship between recognition heuristic biases and investment performance of institutional investors. Similarly, the mediation effect of the technical anomalies between recognition heuristic biases and investment performance of institutional investors was run through the PROCESS method to validate the mediation effects of technical anomalies. The results show that the direct effect of recognition heuristic biases on the investment performance of institutional investors is -0.21 which is statistically significant at P = 0.0051. The indirect effect (β = -0.16) is also statistically significant (the lower and upper bounds are -0.0828 and -0.2676 with 95% bootstrapping confidence interval). The Sobel's test results (Z= -3.85 P=0.0001) also approve that the indirect effect of recognition heuristic biases on investment performance of institutional investors is statistically significant. Thus, the researcher concludes that the technical anomalies play a partial

mediating role between recognition heuristic biases and investment performance of individual investors. All these findings endorse the results of SEM.

Table 4.22. Validation of Mediation Results for Institutional Investors using Process Method

	Indirect effect results by using Sobel test				Indirect effect results by using Bootstrapping method			Direct effect results	
	β	SE	P	z	Indirect effect	95%-LLCI	95%-ULCI	Direct effect	P-value
B➡FA➡PME	-0.14	0.04	0.0002	-3.67	-0.14	-0.2685	-0.0714	-0.50	0.0000
B➡TA➡PME	-0.17	0.04	0.0000	-4.42	-0.17	-0.2698	-0.1013	-0.48	0.0000
B➡FA➡IDM	0.15	0.04	0.0003	3.58	0.15	0.0610	0.3115	0.19	0.0838
B➡TA➡IDM	0.16	0.04	0.0001	4.01	0.16	0.0847	0.2836	0.18	0.0752
B➡FA➡IP	-0.09	0.03	0.0051	-2.80	-0.09	-0.1753	-0.0347	-0.25	0.2310
B➡TA➡IP	-0.16	0.04	0.0001	-3.85	-0.16	-0.2536	-0.0900	-0.18	0.0194
B➡FA➡PME	-0.18	0.04	0.0000	-4.78	-0.18	-0.2879	-0.1074	-0.44	0.0000
B➡TA➡PME	-0.17	0.04	0.0000	-4.59	-0.17	-0.2803	-0.1059	-0.45	0.0000
B➡FA➡IDM	0.22	0.4	0.0000	4.84	0.22	0.1331	0.3176	0.09	0.2648
B➡TA➡IDM	0.20	0.04	0.0000	4.46	0.20	0.1153	0.3058	0.10	0.2090
B➡FA➡IP	-0.10	0.03	0.0047	-2.83	-0.10	-0.1907	-0.0363	-0.27	0.0002
B➡TA➡IP	-0.16	0.04	0.0001	-3.85	-0.16	-0.2676	-0.0828	-0.21	0.0051

The results of moderation were also authenticated through the PROCESS method. Results that were reported in Table 4.23 show that cognitive heuristic biases (β = -0.4584, P = 0.0198) was a significant predictor of perceived market efficiency of institutional investors and financial literacy (β= 0.2585, P = 0.2344) was an insignificant predictor of perceived market efficiency. the interaction term (β =- -0.1742, P = 0.0674) of these variables also has

an insignificant effect on perceived market efficiency. These results also confirm that moderation effect of financial literacy does not exist between the relationship of cognitive heuristic biases and perceived market efficiency of institutional investors. An insignificant association was found between the cognitive heuristic biases (β = 0.0850, P = 0.6852) and investment decision-making of institutional investors and financial literacy (β = -0.3938, P = 0.0925) has also an insignificant relationship with investment decision-making of institutional investors. But the interaction term (β = -0.1385, P = 0.0406) of both variables was also significantly associated with the investment decision-making of institutional investors. These results confirm that moderation effect of financial literacy exist between the relationship of cognitive heuristic biases and investment decision making of institutional investors. The effects of cognitive heuristic biases (β = -0.1041, P = 0.6166) and financial literacy (β = -0.4269, P = 0.0658) on investment performance of institutional investors was found insignificant and the influence of interaction terms (β = 0.1490, P = 0.0264) of both variables on investment performance of institutional investors was significant. These results confirm that moderation effect of financial literacy exist between the relationship of cognitive heuristic biases and investment performance of institutional investors.

The results of the study also reveal that recognition heuristic biases (β = -0.6975, P = 0.0007) and financial literacy (β = 0.5382, P = 0.0090) were a significant predictor of perceived market efficiency of institutional investors and The interaction term (β = 0.1210, P = 0.0398) of these variables also has a significant effect on perceived market efficiency. These results confirm that moderation effect of financial literacy exist between the relationship of recognition heuristic biases and perceived market efficiency of institutional investors. Similarly, the interaction term was a significant predictor of investment decision-making (β =

-0.1896, P = 0.0113) and the investment performance (β = 0.2131, P = 0.0215) of institutional investors. These findings confirm that moderation effect of financial literacy exist between the relationship of recognition heuristic biases and investment decision-making of institutional investors and moderate the relationship between recognition heuristic biases and investment performance of institutional investors. All these findings endorse the results of path analysis.

Table 4.23. Validation of Moderation Results for Institutional Investors using Process Method

	Perceived Market Efficiency		Investment Decisions		Investment Performance	
Predictors	**β**	**P-value**	**β**	**P-value**	**β**	**P-value**
Cognitive Heuristic Biases	-0.4584	0.0198	0.0850	0.6852	-0.1041	0.6166
Financial Literacy	0.2585	0.2344	0.3938	0.0925	-0.4269	0.0658
Int_1	**-0.1742**	**0.0674**	**-0.1385**	**0.0406**	**0.1490**	**0.0264**
Recognition Heuristic Biases	-0.6975	0.0007	0.0663	0.0041	0.1292	0.0452
Financial Literacy	0.5382	0.0090	0.6671	0.0041	-0.2995	0.2197
Int_2	**0.1210**	**0.0398**	**-0.1896**	**0.0113**	**0.2131**	**0.0215**

Note: *Int_1*= CHDBXFL, *Int_2*= RBHDBXFL

4.5 Multigroup Analysis

According to Chin et al., (2016) multigroup analysis (MGA) allows to analyse whether the parameters of the structural model are the same (invariant) between groups. Calvo-Mora et al., (2016) argue convincingly it mainly provides a robust check of the reproducibility of the structural model and validity of the measurement model in different contexts. A multigroup analysis was performed in order to check that whether the individual and institutional investors equally immune to the heuristic-driven biases. This method of estimation is consistent with Chaudary (2019) who also used multigroup analysis to find out the difference between individual and institutional investors how they are influenced by heuristic-driven biases namely salience heuristic. According to Gaskin (2011) the effect of behavioural biases

on these groups of investors may differ at the path level. Two groups of investors namely institutional investors and individual investors were created for multigroup analysis. The output of analysis reported in Table 4.24 and 4.25 reveals that individual and institutional investors equally immune to heuristic-driven biases such as cognitive and recognition heuristic-driven biases. No appreciable difference between individual investors and institutional investors was found they are similar with respect to how they are influenced by heuristic-driven biases. These findings fail to support H5:Compared to individual investors, institutional investors are relatively immune to heuristic-driven biases in Pakistani context. Thus Hypothesis five was rejected.

Table 4.24. Results of Multigroup Analysis with IV to DV

Relationship	Individual investors Beta	Institutional investors Beta	Difference in Betas	P-Value for Difference
CHDB → PME	-0.526***	-0.459***	-0.067	0.740
CHDB → IDM	0.378***	0.263***	0.114	0.228
CHDB → IP	-0.280***	-0.197**	-0.083	0.243
RHDB → PME	-0.437***	-0.509***	0.072	0.064
RHDB → IDM	0.196***	0.225**	-0.029	0.656
RHDB → IP	-0.362***	-0.343***	-0.019	0.805
	Unconstrained	**Constrained**	**Difference**	**P-Value**
X^2	1750.380	1757.380	7.000	0.321
DF	1246	1252	6	

Note:p<0.01; *** p < 0.001**

Table 4.25. Results of Multigroup Analysis IV to DV with Mediator Variables

Relationship	Individual investors Beta	Institutional investors Beta	Difference in Betas	P-Value for Difference
CHDB → PME	-0.339***	-0.338***	-0.001	0.245
CHDB → IDM	0.101	0.158**	-0.058	0.260
CHDB → IP	-0.079	-0.127*	0.048	0.256
CHDB → FA	0.129†	0.323***	-0.193	0.436
CHDB → TA	0.252***	0.253***	-0.001	0.239
RHDB → PME	-0.215***	-0.233***	0.017	0.244
RHDB → IDM	-0.180*	-0.045	-0.135	0.350
RHDB → IP	-0.074	-0.194**	0.119	0.297

RHDB → FA	0.395***	0.321***	0.075	0.317
RHDB → TA	0.441***	0.296***	0.145	0.365
FA → PME	-0.425***	-0.418***	-0.006	0.244
FA → IDM	0.553***	0.553***	0.000	0.243
FA → IP	-0.231**	-0.288***	0.058	0.286
TA → PME	-0.280***	-0.241***	-0.040	0.291
TA → IDM	0.392***	0.182**	0.210	0.556
TA → IP	-0.371***	-0.236***	-0.135	0.295
	Unconstrained	**Constrained**	**Difference**	**P-Value**
X^2	2135.090	2135.090	0.000	1.000
DF	1704	1704	0	

Note:*p<0.05; **p<0.01; *** p < 0.001

4.6 Empirical Results for Short-Term and Long-Term Investment

This section aims to report the empirical findings, clarify the mechanism by which heuristic-driven biases influences the short-term and long-term investment decision-making.

4.6.1 Confirmatory Factor Analysis (CFA)

Firstly, CFA was run to authenticate the factor structure, evaluate the convergent validity, discriminant validity, and internal consistency reliability of the study constructs as well as removing the items having low standardized factor loading. The measurement model 3 was performed in order to test the validity and reliability of the constructs which is shown in Figure 4.11. A satisfactory model fit was accomplished by following the model modifications tactics proposed by Hair et al. (2014), after dropping a few items that either had high error terms cross-loading or weak factor loadings.

Table 4.27 divulges that the factor loadings for each latent construct ranging from 0.852 to 0.868 and were found to be statistically significant, signalling that all the observed factors illustrate the latent variables significantly. The fitness of model was examined with the help

of CMIN/DF, which is 1.181, and was found within the accepted thresholds of 1–3 (See Table 4.26). To confirm further the fitness of model, measures namely RMSEA, SRMR, TFI, PCLOSE, CFI, and NFI were used. The values regarding model fit indices (See Table 4.26) were found within the accepted thresholds where CF1 = 0.992, NFI = 0.949, TLI = 0.991 represent good model fit values. Similarly, RMSEA = 0.025, SRMR = 0.040, and PCLOSE = 0.965 indicated good model fitness as per the recommended thresholds of previous studies (Hair et al., 2014; Vieira, 2011; Hu & Bentler,1999; Tanaka, 1993).

Furthermore, the measurement model was approved by establishing convergent validity, discriminant validity, and internal reliability of the study constructs. To evaluate convergent validity, the average variances extracted (AVE) for each set of measures were computed. The results, reported in Table 4.27 divulge that AVE values ranging from 0.648-0.748 for the constructs which are above the minimum thresholds of 0.50. Researchers. Thus results suggesting that convergent validity was accomplished. Similarly, to assess discriminant validity, square root of AVE values for each set of measures were computed which are above the benchmark of 0.70 (See Table 4.14) suggesting that every construct is different from one another (Hair et al., 2014; Hu & Bentler, 1999). Additionally, the composite reliability (CR) values were utilized to evaluate the internal consistency reliability of the study constructs. the CR values, as reported in Table 4.27, are all above the benchmark of 0.70 (Bagozzi & Yi, 2012) which reveal that the scales had good internal consistency. Hence, the achievement of all the criteria for fitness of measurement allowed to proceed to structural equation modelling testing.

Table 4.26. Goodness of Fit Statistics for Short-term and Long-term Investment Decision

Models	CMIN	DF	CMIN/DF	NFI	CFI	SRMR	TLI	PCLOSE	RMSEA
Measurement3	540.763	458	1.181	0.949	0.992	0.040	0.991	0.965	.025
tructural Model9	888.188	460	1.931	0.916	0.958	0.053	0.954	0.062	.056
cceptable range	-	-	1–3	>0.90	>0.95	< 0.08	> 0.90	> 0.05	< 0.06

Table 4.27. Factor Loadings, Validity and Reliability for Short-term and Long-term Investment Decision

Construct	Indicator	Factor Loadings	CR	AVE	√AVE
Cognitive Heuristic-Driven Biases	CHDB1	0.868***	0.982	0.748	0.865
	CHDB2	0.860***			
	CHDB3	0.866***			
	CHDB5	0.860***			
	CHDB6	0.865***			
	CHDB7	0.864***			
	CHDB8	0.863***			
	CHDB9	0.856***			
	CHDB10	0.861***			
	CHDB11	0.867***			
	CHDB12	0.875***			
	CHDB13	0.868***			
	CHDB14	0.857***			
	CHDB16	0.875***			
	CHDB17	0.855***			
	CHDB18	0.854***			
	CHDB19	0.878***			
	CHDB20	0.871***			
Recognition Based Heuristic-Driven Biases	RBHDB1	0.855***	0.947	0.748	0.865
	RBHDB3	0.875***			
	RBHDB4	0.854***			
	RBHDB5	0.865***			
	RBHDB6	0.870***			
	RBHDB7	0.870***			
Short-Term Investment decisions	STID1	0.864***	0.924	0.721	0.849
	STID2	0.885***			
	STID3	0.852***			
	STID4	0.866***			
Long-Term Investment decisions	LTID1	0.879***	0.823	0.648	0.805
	LTID2	0.857***			

LTID3	0.872***
LTID4	0.852***

CR = Composite Reliability; **AVE** = Average Variance Extracted; ***p < 0.001

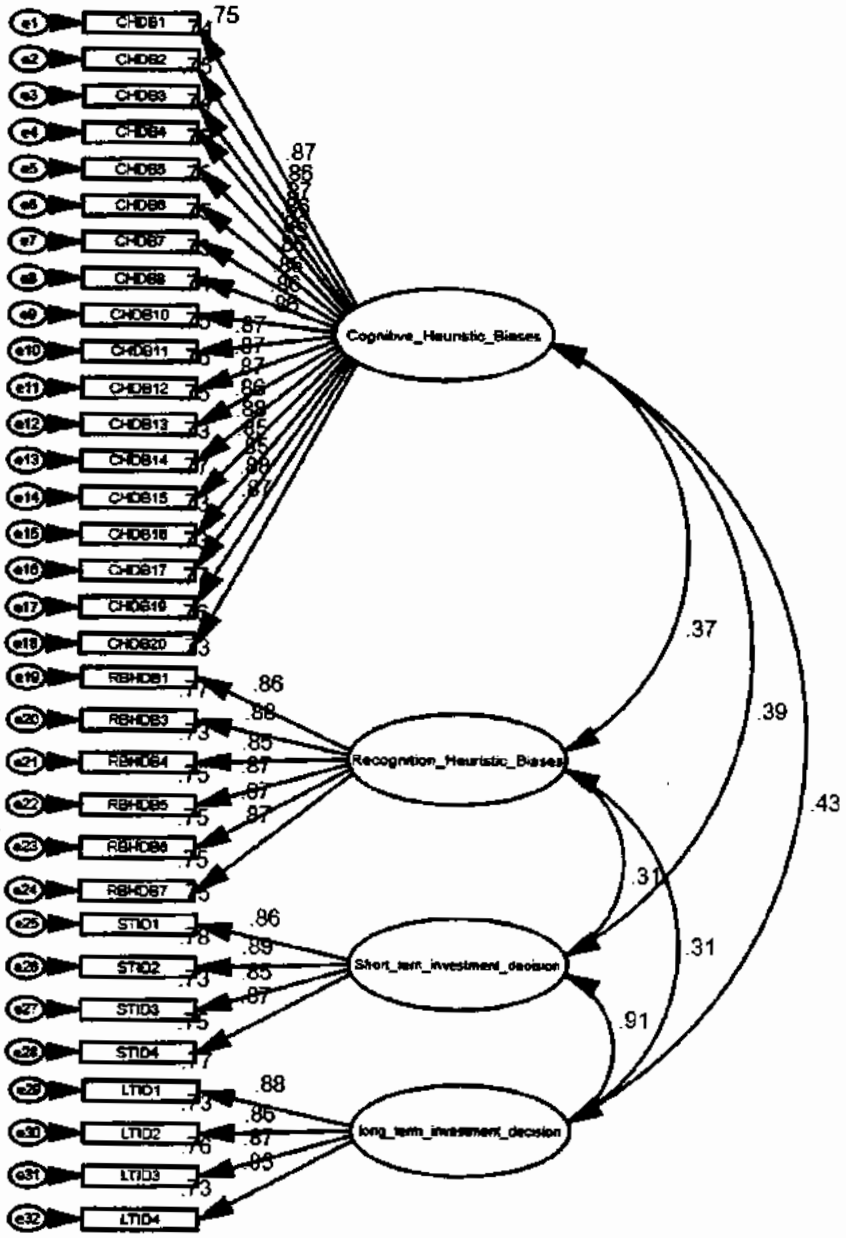

Figure 4.11. Measurement Model 3

4.6.2 Common Method Bias

CMB was also tested for data set by executing Harman's single-factor test using SPSS through principle component analysis as an extraction method. The output of the analysis shows eight factors with eigenvalues greater than 1 of which the first factor explains only 47.171 percent variation of total variance explained which is less than 50 percent. This confirms that there is no threat of CMB affecting the statistical results.

4.6.3 Correlation Analysis

Pearson correlations among the variables are displayed in Table 4.28. It provides preliminary support for anticipated hypothesis related to short-term and long-term investment decisions in the study. The results reveal that cognitive heuristic biases are positively related to short-term investment decisions, with a Pearson's correlation coefficient of $r = 0.293$, which is significant at $p < 0.01$, and long-term investment decisions with a Pearson's correlation coefficient of $r = 0.288$, which is significant at $p < 0.01$. Similarly, recognition heuristic biases were positively correlated with short-term investment decisions ($r = 0.376$, $p < 0.01$) and long-term investment decisions ($r = 0.410$, $p < 0.01$). This means that, as heuristic-driven biases such as cognitive heuristic biases and recognition heuristic biases increases, investors choose inappropriately high investments (both short-term and long-term investment). These findings suggest that heuristic-driven biases can impair the quality of short-term and long-term investment decisions.

Table 4.28. Means, Standard Deviations and Pearson Correlation

Variables	Mean	SD	1	2	3	4
1.Cognitive Heuristic Biases	3.1861	1.08497	1			
2.Recognition Heuristic Biases	2.2013	0.95663	0.362**	1		
3.Short-Term Investment decisions	2.9425	1.14675	0.293**	0.376**	1	
4.Long-Term Investment decisions	3.0167	1.12722	0.288**	0.410**	0.736*	1

Note: N = 307; **p < 0.01; *p < 0.05

4.6.4 Structural Equation Modeling

Table 4.29 presents the results of SEM 9. Structural equation model 9 was performed (Figure 2) to test the hypotheses formally related to short-term and long-term investment decisions. Adequate model fits were found for the SEM 9 as shown in Table 4.26 which indicates CMIN/DF = 1.931, CFI = 0.958, NFI = 0.916, RMSEA = .056, PCLOSE = 0.062 and SRMR = 0.053 . All these parameters are within the limits recommended by Hair et al. (2010); Hu and Bentler (1999); Tanaka (1993). The hypotheses predict that heuristic-driven biases namely cognitive heuristic biases and recognition heuristic biases are negatively linked with both short-term and long-term investment decisions. To test these predictions, The researcher regressed short term and long-term investment decision-making on heuristic-driven biases. Results reported in Table 4.29 show that cognitive heuristic biases ($\beta = 0.335$, $p < 0.001$) has a significant positive influence on short-term investment decision-making and significant positive relationship with long-term investment decision-making was found for the cognitive heuristic biases ($\beta = 0.384$, $p < 0.001$). Similarly, recognition heuristic biases have significant positive effect on short-term investment decision-making and long-term investment decision-making. These findings fail to support H20 and H21. Though not hypothesized, a positive

relationship of heuristic-driven biases emerged for short term and long term investment decisions.

Table 4.29. Results of Structural Equation Model 9

	Estimates	S.E.	C.R.	P-value
Relationships: (unstandardized)				
Short-Term Investment decisions <--- Cognitive Heuristic Biases	0.364	0.064	5.723	***
Long-Term Investment decisions <--- Cognitive Heuristic Biases	0.397	0.060	6.569	***
Short-Term Investment decisions <--- Recognition Heuristic Biases	0.220	0.062	3.552	***
Long-Term Investment decisions <--- Recognition Heuristic Biases	0.183	0.058	3.160	0.002
Relationships: (standardized)				
Short-Term Investment decisions <--- Cognitive Heuristic Biases	0.335 ***			
Long-Term Investment decisions <--- Cognitive Heuristic Biases	0.384 ***			
Short-Term Investment decisions <--- Recognition Heuristic Biases	0.207 ***			
Long-Term Investment decisions <--- Recognition Heuristic Biases	0.181 **			

Notes: N = 307; **p < 0.01; *p < 0.05

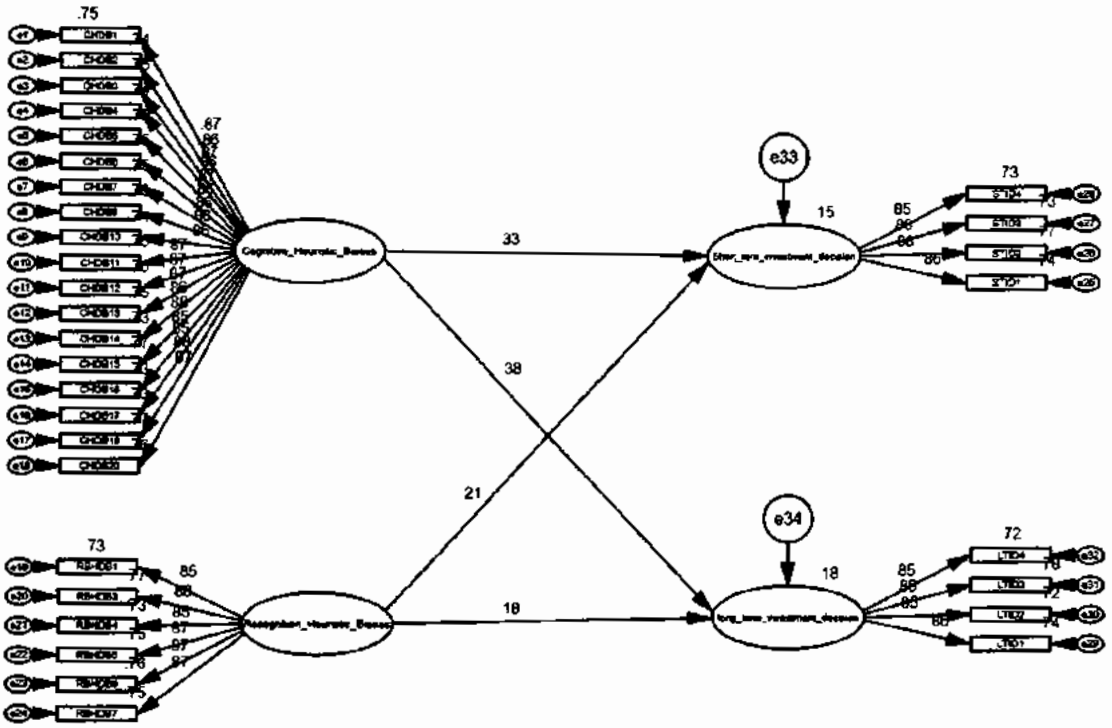

Figure 4.12. Structural Equation Model 9

4.7 Confirmation of Quantitative Results by Using Qualitative Approach

The practical relevancy of the role of heuristic-driven biases in perceived market efficiency and investment management activities of investors is obtained from the subsequent qualitative opinions furnished by some brokers who are maintaining the accounts of investors and investment strategists/advisors who have responded to open-ended questions. This qualitative data serves as a supplement and confirmation to the quantitative results to understand in detail the mechanism by which heuristic-driven biases influences the perceived market efficiency and investment management activities (investment decision-making and investment performance) of investors, actively trading on the PSX, with the mediating role of fundamental and technical anomalies and moderating role of financial literacy. The opinions on the quantitative results of the study provided by some investment strategists/advisors and brokers who are maintaining the accounts of investors are discussed below.

In this study, it was found that investors often utilize heuristics causing several heuristic-driven biases when trading in the stock market, specifically, reliance on the recognition based heuristics namely alphabetical ordering of firm names, name memorability, name fluency and cognitive heuristics such as herding behaviour, disposition effect, anchoring and adjustment, repetitiveness, overconfidence, and availability biases, lead investors to make less than an optimal decisions related to investment management activities. Due to these heuristic-driven biases, investors intend to perceived that markets are inefficient, trade excessively in the stock market, and their investment performance affected adversely. The following responses describe the interviewees' opinions:

80 to 85% this types of behaviour exist in the market, generally, investors purchase stock without looking at its fundamental value, buy stocks which their friends are buying, retain loss-making stocks while selling winning stocks, without proper knowledge and research work they start treading in the stock market and seeks advice from their friends and colleagues who already treading in the stock market and invest in the *same stock, ultimately such types of behaviours lead toward the losses. 80% losers are those type of investors who reinvest in the stock market by relying on fast and frugal reasoning to recover their losses but fails, as a result, they invest more and their losses become higher and higher (Interviewee no. 1).*

Yes, investors show these types of behaviours in the stock market. they invest in different stock by following the behaviour of the crowd, base their decisions on past performance, hear from a friend about a stock that achieved high returns, and based on that information invest in that stock, etc..... Due to this type of behaviour, they make trading mistakes which leads toward losses (Interviewee no. 2).

90% of people in the stock market buy stocks which their friends are buying and for the time being stock seen profitable but end up in loss because they would not sell in a due time period (when the prices are high). They hold that stock and buy another by a concern with friends and colleagues as the prices of that stock go up they sell it. They buy and sell stock without looking at its fundamental values. They don't know why the stock price increases or decreases, they don't study the behaviour of the market. they don't try to understand the past performance of the stock in which they going to invest by concerning their fundamental report which is available on their website. That is why investors invest in the stock market by

relying on the mental shortcuts which reduce their profit or lead toward losses. (Interviewee no. 3).

Almost similar behaviour exit in the stock market as your results suggested (Interviewee no. 4).

Yes, when new investors enter the market they invest by relying on fast and frugal rules (heuristics). They do not observe the behaviour of the market before investing. They do not collect data related to stock performance (whether or not it is overvalued or undervalued) in which they are going to invest, even they don't have knowledge regarding profit and loss of the stocks. They don't study the background of the stock and engage in buying and selling the stock by following the actions of others. Only 8% to 10% investors in the market are those who perform proper analysis and do research work before investing and other people invest in the stock market by using heuristic factors namely herding, disposition effect, representativeness, anchoring, and name fluency, etc. as a result they are suffering from the huge losses as well as market become inefficient (Interviewee no. 5).

The opinions on the quantitative results of the study provided by investment strategists/advisors and brokers who are maintaining the accounts of investors on the PSX confirms that investor often fell prey to heuristic-driven biases namely cognitive heuristic-driven biases and recognition heuristic-driven biases when trading in the stock market, lead them to make irrational decisions related to investment management activities and due to irrational behaviour of investors market become inefficient.

The quantitative results of the study divulge that investors suffering from heuristics and heuristic-driven biases when trading in the stock market as a result, fundamental and

technical anomalies persist in the market, due to these anomalies they intend to perceived that markets are inefficient and make irrational investment decisions, and their investment performance reduced. The following quotations are the responses of the interviewees:

Yes, a similar phenomenon exists in the market, anomalies arise in the stock market due to heuristic-driven biases of investors which leads them to make irrational decisions related to investment management activities and they are suffering from losses (Interviewee no. 1).

Yes, I agree with these results heuristic-driven biases of investors create anomalies in the stock market which adversely affect their investment returns (Interviewee no. 2).

Of course when investors are investing in different stocks without looking at its fundamental values anomalies occurs in the stock market and that anomalies misrepresent the price of shares, and destabilizes markets (Interviewee no. 3).

Anomalies exist in the market and that anomalies take place due people who are investing in the stock market without any research work by following the actions of others. When individual investors use heuristics, they reduce the mental effort in the decision-making process, but that leads to errors in judgment, as a results anomalies persist in the stock market, definitely such type of people suffering from the loses (Interviewee no. 4).

Yes I am agree with results irrational behavioural of investors give rise to anomalies in stock market and stock price diverge form their fundamental values (Interviewee no. 5).

The above mention opinions of interviewees confirm that heuristic-driven biases of investors give rise to anomalies in the stock market and that anomalies hurt the perceived market efficiency and investment management activities of investors.

The results of the study demonstrate that individual and institutional investors equally immune to heuristic-driven biases such as cognitive and recognition heuristic-driven biases. No appreciable difference between individual investors and institutional investors was found. They are similar with respect to how they are influenced by heuristic-driven biases. The interviewees' opinions related to this finding given below:

Individual investors are prone to heuristic driven biases, as they have a lack of awareness regarding market fundamentals, even when buying and selling stock they have no information whether it is overpriced or under-price. They are mostly day traders and without proper knowledge trade excessively for small profits by relying on mental shortcuts. Due to heuristic driven biases, they make trading mistakes that adversely affect their returns.

If we talk about institutional investors they are also predisposed to heuristic-driven biases due to market volatility and competition. When there is depth or volume in the stock market then every investor expects that I can easily liquidate my investment. Unfortunately, in Pakistan, there is no depth or volume in the stock market and high volatility exist in the market as a result institutional also fell prey to heuristic-driven biases when trading in the stock market. As well as high competition exists among the institutional if they do not satisfy their fund providers then they withdraw their funds. In this situation due to high market volatility institutional investors investing in the stock market by relying on heuristics rather than depending on market fundamentals and due to heuristic factors, they also make trading mistakes that adversely affect their investment performance (Interviewee no. 1).

Individual investors have lack of knowledge, lack of experience and lack of expertise that is why they often used heuristics when trading in the stock market as a result anomalies exist in

the stock market which hurts their decisions and returns. The political instability in Pakistan also has a deep impact on the PSX. Due to the political instability price of stocks change dramatically in a short period of time. In such a situation, institutional investors can't follow the guiding principles of investment and start trading by relying on heuristics. Instability exists in the Pakistan stock mark from the last 3 years and high ups and downs in stock prices were seen during that period that is why institutional investors also relying on fast and frugal heuristics when trading in the stock market and make irrational decisions which lead toward the negative returns. This might be reason both institutional and individual investors similar with respect to how they are influenced by heuristic-driven biases. (Interviewee no. 2)

The behaviour of individual and institutional investors is entirely different. The institutional investors have a more professional approach towards investment decisions. But Pakistani market is very small there is no massive investment or huge investors are attached to this market (very few buy and seller) and not work according to fundamental because of political instability and law and order situation. Even small change in political horizon or any small change regarding the low and order situation have a lot of effect on the stock exchange such as destabilizes markets, deteriorates volatility. Due to these reasons institutional investors invest in the stock market by relying on heuristics and behave like individual investors (Interviewee no. 3).

Yes, almost institutional and individual investors have the same behaviour in the stock market form the last two to three years (Interviewee no. 4).

No, the overall behaviour of institutional investors is entirely different from individual investors. The institutional investors also fell prey to heuristic-driven biases when trading in

the stock market but their intensity is low as compared to individual investors. Both types of investor used heuristic factors when investing in the stocks but institutional investors less effected due to heuristic-driven biases as compared to individual investors but when high uncertainty exist in the market then both types of almost equally influenced (Interviewee no. 5).

The above mention opinions of interviewees confirm that both type of investors institutional and individual investors equally influenced due to heuristic-driven biases.

In this study, it was found that financial literacy play an important role in overcoming the negative effect of heuristics factors in case of institutional investors. When advanced financial literacy interacting with heuristic-driven biases have a substantial influence on the perceived market efficiency and investment management activities of intuitional investors. More explicitly, heuristic-driven biases have a significant negative influence on the perceived market efficiency and investment performance of institutional investors and have a significant positive effect on investment decision-making of institutional investors. When institutional investors used heuristic factors with inclusion of higher financial knowledge, their negative affect on the perceived market efficiency and investment management activities eliminated. Accordingly, financial literacy of institutional investors could eliminate their likelihood of taking improper and redundant risks consequently, they make rational decisions, which in turn positively affect their investment performance. Hence, in the presence of necessary financial knowledge, this emotional and behavioural ground available could turn into more realistic appearance. But in the case of individual investors, financial literacy does not appear to moderate relationships between heuristic-driven biases and perceived market efficiency, between heuristic-driven biases and investment management

activities. When individual investors used heuristic factors with inclusion or exclusion of financial knowledge they take decision in the same direction. The interviewees' views related to this finding presented below:

Yes, financial literacy plays an important role in financial decision-making. Generally, institutional investors have a more professional approach to investment decisions. They have defined system and set of rules and guidelines to make an investment decision. But the stock market dynamic is totally different from the fixed-income securities. To become successful in the stock market one thing is important that is decision-making at the right time. If they are not taking the right decisions at the right time then they are losers. To some extent, financial literacy helps to make the right decisions at the right time but in most cases, there is a need to decide based on subjective judgment. On the other hand, if talk about the individual investors they are noise trader and their choices are affected by several limitations which causes biases it don't matter they have financial literacy or not (Interviewee no. 1).

Normally individual investors invest in the stock market by looking at the market trend they do not try to understand which stock is under-priced and which stock is overpriced at the time of buying and selling. If they received information through any source which might beneficial for them but market trend suggest something quite different form that information in this situation they don't give worth to that information and take decision on the basis of market trend that why financial literacy does not appear to moderate relationships between heuristic-driven biases and investment management activities of individual investors. On the flip side, institutional investors are regulated by regulatory authorities, and their risk level is already defined. They try to understand the market situation before investing in stocks and

financial literacy helps them to understand market fundamentals consequently the make better decisions (Interviewee no. 2).

Yes investors who are more financially literate can make better investment decisions than investors who are less financially literate (Interviewee no. 3).

Institutional investors have not their own funds. They have pool money. They have provided a return to their fund's provider that is why they try to collect all information related to stock in which they going to invest before investing in that stock and make better decisions as compared to individual investors because individual investors invest in the stock market to take short benefits. They do not collect relevant information before investing. Even if they received information related to stock not considered that information during decision making and take decisions by following the action of others that is why financial literacy does not appear as a moderated (Interviewee no. 4).

Yes I am with results financial literacy does not appear to moderate the relationship between heuristic-driven biases and perceived market efficiency, between heuristic-driven biases and investment management activities of individual investors because they are noise traders (Interviewee no. 5).

The above mention opinions of interviewees confirm that financial literacy appears to moderate the relationships between heuristic-driven biases and perceived market efficiency, between heuristic-driven biases and investment management activities of institutional investors but financial literacy does not appear to moderate these relationships in case of individual investors.

The findings of the study suggest investors who are suffering from heuristic-driven biases tend to engage in excessively high investment in the stock market both in the short and long run.

75% of investors are day traders who invest in the stock market for a short period and 25% of investors are those who invest in the stock market for a long period like for two or three years. In both situations investors suffering from the heuristic-driven biases when trading in the stock market and but trade excessively in the short-run as compared to the long run (Interviewee no. 1).

Yes investors who are more sensitive to heuristic-driven biases tend to trade more. Being day traders, they enter and exit the positions multiple times a day and trade for small profits (Interviewee no. 2).

Whether they are investing for short run or long run in both situation they show similar behaviour in the stock market. Normally they trade excessively in short run (Interviewee no. 3).

Yes practically such type of behaviour also exist in the market (Interviewee no. 4).

Yes I am agree with the results (Interviewee no. 5).

The above mention opinions of interviewees confirm that heuristic-driven biases of investors have a significant positive effect on the investment decisions both in the short and long run.

What are the factors causing an increase use of heuristic variables by individual and institutional investors?

Individual investors often used heuristic factors when they are trading in the stock market because they have lack of knowledge regarding market fundamentals. They are also suffering from heuristic-driven biases when they are intended to maximize their profit with a short period. Institutional investors rely on heuristics when they are unable to get all the information needed for decision-making, or they may not be capable to do so at the time a decision must be made. Even if all the information is available, they may not be able to complete the optimization calculation on time (Interviewee no. 1).

The individual investors used heuristics because they have not awareness regarding how to evaluate the stock performance and might not have the resources to seek help from others. The institutional investors suffering from the heuristic-driven biases due to limitation of time (Interviewee no. 2).

Normal investors start trading without any research work regarding the stock performance which stock is overpriced and which stock is under-priced that is why they invest in the stock market by using heuristic factors and institutional investors invest in the stock market by relying on heuristics due instability in the stock market (Interviewee no. 3).

In order to avoid exhaustive research work investors often used heuristics when trading in the stock market (Interviewee no. 4).

Normally people want to gain maximum return within a short period that is why they relying on the heuristic factors (Interviewee no. 5).

The above mention opinions of interviewees highlight that the individual investors have a lack of knowledge regarding market fundamentals and start trading without proper research

work regarding the stock performance, which stock is overpriced, and which stock is under-priced. They have not awareness concerning how to evaluate the stock performance and might not have the resources to seek help from others as well as they are intended to maximize their profit with a short period. Due to all these reasons, they invest in the stock market by using heuristic factors. Institutional investors rely on heuristics when they are unable to get all the information needed for decision-making, or they may not be capable to do so at the time a decision must be made. Even if all the information is available, they may not be able to complete the optimization calculation on time. The high volatility exists in the stock market and they have limited time to conduct a proper analysis regarding investment opportunities all these factors leads investors to make trading decisions by relying on mental shortcuts.

Any suggestion concerning how to overcome the negative effect of heuristic-driven biases so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic factors?

Experience diminishes the inadvertent consequences played by heuristic-driven biases. With the passage of time through experience, they can learn how to overcome the negative effect of heuristic biases but they cannot completely eliminate the negative effect of heuristic factors (Interviewee no. 1).

To specify the algorithm for investing in the stock market before trading and to employ it dispassionately in this way to some extent they can overcome the negative effect of heuristic factors (Interviewee no. 2).

Conduct a proper analysis of investment opportunities, develop quantitative investment criteria and establish investment objectives and constraints (Interviewee no. 3).

There is a need to create awareness among individual investors regarding market fundamentals and they should evaluate the performance of stock before investing. They can get awareness by reading newspapers, magazines, seeking investment advice from financial strategist/advisor' reports, family members, friends, traders in the stock market, online forums, and online search. The institutional investors can overcome the negative effect of heuristic-driven biases by maintaining self-discipline, following guiding principles of investment, before investing or putting resources in a company to seek information relevant to the company to know their business activities and receive investment advice from the investment team and occasionally from other portfolio managers. As well as talking about the investment intention in the board of trustees meeting (Interviewee no. 4).

Before investing study the market behaviour and evaluate the performance of stock sector-wise and do proper research work in this way they can avoid suffering from the heuristic-driven biases (Interviewee no. 5).

Thus to overcome the negative effect of heuristic-driven biases investors follow guiding principles provided by brokers who are maintaining the accounts of investors at the PSX and investment strategists/advisors. For example, individual investors need to get awareness about market fundamentals before investing in the stock market and they can get awareness by reading newspapers, magazines, seeking investment advice from financial strategist/advisor' reports, family members, friends, traders in the stock market, online forums, and online search. In this way to some extent they can overcome negative effect of

heuristic-driven biases. The institutional investors can overcome the negative effect of heuristic-driven biases by maintaining self-discipline, following guiding principles of investment, before investing or putting resources in a company to seek information relevant to the company to know their business activities and receive investment advice from the investment team and occasionally from other portfolio managers. As well as talking about the investment intention in the board of trustees meeting. Both individual and institutional investors conduct a proper analysis of investment opportunities, develop quantitative investment criteria and establish investment objectives and constraints and take investment decisions according. To specify the algorithm for investing in the stock market in advance and to employ it dispassionately. Experience also diminishes the inadvertent consequences played by heuristic-driven biases. With the passage of time through experience, they can learn how to overcome the negative effect of heuristic biases.

The overall results obtained from the qualitative data divulged that 85% to 90% investors enter in stock market without proper knowledge regarding market fundamentals and without research work about stocks in which they are going to invest whether it is under-priced or overpriced as well as don't try to understand the past performance by concerning their fundamental report which is available on their website. Thus they often used heuristics factors when trading in the stock market, specifically, reliance on the recognition based heuristics namely alphabetical ordering of firm names, name memorability, name fluency and cognitive heuristics such as herding behaviour, disposition effect, anchoring and adjustment, repetitiveness, overconfidence, and availability biases, lead investors to make less than an optimal decisions related to investment management activities. The results of qualitative data also revealed that when individual investors use heuristics, they reduce the

mental effort in the decision-making process, but that leads to errors in judgment as a result, anomalies persist in the stock market that anomalies misrepresent the price of shares, and destabilizes markets and they make trading mistakes which hurts their investment returns.

The results of qualitative data also indicate that the Pakistani market is very small, there is no massive investment or huge investors are attached to this market (very few buy and seller) and not work according to fundamental because of political instability and law and order situation. Even small changes in the political horizon or any small change regarding the law and order situation have a lot of effect on the stock exchange such as destabilizes markets, deteriorates volatility. Unfortunately, in Pakistan, there is no depth or volume in the stock market and high volatility exist in this situation it is not for institutional investors to invest in the stock market by following market fundamentals. Due to these reasons, institutional investors also invest in the stock market by relying on heuristics and behave like individual investors. To some extent, institutional investors behave differently from the individual investors but that difference is not significant. Thus institutional and individual investors both suffering from the heuristic-driven biases when trading in the stock market and almost they are similar with respect to how they are influenced by heuristic-driven biases. Due to cognitive heuristic biases and recognition heuristic biases investors underestimate their downside risk and trade excessively in the stock market both in short and long run which hurts their returns.

The results of qualitative data also disclosed that financial literacy plays an important role in financial decision-making. Generally, institutional investors have a more professional approach to investment decisions. They have defined system and set of rules and guidelines to make an investment decision. They are regulated by regulatory authorities, and their risk

level is already defined. They try to understand the market situation before investing in stocks and financial literacy helps them to understand market fundamentals consequently the make better decisions. But the stock market dynamic is totally different from the fixed-income securities. To become successful in the stock market one thing is important that is decision-making at the right time. If they are not taking the right decisions at the right time then they are losers. To some extent, financial literacy helps to make the right decisions at the right time but in most cases, there is a need to decide based on subjective judgment. On the flip side, if talk about the individual investors they are noise trader and their choices are affected by several limitations which causes biases and their returns affected adversely it don't matter they have financial literacy or not. Overall these findings endorse the results obtained from the quantitative analysis.

By using a qualitative approach the researchers also highlighted some factors causing an increased use of heuristic variables by individual and institutional investors and discussed practical approaches to overcoming the negative effects of heuristics factors so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic biases. The factors causing an increased use of heuristic variables by investors and practical approaches to overcoming the negative effects of heuristics factors are listed and discussed below .

The results show that the individual investors have a lack of knowledge regarding market fundamentals and start trading without proper research work regarding the stock performance, which stock is overpriced, and which stock is under-priced. They have not awareness concerning how to evaluate the stock performance and might not have the resources to seek help from others as well as they are intended to maximize their profit with a

short period. Due to all these reasons, they invest in the stock market by using heuristic factors. Institutional investors rely on heuristics when they are unable to get all the information needed for decision-making, or they may not be capable to do so at the time a decision must be made. Even if all the information is available, they may not be able to complete the optimization calculation on time. The high volatility exists in the stock market and they have limited time to conduct a proper analysis regarding investment opportunities all these factors leads investors to make trading decisions by relying on mental shortcuts.

In order to overcome the negative effect of heuristic-driven biases investors follow guiding principles provided by brokers who are maintaining the accounts of investors and investment strategists/advisors. Individual investors need to get awareness about market fundamentals before investing in the stock market and they can get awareness by reading newspapers, magazines, seeking investment advice from financial strategist/advisor' reports, family members, friends, traders in the stock market, online forums, and online search. In this way to some extent they can overcome negative effect of heuristic-driven biases. The institutional investors can overcome the negative effect of heuristic-driven biases by maintaining self-discipline, following guiding principles of investment, before investing or putting resources in a company to seek information relevant to the company to know their business activities and receive investment advice from the investment team and occasionally from other portfolio managers. As well as talking about the investment intention in the board of trustees meeting. Both individual and institutional investors conduct a proper analysis of investment opportunities, develop quantitative investment criteria and establish investment objectives and constraints and take investment decisions according. To specify the algorithm for investing in the stock market in advance and to employ it dispassionately. Experience also

diminishes the inadvertent consequences played by heuristic-driven biases. With the passage of time through experience, they can learn how to overcome the negative effect of heuristic biases.

Chapter five

ANALYSIS AND DISCUSSION

5.1 Introduction

This chapter aims to discuss the results obtained from the empirical findings section (Chapter 4) in the light of research question, theoretical framework and literature review as well as compare and contrast these results or findings with the theories and literature from previous findings. The focus of this chapter is on finding the answers to the research questions in order to meet the purposes of research. The results of structural equation modeling are discussed, compare, and contrast with the theories and previous findings from literature in detail hereinafter.

5.2 Discussion

Decisions relating to investment management activities are a complex task for all types of investors these days. The investors mostly confront unstable financial conditions with elevated levels of uncertainty. This instability makes the decision-making process more intricate as compared to any other time. In rapidly evolving conditions, it is quite challenging to utilize available opportunities and resources in a better way and to make decisions related to investment management using all available information, to be a rational business actor. By the time decisions are made, it is likely that the opportunity no longer exists. Under conditions of environmental uncertainty and complexity (turbulent), investors often fell prey to heuristic-driven biases namely cognitive heuristic biases and recognition heuristic biases which adversely affect perceived market efficiency and their investment management activities such as investment decision-making and investment performance. This article has

expanded the prospect theory, bounded rationality theory and heuristic theory with regards to investment management activities and market efficiency, by measuring the perceptions of individual and institutional investors in regard to their heuristic-driven biases, market efficiency, investment management activities, fundamental and technical anomalies and financial literacy.

The idea of this study developed from the existing literature of behavioral finance and was tested with the help of the SEM technique, using AMOS graphics software. The findings of this study confirm that investors behave irrationally and make trading mistakes due to heuristic-driven biases, which adversely affect their investment performance. Furthermore, the empirical findings contrasted and supported in the light of the literature review, as illustrated hereunder.

The findings of this study divulge that the heuristic-driven biases namely recognition heuristic biases and cognitive heuristic biases have a significant negative effect on the perceived market efficiency of institutional and individual investors. These findings suggest that investors who are suffering from cognitive heuristic biases and recognition heuristic biases intend to perceived that markets are inefficient. These findings are consistent with research by and Shah, Ahmad, and Mahmood, (2018); Hadi (2017) who have found that heuristic bias negatively influences perceived market efficiency of investors. The recognition heuristic-driven biases and cognitive heuristic-driven biases have a significant positive influence on the investment decision-making of institutional and individual investors. These results suggest that investors who fell prey to heuristic-driven biases intend to make inappropriate or risky investments and trade excessively in the stock market. The findings match with the findings of Toma (2015); Rasheed, et al. (2018); Metawa, et al. (2019); Jain,

Walia, and Gupta, (2020) who have found that heuristic biases have a significance positive effect on the investment decision-making of investors.

The results of the study also indicate that the recognition heuristic-driven biases and cognitive heuristic-driven biases have a significant negative influence on the investment performance of institutional and individual investors. These results demonstrate that heuristic-driven biases reduce the investment performance of investors. These results is similar to Ahmad, and Shah, (2020) who asserts that when investors use heuristics, their technical knowledge and reasoning faculties are impaired, leading to errors in judgment. As a result, investors make irrational decisions, which in turn adversely affect their investment performance. Overall the results of the analysis suggest that investors often utilize heuristics causing several heuristic-driven biases when trading in the stock market, specifically, reliance on the recognition based heuristics namely alphabetical ordering of firm names, name memorability, name fluency and cognitive heuristics such as herding behaviour, disposition effect, anchoring and adjustment, repetitiveness, overconfidence, and availability biases, lead investors to make less than an optimal decisions related to investment management activities. Due to these heuristic-driven biases, investors intend to perceived that markets are inefficient, trade excessively in the stock market, and their investment performance affected adversely.

The results of the study demonstrate that individual and institutional investors equally immune to heuristic-driven biases such as cognitive and recognition heuristic-driven biases. No appreciable difference between individual investors and institutional investors was found. They are similar with respect to how they are influenced by heuristic-driven biases. The findings are consistent with research by Jaiyeoba, et al. (2020) who found that heuristic-

driven biases namely representativeness, overconfidence and anchoring equally influence the institutional and individual investors. Fisher and Statman (2002) argue convincingly "institutional investors, just like individual investors, were subject to behavioural biases and these biases had equal influences on both investor groups".

The findings of this study divulge that heuristic-driven bias such as cognitive and recognition heuristic biases have significant positive effect on short-term and long-term investment decision-making of investors. These findings suggest that investors who are suffering from the heuristic-driven biases, intend to make risky investments and trade excessively in the stock market both in short run and long run. Psychologically, this means that heuristic-driven bias deteriorates the quality of investment decisions both in the short and long run because investors who are suffering from heuristic-driven biases underestimate their downside risk, as a result, generates high trading volume. These findings are consistent with research by Chaudary, (2019) who have found that heuristic-driven biases i.e. salience has significant positive influences on both short-term and long-term investment decisions.

Highlighting the mediating role of fundamental and technical anomalies, this study divulged that fundamental and technical anomalies significantly mediate the relationship between heuristic-driven biases (cognitive heuristic biases and recognition heuristic biases) and perceived market efficiency of institutional and individual investors and between heuristic-driven biases (cognitive heuristic biases and recognition heuristic biases) and investment management activities (investment decision-making and investment performance) of institutional and individual investors. Investors often utilize heuristics causing several heuristic-driven biases when trading in the stock market, specifically, reliance on the recognition based heuristics and cognitive heuristics as a result, fundamental and technical

anomalies persist in the market. Due to these anomalies, they intend to perceived that markets are inefficient and make trading mistakes that adversely affect their investment performance of investors. The findings are consistent with research by Lazuarni, (2019) who found that heuristic biases namely hindsight and representativeness are reasons for the existence of the technical and fundamental anomalies in stock market which negatively affect the investment performance of investors.

This study revealed that fundamental and technical anomalies partially mediated the relationship between heuristic-driven biases (cognitive heuristic biases and recognition heuristic biases) and perceived market efficiency of institutional and individual. The results also indicate that fundamental and technical anomalies partially mediated the relationship between recognition heuristic biases and investment performance of individual investors and fully mediated the relationship between recognition heuristic biases and investment performance of institutional investors. The relationship between cognitive heuristic biases and investment performance of institutional investors is fully mediated by fundamental and technical anomalies and the relationship between cognitive heuristic biases and investment performance of individual investors is partially mediated the fundamental and technical anomalies. The results also suggest that the fundamental and technical anomalies play a partial mediating role between recognition heuristic biases and investment decision-making of institutional investors and full mediating role between the relationship of cognitive heuristic biases and investment decision-making of institutional investors. Similarly, the fundamental and technical anomalies play a partial mediating role between heuristic-driven biases investment decision-making of individual investors and play a full mediating role between recognition heuristic biases and investment decision-making of individual

investors. Overall these findings suggest that when individual investors use heuristics, they reduce the mental effort in the decision-making process, but that leads to errors in judgment (Shah, Ahmad, and Mahmood, 2018) and, as a result, anomalies persist in the market, that anomalies misrepresent the price of shares, and destabilizes markets and they make trading mistakes which hurts their investment returns.

However, insightful and interesting findings were obtained from exploring the moderating relationships that reduce the negative influence of heuristic-driven biases on perceived market efficiency and investment management activities of institutional investors with inclusion of higher financial knowledge. Financial literacy appears to moderate the relationships between heuristic-driven biases and perceived market efficiency of institutional investors, between heuristic-driven biases and investment performance of institutional investors and between heuristic-driven biases and investment decision-making of institutional investors. When advanced financial literacy interacting with heuristic-driven biases have a substantial influence on the perceived market efficiency and investment management activities of intuitional investors. More explicitly, heuristic-driven biases have a significant negative influence on the perceived market efficiency and investment performance of institutional investors and have a significant positive effect on investment decision-making of institutional investors. When institutional investors used heuristic factors with inclusion of higher financial knowledge, their negative affect on the perceived market efficiency and investment management activities eliminated. Accordingly, financial literacy of institutional investors could eliminate their likelihood of taking improper and redundant risks consequently, they make rational decisions, which in turn positively affect their investment performance. Hence, in the presence of necessary financial knowledge, this

emotional and behavioural ground available could turn into more realistic appearance. The findings are consistent with research by Hadi, (2017) who asserts that financial literacy enhances an investor's ability to control and manage his emotions, and thus enabling them to make successful investment decisions. But in the case of individual investors, financial literacy does not appear to moderate these relationships. When individual investors used heuristic factors with inclusion or exclusion of financial knowledge they take decision in the same direction. They are noise trader and their choices are affected by several limitations which causes biases it don't matter they have financial literacy or not. These results are consistent with Novianggie, & Asandimitra, (2019).

In summary, the study aimed to explore the influence of heuristic-driven biases on the investment management activities and perceived market efficiency of individual and institutional investors actively trading on the Pakistan Stock Exchange with mediating role of fundamental and technical anomalies and moderating role of financial literacy. The study in particular measured ten research objectives, however for the sake of encapsulating only major objectives are discussed here. Referring to the first objective, the study intended to find out the heuristic-driven biases influencing investment management activities of individual and intuitional investors at the PSX and their perceptions related to market efficiency. In order to reach on the findings, the study applied mixed-method approach namely sequential explanatory design which specifically includes structural equation modelling and qualitative approach. The key findings in this context suggested heuristic-driven biases have a markedly negative influence on the perceived market efficiency and investment performance and positively influence on the investment decision-making of institutional and individual

investors. These results are consistent with heuristic theory, bounded rationality theory, and prospect theory.

In context of second objective, the study attempted to compare which type of investors, individual or institutional, are less affected by heuristic-driven biases and vice versa. Mixed method approach was used comprising multigroup analysis and qualitative approach. The study found that individual and institutional investors equally immune to heuristic-driven biases. To some extent, institutional investors behave differently from the individual investors (compared to individual investors, institutional investors are relatively immune to heuristic biases) but that difference is not significant. In case of third objective, the study empirically investigated the mediating effect of fundamental anomalies and technical anomalies on the relationship between heuristic-driven biases and investment management activities (investment decision-making and investment performance) and on the relationship between heuristic-driven biases and perceived market efficiency. Like study's first objective, mixed-method approach namely sequential explanatory design was applied. According to the findings, fundamental and technical anomalies mediate the relationships between the heuristic-driven biases on the one hand, and the perceived market efficiency and investment management activities on the other.

Referring to the fourth objective, the study investigated the moderating effect of financial literacy on the relationship between heuristic-driven biases and investment management activities and on the relationship between heuristic-driven biases and perceived market efficiency. Mixed method approach, as parallel to the first and third study objective, was used. The findings reflected that financial literacy appears to moderate these relationships in case of institutional investors but it does not moderate these relationships in case of

individual investors. Conclusively in case of the fifth major objective, the study identified the impact levels of the heuristic-driven biases in short- term and long-term investment decisions. Similar to the previous objective, mixed method approach was applied. As per the key findings, heuristic-driven bias have significant positive effect on short-term and long-term investment decision-making of investors.

The aforementioned summarized view is reproduced in the tabular form on the face page.

Table 30. Summary of the Main Objectives and Findings

Research Objective	Study Hypothesis	Statistical Technique	Main Findings	Acceptance or Rejection of Study Hypothesis
To find out the heuristic-driven biases influencing investment management activities of individual and intuitional investors at the PSX and their perceptions related to market efficiency.	**H1**: The heuristic-driven biases have a significant negative influence on investment decisions of individual investors on the PSX. **H2**: The heuristic-driven biases have a significant negative influence on the investment performance of individual investors on the PSX. **H3**: The heuristic-driven biases have a significant negative influence on investment decisions of institutional investors on the PSX. **H4**: The heuristic-driven biases have a significant negative influence on the investment performance of institutional investors on the PSX. **H6**: The heuristic-driven biases have a significant negative influence on	**Mixed Method Approach (Sequential Explanatory Design):** Structural Equation Modeling, Qualitative Approach	The results suggest that heuristic-driven biases have a markedly negative influence on the perceived market efficiency and investment performance and positively influence on the investment decision-making of institutional and individual investors.	H1 rejected. H2 accepted. H3 rejected. H4 accepted. H6 accepted. H7 accepted.

	perceived market efficiency of individual investors. **H7**: The heuristic-driven biases have a significant negative influence on perceived market efficiency of institutional investors.			
Comparing which type of investors, individual or institutional, are less affected by heuristic-driven biases and vice versa.	**H5:** Compared to individual investors, institutional investors are relatively immune to heuristic-driven biases in Pakistani context.	**Mixed Method Approach (Sequential Explanatory Design):** Multigroup Analysis, Qualitative Approach	The results of the study demonstrate that individual and institutional investors equally immune to heuristic-driven biases. To some extent, institutional investors behave differently from the individual investors (compared to individual investors, institutional investors are relatively immune to heuristic biases) but that difference is not significant.	H5 rejected.
To empirically investigate the mediating effect of fundamental anomalies and technical anomalies on the relationship between heuristic-driven biases and investment management activities (investment decision-making and investment	**H8:** Fundamental and technical anomalies mediate the relationship between heuristics and investment decisions of individual investors on the PSX. **H9:** Fundamental and technical anomalies mediate the relationship between heuristics and investment performance of individual investors on the PSX.	**Mixed Method Approach (Sequential Explanatory Design):** Structural Equation Modeling, Qualitative Approach	The results also suggest that fundamental and technical anomalies mediate the relationships between the heuristic-driven biases on the one hand, and the perceived market efficiency and investment management activities on the other.	H8 accepted. H9 accepted. H10 accepted. H11 accepted. H12 accepted. H13 accepted.

performance) and on the relationship between heuristic-driven biases and perceived market efficiency.	**H10:** Fundamental and technical anomalies mediate the relationship between heuristics and perceived market efficiency of individual investors on the PSX. **H11:** Fundamental and technical anomalies mediate the relationship between heuristics and investment decisions of institutional investors on the PSX. **H12:** Fundamental and technical anomalies mediate the relationship between heuristics and investment performance of institution investors on the PSX. **H13:** Fundamental and technical anomalies mediate the relationship between heuristics and perceived market efficiency of institutional investors on the PSX.			
To empirically investigate the moderating effect of financial literacy on the relationship	**H14:** Financial literacy moderates the relationship between heuristic-driven biases and investment decisions of individual	**Mixed Method Approach (Sequential Explanatory Design):**	Financial literacy appears to moderate these relationships in case of institutional investors but it does not moderate these relationships in case of individual investors.	H14 rejected. H15 rejected. H16 accepted. H17 accepted. H18 rejected.

between heuristic-driven biases and investment management activities and on the relationship between heuristic-driven biases and perceived market efficiency.	investors on the PSX. **H15:** Financial literacy moderates the relationship between heuristic-driven biases and investment performance of individual investors on the PSX. **H16:** Financial literacy moderates the relationship between heuristic-driven biases and investment decisions of institutional investors on the PSX. **H17:** Financial literacy moderates the relationship between heuristic-driven biases and investment performance of institutional investors on the PSX. **H18:** Financial literacy moderates the relationship between heuristic-driven biases and perceived market efficiency of individual investors. **H19:** Financial literacy moderates the relationship between heuristic-driven biases and perceived market efficiency of institutional investors.;	Structural Equation Modeling, Qualitative Approach		H19 accepted.
To identify the impact	**H20**: The heuristic biases	**Mixed Method**	The findings of this study show that	H20 rejected.

levels of the heuristic-driven biases in short-term and long-term investment decisions.	have a significant negative influence on the long-term investment decisions. **H21**: The heuristic biases have a significant negative influence on the and short-term investment decisions.	**Approach (Sequential Explanatory Design):** Structural Equation Modeling, Qualitative Approach	heuristic-driven bias have significant positive effect on short-term and long-term investment decision-making of investors.	H21 rejected.

Chapter six

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter aims to summarize all the findings of the research, which are related to heuristics and heuristic-driven biases and their effect on perceived market efficiency and investment management activities of institutional and individual investors. The chapter also gives some recommendations to the finance practitioners to overcome the negative effect of heuristic-driven biases so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic factors. And highlight the contribution of this dissertation to the field of behavioural finance and suggest avenues for future research.

This chapter proceeds as follows: Section two is related to the conclusions of the dissertation. In sections three, the researcher discusses contribution of this dissertation to the field of behavioural finance. Section four is related to the implications of the results. In the fifth section, the study suggests avenues for future research.

6.2 Conclusion

This study aimed to explore and clarify the mechanism by which heuristic-driven biases influences the perceived market efficiency and investment management activities (investment decision-making and investment performance) of institutional and individual investors, actively trading on the PSX, with the mediating role of fundamental and technical anomalies and moderating role of financial literacy. And also highlight some factors causing an increased use of heuristic variables by individual and institutional investors and discussed

practical approaches to overcoming the negative effects of heuristics factors so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic biases.

To achieve this research objective, the deductive approach was used, as the research is based on the theoretical framework of behavioural finance. A mixed-method approach namely sequential explanatory design was used for answering research questions and testing hypotheses. Data included information from interviews (i.e., qualitative data) and the surveys (i.e., quantitative data). A 5-point Likert scale questionnaire was used for collecting quantitative data in which closed questions were asked of the target population and semi-structured interview was used for collecting qualitative data in which open-ended questions were asked of the target population. The collected data were analyzed using SPSS and Amos graphics software. The sample consists of 307 individual investors, 180 institutional investors trading on the PSX, and 5 brokers and/or investment strategists/advisors who are maintaining the accounts of investors or providing investment advice to the investors on the PSX, who were selected on a convenient basis. The hypotheses were tested through structural equation modelling (SEM) technique and multigroup analysis.

The results of the study divulge that institutional and individual often used heuristics factors when trading in the stock market, specifically, reliance on the recognition based heuristics namely alphabetical ordering of firm names, name memorability, name fluency and cognitive heuristics such as herding behaviour, disposition effect, anchoring and adjustment, repetitiveness, overconfidence, and availability biases, lead investors to make less than an optimal decisions related to investment management activities. Due to these heuristic-driven biases, investors intend to perceived that markets are inefficient, trade excessively in the stock market, and their investment performance affected adversely. These results are

consistent with heuristic theory, bounded rationality theory, and prospect theory, which hold that that decision makers use heuristics to avoid the risk of losses in uncertain situations but that leads to errors in judgment; as a result, investors make irrational decisions, which may cause the market to overreact or underreact – in both situations the market becomes inefficient.

The results of the study demonstrate that individual and institutional investors equally immune to heuristic-driven biases such as cognitive and recognition heuristic-driven biases. To some extent, institutional investors behave differently from the individual investors (compared to individual investors, institutional investors are relatively immune to heuristic biases) but that difference is not significant. No appreciable difference between individual investors and institutional investors was found. Thus institutional and individual investors both suffering from the heuristic-driven biases when trading in the stock market and almost they are similar with respect to how they are influenced by heuristic-driven biases. The findings of this study also show that heuristic-driven bias such as cognitive and recognition heuristic biases have significant positive effect on short-term and long-term investment decision-making of investors. These findings suggest that investors who are suffering from the heuristic-driven biases, underestimate their downside risk and trade excessively in the stock market both in short run and long run.

Highlighting the mediating role of fundamental and technical anomalies, this study divulged that fundamental and technical anomalies partially mediated the relationship between heuristic-driven biases (cognitive heuristic biases and recognition heuristic biases) and perceived market efficiency of institutional and individual. The results also indicate that fundamental and technical anomalies partially mediated the relationship between recognition

heuristic biases and investment performance of individual investors and fully mediated the relationship between recognition heuristic biases and investment performance of institutional investors. The relationship between cognitive heuristic biases and investment performance of institutional investors is fully mediated by fundamental and technical anomalies and the relationship between cognitive heuristic biases and investment performance of individual investors is partially mediated the fundamental and technical anomalies. The results also suggest that the fundamental and technical anomalies play a partial mediating role between recognition heuristic biases and investment decision-making of institutional investors and full mediating role between the relationship of cognitive heuristic biases and investment decision-making of institutional investors. Similarly, the fundamental and technical anomalies play a partial mediating role between heuristic-driven biases investment decision-making of individual investors and play a full mediating role between recognition heuristic biases and investment decision-making of individual investors. Overall these findings suggest that when individual investors use heuristics, they reduce the mental effort in the decision-making process, but that leads to errors in judgment, as a result, anomalies persist in the market, that anomalies misrepresent the price of shares, and destabilizes markets and they make trading mistakes which hurts their investment returns.

However, insightful and interesting findings were obtained from exploring the moderating relationships that reduce the negative influence of heuristic-driven biases on perceived market efficiency and investment management activities of institutional investors with inclusion of higher financial knowledge. Financial literacy appears to moderate the relationships between heuristic-driven biases and perceived market efficiency of institutional investors, between heuristic-driven biases and investment performance of institutional

investors and between heuristic-driven biases and investment decision-making of institutional investors. When advanced financial literacy interacting with heuristic-driven biases have a substantial influence on the perceived market efficiency and investment management activities of intuitional investors. More explicitly, heuristic-driven biases have a significant negative influence on the perceived market efficiency and investment performance of institutional investors and have a significant positive effect on investment decision-making of institutional investors. When institutional investors used heuristic factors with inclusion of higher financial knowledge, their negative affect on the perceived market efficiency and investment management activities eliminated. Accordingly, financial literacy of institutional investors could eliminate their likelihood of taking improper and redundant risks consequently, they make rational decisions, which in turn positively affect their investment performance. Hence, in the presence of necessary financial knowledge, this emotional and behavioural ground available could turn into more realistic appearance. But in the case of individual investors, financial literacy does not appear to moderate these relationships. When individual investors used heuristic factors with inclusion or exclusion of financial knowledge they take decision in the same direction. They are noise trader and their choices are affected by several limitations which causes biases it don't matter they have financial literacy or not.

The results of study show that the individual investors have a lack of knowledge regarding market fundamentals and start trading without proper research work regarding the stock performance, which stock is overpriced, and which stock is underpriced. They have not awareness concerning how to evaluate the stock performance and might not have the resources to seek help from others as well as they are intended to maximize their profit with a

short period. Due to all these reasons, they invest in the stock market by using heuristic factors. Institutional investors rely on heuristics when they are unable to get all the information needed for decision-making, or they may not be capable to do so at the time a decision must be made. Even if all the information is available, they may not be able to complete the optimization calculation on time. The high volatility exists in the stock market and they have limited time to conduct a proper analysis regarding investment opportunities all these factors leads investors to make trading decisions by relying on mental shortcuts.

In order to overcome the negative effect of heuristic-driven biases individual investors need to get awareness about market fundamentals before investing in the stock market and they can get awareness by reading newspapers, magazines, seeking investment advice from financial strategist/advisor' reports, family members, friends, traders in the stock market, online forums, and online search. In this way to some extent they can overcome negative effect of heuristic-driven biases. The institutional investors can overcome the negative effect of heuristic-driven biases by maintaining self-discipline, following guiding principles of investment, before investing or putting resources in a company to seek information relevant to the company to know their business activities and receive investment advice from the investment team and occasionally from other portfolio managers. As well as talking about the investment intention in the board of trustees meeting. Both individual and institutional investors conduct a proper analysis of investment opportunities, develop quantitative investment criteria and establish investment objectives and constraints and take investment decisions according. To specify the algorithm for investing in the stock market in advance and to employ it dispassionately. Experience also diminishes the inadvertent consequences

played by heuristic-driven biases. With the passage of time through experience, they can learn how to overcome the negative effect of heuristic biases.

6.3 Contribution of the Study

This study contributes to the existing body of literature on behavioural finance from various perspectives. Firstly, this article contributes to extant literature demonstrating the effect of heuristic-driven biases namely cognitive heuristic biases and recognition heuristic biases on perceived market efficiency and investment management activities (investment decision-making and investment performance) of individual and institutional investors. This research work is a pioneering study in this context. Second, the mediating effect of fundamental and technical anomalies on the relationship between heuristic-driven biases and perceived market efficiency and the relationship between heuristic-driven biases and investment management activities of individual and institutional investors is studied for the first time in an emerging market through this survey which differentiates this study from others.

Third, previous researchers examined the direct effect of heuristic biases on perceived market efficiency, investment decision-making and investment performance (e.g., Barber and Odean (2000); Dorn and Sengmeuller (2009); Shah, Ahmad, & Mahmood, (2018); Ahmad and Shah, (2020); Ahmad,(2020)). The moderating effect of financial literacy on the relationship between heuristic-driven biases, and perceived market efficiency and on the relationship between heuristic-driven biases and investment management activities (investment decision-making and investment performance) of institutional and individual investors is examined for the first time in an emerging market through this survey which also differentiates this study from others. Fourth, this study also contributes existing body of literature on behavioural

finance showing that institutional and individual investors are behaviourally biased. The current study is the first to directly compare heuristic use between institutional and individual investors.

Fifth, this study also makes a theoretical contribution by providing further insights into the investors' decision–heuristic-driven biases relationship by exploring how investors short-term and long-term investment decisions are affected by their heuristic-driven biases. Sixth, the prior researchers examined the effect of behavioural biases on perceived market efficiency, investment decision-making and investment performance of investors by using qualitative or quantitative approach. The current study is the first of its kind, exploring and clarify the mechanism by which heuristic-driven biases influences the investment management activities (investment decision-making and investment performance) of investors, actively trading on the PSX, and the perceived market efficiency by using mix method approach.

Seventh, with help of qualitative approach the researcher also highlighted some factors causing an increased use of heuristic variables by individual and institutional investors and discussed practical approaches to overcoming the negative effects of heuristics factors so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic biases which also differentiates this study from others. Eighth, "most studies focus on well-developed financial markets and very little is known about investors' behaviour in emerging markets like Pakistan" (Shah et al. 2018). The present study also contributes to filling this gap in the literature.

It has important theoretical as well as practical implications for finance practitioners' such as investor who plays at stock exchange, a financial strategist/advisor in an investment firm, a

portfolio manager, a financial planner, an investment banker, a trader/ broker at stock exchange, or a financial analyst. But most importantly, the term also includes all those persons who manage corporate entities and are responsible for making its financial decisions and academia. The study is a good reference point of financial behaviour for the individual and institutional investor, finance manager, financial broker, and other financial decision-makers to deliberate and examine the financial market trend before making desirable investment decisions. It furnished effective information about the effect of heuristic-driven biases on perceived market efficiency and investment management activities with mediating role of fundamental and technical anomalies and moderating role of financial literacy. It is beneficial for the investors when they would like to invest in the stock market, by getting help from this study.

6.4 Policy Implications

The results of the study suggested that investment strategy relies on fast and frugal rules that would not result in better outcomes to finance practitioners. Based on findings, the researcher would like to suggests that investors should not rely on heuristics while making investment decisions, but conduct a proper analysis of investment opportunities, develop quantitative investment criteria and establish investment objectives and constraints, base decisions on their financial capability and experience levels instead of making investment strategies by using cognitive heuristics and sentiments solely, to make better investment decisions, and move towards appropriate investment opportunities.

Investors also follow guiding principles provided by different researchers to mitigates the negative effect of heuristic-driven biases and how heuristics can be positively employed in

investment strategies. For example, Otuteye, and Siddiquee, (2015) assert that to mitigate the chances of being fell prey to heuristic biases is to stipulate the algorithm for the investment management activities in advance and to employ it dispassionately. They also documented that disciplined enforcement of heuristics in investment strategies will evade the common pitfalls of cognitive heuristic biases. Ahmad and Shah, (2020) argue convincingly, financial literacy plays an important role in overcoming the negative effect of heuristics factors. If investors used heuristics with the inclusion of financial knowledge negative effect of heuristic factors will reduce as a result investors can be positively utilized heuristics in their investment management activities.

According to Jaiyeoba, Adewale, Haron, and Ismail, (2018) institutional investors can mitigate the impact of psychological biases and emotions by maintaining self-discipline, talking about the investment intention in the board of trustees meeting, following guiding principles of investment, before investing or putting resources in a company seek information relevant to the company to know their business activities and receive investment advice from the investment team and occasionally from other portfolio managers. Moreover, individual investors can minimize the influence of emotions and psychological biases by reading newspapers, magazines, seeking investment advice from financial strategist/advisor' reports, family members, friends, traders in the stock market, online forums, and online search. As Anandarajan, Kleinman, and Palmon, (2008) concluded that experience diminishes the inadvertent consequences played by heuristic-driven biases.

Furthermore, this study provides an insight to stock market policy-makers and regulators, and assist them in understanding the mechanism and role of behavioural factors in investors 'decision-making processes. This study can help them to better understand investors and

develop policies that take into account these psychological factors to ensure smooth market movement. According to Spindler (2011), investors' protection is a major concern for policy-makers, along with stronger regulation of capital markets, after the global financial crisis. Montier (2002) and Fromlet (2001) have warned investors of the serious consequence if behavioural biases are ignored in investment analysis. Thus the present study provides awareness and understanding of heuristic biases in investment management, which could be very useful for finance practitioners. This study suggest investors to select better investment tools and avoid repeating the expensive errors which occur due to heuristic biases. They can improve their performance by recognizing their biases and errors of judgment, to which we are all prone, resulting in a more efficient market. The study also aims to facilitate financial advisors in gaining a better understanding of their customers' psychology. It helps them in devising behaviourally modified portfolio, which best suits their customers' inclination. It assists investment bankers in understanding market emotions because these sentiments create public issues for their companies. It helps the financial strategists to make better forecasts; and aids security analysts in formulating efficient stock recommendations.

6.5 Directions for Future Research

This study walks around the influence of heuristic-driven biases on the perceived market efficiency and investment management activities specifically in the context of Pakistan only. It would, therefore, be imperative for researchers, to substantiate the findings of this research with greater diversity of respondents from other areas of the country as well. It is also recommended, for further research, to probe the link of heuristic-driven biases and perceived market efficiency and investment management activities by taking others suitable mediators

and moderator variables to understand comprehensively, how the heuristic-driven biases impacts perceived market efficiency and investment management activities of individual and institutional investors.

Furthermore, the researcher has measured cognitive heuristic-driven biases and recognition heuristic-driven biases, as a whole, and have not tested the relationship of every cognitive heuristic biases and recognition heuristic biases with perceived market efficiency and investment management activities. Since it has, yet, been recommended that every bias of recognition and cognitive heuristic factors may not generally be harmful and/or favourable for investment management activities thus further studies expanding the understanding of the impacts of heuristic-driven biases namely cognitive heuristic biases and recognition heuristic biases on perceived market efficiency and investment management activities, by also looking at the impact of each cognitive heuristic-driven biases and recognition heuristic-driven biases on perceived market efficiency and investment management activities. Moreover. It may also be helpful if a study were carried out that covers data from three different markets, like one from a developed country, second from a developing country and the third from not so developed an economy. Such a comparative study can prove to be a meaningful addition to the body of knowledge on behavioural finance.

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Appendices

Appendix 1: Questionnaire

HEURISTIC-DRIVEN BIASES

Overconfidence

CHDB 1	You believe that your skills and knowledge of stock market can help you to outperform the market.
CHDB 2	You are confident of your ability to do better than others in picking stocks
CHDB 3	You feel more confident in your own investment opinions over opinions of your colleagues or friends.
CHDB 4	You trade excessively in the stock market because you are sure of what step to take at all times to increase the worth of your investment
CHDB 5	You have the ability to choose the stocks which its performance will be better than the market performance.

Representativeness

CHDB6	You buy 'hot' stocks and avoid stocks that have performed poorly in the recent past.
CHDB7	You consider the past performance of the stocks before investing in it
CHDB8	you avoid investments in stocks that have a history of poor earnings.

Availability

CHDB9	You prefer to invest in local stocks than international stocks because the information of local stocks is more available
CHDB10	You consider the information from your close friends and relatives as the reliable reference for your investment decisions
CHDB11	You prefer to buy stocks on the days when the value of the stock market index increases.
CHDB12	You prefer to sell stocks on the days when the value of the stock market index decreases.
CHDB13	If you heard from a friend about a stock that achieved high returns, you would buy it.

Anchoring

CHDB14	You rely on your previous experiences in the market for your next investment.
CHDB15	You forecast the changes in stock prices in the future based on the recent stock prices
CHDB16	You rely on the high rate of return achieved in the market before as the benchmark for estimating future return on investment
CHDB17	The high rate of return in the market is the main motivating factor for investing in the stock market in Pakistan
CHDB18	You use the stock purchase price as a reference point for trade

Herding

CHDB19	You rarely consult others before making stock purchases or sales
CHDB20	Other investors' decisions of buying and selling stocks impact your investment decisions
CHDB21	you usually react quickly to the changes of other investors' decisions and follow

	their reactions to the stock market
CHDB22	you consult others (family, friends or colleagues) before making stock purchased
CHDB23	You follow social blogs/ forums before making stock a purchase/sale
Disposition effect	
CHDB24	I do not have any quick responses to good or bad news and tend to sell profitable stocks too early and sell losing stocks too late
CHDB25	I am often reluctant to realize losses
CHDB26	I sell profitable stocks because I am afraid that the stock price would fall again
Recognition based heuristics	
Alphabetical Ordering	
RBHDB1	You are more likely to trade the stocks of firms beginning with letters appearing early in the alphabet than stocks beginning with later alphabet letters
RBHDB2	Based on financial advisor recommends would you like to change your investment portfolio for better return.
RBHDB3	you would like to change your investment portfolio, but you feel stressed to put yourself into new ones options
Name Fluency	
RBHDB4	You are more likely to trade the stocks of firms which names are easily pronounced than stocks of firms with difficult to pronounce name
RBHDB5	You prefer to buy the stocks of firms having short name as compared to stocks of firms having long name
Name Memorability	
RBHDB6	You are more likely to trade the stocks of firms which names are easily remember than stocks of firms with difficult to remember name
RBHDB7	You prefer to buy the stocks of firms that are highly advertising
Anomalies	
Fundamental Anomalies	
FA1	You consider carefully the Price Change of stocks that you intend to invest in
FA2	You study about the market Fundamental (economic indicators) of underlying stocks before making investment decisions.
FA3	You focus on popular stock for your investment
FA4	You have the Over/under react to price change of stocks.
Technical Anomalies	
TA1	Market information is important for your stock investment.
TA2	You put the Past trend of stocks under your consideration for yours investment
Financial literacy	
FL1	You are somewhat knowledgeable of stock market activities on the Pakistan stock exchange
FL2	You usually follow the stock market through financial news on TV at least twice a week
FL3	You clearly understand the role of brokerage firms in listing on the Pakistan stock exchange
FL4	You easily access the latest report, prospectus, and financial statements of any company on the Pakistan stock exchange annually
FL5	When seeking financial advice, I deal with licensed brokers, intermediaries or financial services companies

Investment Decision Making

IDM1	When making investments, you rely upon your instincts
IDM2	You generally make investments that feel right to you
IDM3	When you make Investment, you tend to rely on your intuition
IDM4	When making an investment, you trust your inner feelings and reactions
IDM5	When you make an investment, it is more important for you to feel the investment is right than have a rational reason for it

Perceived Market Efficiency

PME1	You consider carefully the price changes of stocks that you intend to invest in
PME2	Market information is important for your stock investment.
PME3	You put the past trends of stocks under your consideration for your investment.
PME4	You have the over-reaction to price changes of stocks.
PME5	You analyze the companies' customer preference before you invest in their stocks.
PME6	You study about the market fundamentals of underlying stocks before making investment decisions

Investment Performance

IP1	The return rate of your recent stock investment meets your expectation
IP2	Your rate of return is equal to or higher than the average return rate of the market
IP3	You feel satisfied with your investment decisions in the last year (including selling, buying, choosing stocks, and deciding the stock volumes)

Short-Term Investment Decisions

STID1	With the given investment opportunities, you would prefer to invest in stock market rather than in fixed income securities
STID2	You engage in portfolio management activities at least twice per week
STID3	You put at least half of your investment money into the stock market
STID4	You perform your own investment research instead of using outside advice

Long-Term Investment Decisions

LTID1	You save at least 10% of your gross earnings for investing/saving/retirement purposes
LTID2	You have a portfolio that focuses on multiple asset classes (i.e., stocks, bonds, cash, real estate, etc.)
LTID3	You invest some money in long-term assets where your money will be tied up and inaccessible for years
LTID4	You manage your portfolio for maximum gross return rather than tax and cost efficiency.

Appendix 2: Instrumentation for Semi-Structured Interviews

As stated above, semi-structured interviews were used to collect qualitative data. This type of interviewing initially utilizes main questions, probing and follow-up questions, which may vary from interviewee to interviewee, depending on the specific responses given and themes introduced during the interview (Rubin & Rubin, 2011). The interview guide was developed based on the quantitative data analysis results. The interview instrument contained seven guided questions, which were:

1. Investors often utilize heuristics, causing several heuristic-driven biases when trading in the stock market, specifically: recognition-based heuristics namely alphabetical ordering of firm names, name memorability, name fluency, and cognitive heuristics, such as herding behaviour, disposition effect, anchoring and adjustment, repetition, overconfidence, and availability biases. These biases lead investors to make sub-optimal decisions when managing their investments. Due to these heuristic-driven biases, investors tend to perceive that markets are inefficient, trade excessively in the stock market, and their investment performance affected adversely. What is your opinions about the results?
2. Heuristic-driven biases of individual and institutional investors give rise to anomalies (fundamental and technical anomalies) in the stock market and, due to these anomalies, investors tend to perceive that markets are inefficient, so they make irrational investment decisions, and their investment performance is reduced. What is your opinions about the results?
3. Individual and institutional investors are equally prone to heuristic-driven biases, such as cognitive and recognition heuristic-driven biases. What is your opinions about the results?
4. Investors who are suffering from heuristic-driven biases tend to engage in excessively high investment in the stock market in both the short and long run. What is your opinions about the results?
5. Financial literacy appears to moderate the relationships between heuristic-driven biases and perceived market efficiency, between heuristic-driven biases and investment management activities of institutional investors but financial does not appears to moderate these relationships in case of individual investors. What is your opinions about the results?
6. What are the factors causing an increased use of heuristic variables by individual and institutional investors?
7. Any suggestions concerning how to overcome the negative effect of heuristic-driven biases so that finance practitioners can avoid repeating the expensive errors which occur due to heuristic factors?

Appendix 3: Call For Papers

3.1 Hillcrest Behavioural Finance Award Call for Papers

Hillcrest Asset Management is an institutional investment management firm and a recognized leader in the field of Behavioural Finance investing. Their investment philosophy and process are guided by a fundamental belief that stocks deviate from their fair value due to investor behavioural biases. Hillcrest's experienced investment team believes that stocks follow the behavioural cycle of stock movements. We combine model-driven behavioural analysis with traditional fundamental research to build on the strengths of both approaches

HillcrestBehavioralFinanceAward
2018 Call for Papers

The **Hillcrest Behavioral Finance Award** seeks to annually recognize excellence in research through the selection of an original paper from academics on the subject of behavioral finance.

Hillcrest Behavioral Finance Award Past Winners include:

2017 Kent Daniel (Columbia Business School and NBER), David Hirshleifer (UC Irvine and NBER) and Lin Sun (Florida State University) "Short and Long Horizon Behavioral Factors"

2016 Lauren Cohen and Christopher Malloy (Harvard Business School) and Quoc Nguyen (University of Illinois at Chicago) "Lazy Prices"

2015 Tom Chang and David Solomon (University of Southern California), Samuel Hartzmark (University of Chicago) and Eugene Soltes (Harvard Business School) "Being Surprised by the Unsurprising: Earnings Seasonality and Stock Returns"

2014 Tim Loughran and Bill McDonald (University of Notre Dame) "The Use of Word List in Textual Analysis"

Please see the **Hillcrest Asset Management** website for further information regarding the award and its previous winners:
https://www.hillcrestasset.com/behavioral-finance/hillcrest-finance-award/

COMPETITION DETAILS: Paper submissions will be accepted from current PhD students and professors from accredited academic institutions. Papers may be an original work created specifically for the **Hillcrest Behavioral Finance Award** or relevant unpublished papers.

While any submissions from the field of behavior finance are acceptable, the following topics are especially welcome:

1. **The impact investment heuristics can have on rational asset selection and practical approaches to overcoming them.**
2. The role of big data in behavioral modeling.
3. Event studies of cognitive biases applied to stock selection.

Paper submissions will be judged by a Reading Committee formed by selected members of the Institute of Behavioral Finance and previous winners of the Award along with Hillcrest Asset Management CEO and editor of the Journal of Behavioral Finance, Brian Bruce.

Hillcrest Asset Management will recognize one winning paper written by an author attending and/or teaching at an accredited university. The author will receive a $2,000 award.

The winner of the **Hillcrest Behavioral Finance Award** will be announced after **November 30, 2018.**

INSTRUCTIONS FOR CONTRIBUTORS:
Submit a WORD or Adobe PDF version of the paper to: **Melinda Estelle** (**mestelle@hillcrestasset.com**)

Cover page must include:

- Author contact information for each author: name, title, affiliation, mailing address, phone number, and e-mail address for each author
- An abstract that summarizes the issue, methodology, and solution in 250 words or fewer
- Five (5) key words that can be used in searches for the article.

Paper Submission Deadline is: 12 midnight EST on **October 1, 2018**

3.2 Special Issue Call for Papers From Studies in Economics and Finance (2018)

Guest Editors:

Haim Levy, The Hebrew University of Jerusalem, Israel
Oliver Linton, University of Cambridge, UK
Thierry Post, Koc University, Turkey
Wing-Keung Wong, Asia University, Taiwan

Behavioral Economics and Behavioral Finance play a vital role in many fields in Economics and Finance. **Using individual's behavior is essential to** develop many new economic and finance theories and test their validity through the analysis of empirical real-world data. For example, Behavioral Economics and Behavioral Finance could help to form effective monetary and fiscal policies, and to develop pricing models for financial assets such as equities, bonds, currencies, and derivative securities.

This special issue of ***Studies in Economics and Finance*** in Behavioral Economics and Behavioral Finance edited by Haim Levy, Oliver Linton, Thierry Post, and Wing Keung Wong will be devoted to advancements in the theory development with applications on Behavioral Economics and Behavioral Finance. This special issue will bring together theory, practice and applications of Behavioral Economics and Behavioral Finance.

We invite scholars to contribute original research articles as well as review articles in theory, practice and applications of Behavioral Economics and Behavioral Finance. All submissions must contain original unpublished work not being considered for publication elsewhere.

Submissions are made through the journal's online system at: https://mc.manuscriptcentral.com/sef. When submitting your paper, please indicate that your manuscript is for the Special Issue on "Behavioral Economics and Behavioral Finance" by selecting the appropriate issue. Before submitting please read the author guidelines here.

The submission deadline is **30 June 2018**. For queries please contact the corresponding guest editor, Wing-Keung Wong at wong@asia.edu.tw

3.3 Special Issue Call for Papers from Management Decision

New challenges for business actors decision making and positive heuristics

Aim and Scope

This special issue focuses on the use of heuristics and forms of judgment based on simple rules by business actors in contexts characterized by increasing availability of information technologies (big data, artificial intelligence, marketing automation tools, etc.), and at the same time growing uncertainty.

Business actors include entrepreneurs, managers and entire organizations. Theories of entrepreneurship and management tend to focus on either the capabilities of the individual or the resources of the organization. Thus, these theories are incomplete to the extent that, as Herbert

Simon and James March argued, success comes from the match between the individual and the organization.

Decision making is a relevant topic in the field of management and entrepreneurship. Managerial decision-making in the strategic -and especially entrepreneurial- context is characterized by a high degree of uncertainty regarding future developments of predominantly complex systems. To understand how individuals make decisions under uncertainty is a key question (Hammond 1996).

There are different research approaches to better understand decision-making under uncertainty and to develop models that better explain real-world decision-making processes and lead to improved theories and recommendations. For instance, intuition, sometimes defined as "choices made without obvious formal analysis" (Behling & Eckel, 1991: 47) has lost its flaw as being always inferior. Yet, there is neither a clear definition of intuition especially a clear delineation between gut feeling (without experience) and expert's intuition (based on past experiences) nor a systematization of related concepts and terminologies such as positive, rational heuristics (Bingham & Eisenhardt, 2011), negative heuristics or decision-making biases (e.g., Kahneman 2011, Tversky & Kahneman 1974, Thaler, 1994), affective rationality and affective heuristics as well as the differentiation of experiential and analytic system as the two generic ways of human perception, judgment and decision-making (Slovic, et al., 2004) or the different forms and visions of rationality that include fast and frugal heuristics as a sub-category of bounded rationality (Gigerenzer & Todd, 1999).

While cognitive biases point towards the negative side of non-analytical decision making, positive heuristics express the view that simply rules can be more effective or the only feasible option in given situations for making appropriate decisions, considering their effectiveness beyond ideological prejudices. (Gigerenzer & Marewski, 2015).

Methods that are effective for analysing data insights are not the same for analyzing data foresight, because of the task environment. The research has to consider the conditions under which entrepreneurs and managers are more effective when they rely on intuition (see Bird 1988, or before Gragg 1940) and the conditions under which they are more effective when they rely on analysis (see Segars and Grover 1998, or before Knight 1921), or how other factors such as experience are related to intuitive decision making (Dane 2011). The research examining the decision-making processes adopted by the managerial experts confirms the diffusion and perception of effectiveness of decision-making methods based on heuristic rules (Maidique 2011, Guercini et al. 2015).

One could argue that technology increasingly makes available a great deal of information for economic actors, as well as a great ability to compute and to synthesize data in analytics (big data mangement). This makes it possible to tackle many problems, but it makes clear the need to adapt large data availability to people's capabilities given their cognitive limits.

Given the role of increasing data availability, the question arises what role heuristics still play in managerial decision making (Artinger et al. 2015).

In this special issue, we propose to bring together experts in theories of individual judgment who also have experience and interest in entrepreneurship and management, with experts on entrepreneurship and management who also have experience and interest in individual judgment.

Topics for this special issue may include (but are not limited to):

1. Examples of heuristics, simple rules and adaptive toolboxes used in specific business cases and contexts (industries, local systems etc.)
2. Simple rules uses in specific decision making processes (entry in international markets; innovation processes etc.)
3. Theory about rule based decision making in relation to wisdom in management; cognitive dimensions of framing; individual and collective cognition
4. Scope of adoption and effectiveness of heuristics adopted by business actors in relation to context variables and action.
5. Delineating heuristics from other forms of bounded rational decision making and its impact on organizations.

This special issue aims to provide high-quality, cutting edge research regarding heuristics in business actors' decision making. This special call for papers for Management Decision (http://www.emeraldinsight.com/page/samples/md) seeks theoretical and practical research avenues, frameworks, drivers, barriers, and best practices on the topic.

Submissions

- **Manuscript submission deadline: September 30, 2019**

3.4 Special Issue Call for Papers from Qualitative Research in Financial Markets (2018)

Guest Editors:

Dr Satish Kumar, National Institute of Industrial Engineering, Vihar Lake, Mumbai, India
Dr Gabriela Chmelíková, Mendel University, Czech Republic

Despite extensive high-quality research in financial market activity, global problems in the sector, the drastic devaluation of asset values, plus substantial growth in the volatility of stock/commodity prices markets all give rise to questions that remain unanswered.

Interest in the predictions and explanations offered by behavioural finance has increased exponentially over the last few decades against this backdrop of empirical puzzles. Many articles in, and special issues of, leading journals have focussed on the pricing of financial assets, portfolio choices and the trading decisions made by individual investors, firms' managers and institutional investors (see, for example, Shefrin & Statman, 2000; Shapira & Venezia, 2001; Lin, 2005). Much of this research has addressed cognitive and emotional biases such as overconfidence, reference points, loss aversion, mental accounting, representativeness, status-quo bias, self-attribution, gambler's fallacy, framing effect, familiarity bias and over-optimism etc. (Kahneman & Lovallo, 1993; Barber & Odean, 2000; Dhar & Zhu, 2002; Shefran et al.

2009).

In this context of a renewed quest for meaningful understanding of observed behaviour that does not fit with the classical paradigm of human rationality, Qualitative Research in Financial Markets requests submissions for a special issue devoted to Behavioural Finance and Investor Psychology. This special issue invites theoretical, empirical, case study, interview based and experimental works that involve the application of psychology, as well as neuroscience, to all areas of financial decision-making. The list of topics covered (non-exhaustive) in this special issue are:-

*** Judgement and Decision Making;**
*** Investors' Behavior and Sentiments;;**
*** Anomalies in Financial Market;**

Articles of 5,000-9,000 words for consideration for publication should be submitted via the journal's online system at: https://mc.manuscriptcentral.com/qrfm by **31st of March 2018**. Before submitting please follow the author guidelines described here. All articles will go through the double blind peer review process.

3.5 Special Issue Call for Papers: The Heuristic Revolution in Finance 2020

Guest Editors:
Professor William Forbes, Queen Mary, University of London, UK
Dr Aloysius Igboekwu, University of Aberstwyth, UK

A divergence in the path followed by the behavioural project has recently emerged. Early work, especially in finance, was influenced by the "heuristics and biases" program of Kahneman and Tversky, a contribution recognised by the Nobel Prize Committee. However, an inherent weakness in this approach is that it assumes heuristics are a concession to human frailty, using System 1 (autopilot) thinking when System 2 (analytical/calculative) thinking is needed. Gerd Gigerenzer, within his Adaptive Behaviour and Cognition (ABC) group based in the Max Planck Institute in Berlin have dared to challenge this view, arguing that heuristics may simply be a better way to make decisions in a world characterised by uncertainty (as opposed to risk) and frequent changes in underlying financial market conditions. In such markets "classical rationality's" suggestion that there is a "best" way to do things may be an unhelpful way of thinking. The ABC have developed a "heuristic toolbox" in which the process of cognition is linked to the context in which it occurs. In this regard, heuristics deploy sparse information to resolve decisions via simple decision-making cues, often of a yes/no nature. In developing such heuristics for use, "less is more" and models representable as simple decision-making trees can be shown to out-perform more common regression models in prediction as well as explanation.

A new "fast and frugal" model of reasoning in finance is emerging in this context and this Special Issue welcomes papers addressing these issues as they relate to any of the following themes:

- Corporate governance
- Asset pricing
- Financial regulation

Appendix 4: Choice of Digital Resources and Literature Search Strings

4.1 Digital Resources (Databases/Libraries)

To proceed with the study, the author has to decide which databases should be considered for obtaining relevant literature – a challenging task. Where to look for and how to find relevant information for research objectives is very important at the start of the study. Mahmood, Khan, and Khan (2019) assert that obtaining relevant information from different resources increased the quality of their literature review and the authors can anticipate different perspectives on similar issues. Thus the author used the nine databases listed below for the literature search. Six of them, namely Emerald, Science Direct, Springer Link, ProQuest, JSTOR, and Institute of Electrical and Electronics Engineers (IEEE) were available in a digital library subscribed to by the "International Islamic University Islamabad Pakistan"; Z library is one of the best websites to download free articles and eBooks and Google Scholar is an academic search engine.

- Emerald.
- Science Direct.
- Springer Link.
- ProQuest (For Dissertations).
- JSTOR.
- Institute of Electrical and Electronics Engineers (IEEE).
- Z library.
- Google Scholar.
- Social Science Research Network (SSRN).

4.2 Literature Search Strings

To conduct a rigorous review of the literature, the selection of search traces or keywords play a significant role in the research activity. According to Collis and Hussey (2009), a literature search is a systematic process through which researchers identify the existing knowledge concerning a specific topic. Bryman and Bell (2007) assert that literature plays a significant role in providing the conceptual and theoretical content of the research from which researchers or authors can justify their research questions. Cooper et al. (2009) documented that, to achieve the required objectives, you should search the literature until you reach the required goal. The guidelines provided by prior research studies (for example Levy & Ellis, 2006; Kitchenham, 2007; Collis & Hussey, 2009; and Kitchenham, et al., 2010) were followed for searching and writing an effective literature review. According to Collis and Hussey (2009), one should start by eliciting the list of sources and then define the scope of the research. Initially, the researcher wanted to explore the mechanism by which behavioural

biases influence perceived market efficiency and investment management activities of individuals and institutions actively trading on the PSX. However, it is such a wide area that the aim was narrowed to focus only on exploring and clarifying the mechanisms by which heuristic-driven biases influence investment management activities and perceived market efficiency, with the mediating role of fundamental and technical anomalies and moderating role of financial literacy.

4.3 Keyword Searching

For this present study relevant literature was searched by using all possible keywords. Both single keywords and combined keywords were used to obtain the desired literature. Some of the important keywords used for searching relevant literature cited in this current study are described here. For example: "heuristic-driven biases", "cognitive heuristics", "recognition based heuristics", "historical background of behavioural finance", "definitions of behavioural finance", "types of behavioural finance", "conventional finance versus behavioural finance", "significance of behavioural finance", "behavioural finance in Asia", "market efficiency", "overconfidence bias", "representativeness bias", "availability bias", "anchoring and adjustment bias", "herding behaviour", "disposition effect", "name memorability", "alphabetical ordering", "name fluency", "fundamental anomalies", "technical anomalies" "financial literacy" "cognitive heuristic-driven biases", "recognition based heuristic-driven biases", "name based behavioural biases", "heuristic-driven biases and investment decision-making", "heuristic-driven biases and investment performance", "heuristic-driven biases and market efficiency", "recognition based heuristic-driven biases and investment decision-making", "recognition based heuristic-driven biases and investment performance", "recognition based heuristic-driven biases and market efficiency", "behavioural biases and investment decision-making", "behavioural biases and investment performance", "behavioural biases and market efficiency", "institutional investors behavioural biases and investment decision making", "institutional investors' behavioural biases and investment performance", "mediating effect of anomalies", "mediating role of fundamental anomalies", "mediating role of technical anomalies", and "moderating effect of financial literacy" etc. Furthermore, the forward and backward search approach recommended by Levy and Ellis, (2006) was also utilized to make the search process more rigorous.

4.4 Forward Searching

According to Webster and Watson (2002), forward-searching is a process of identifying and reviewing relevant articles that cite an original article. Levy and Ellis (2006) assert that this type of search pays attention to the relevant literature created after an article was published. The forward-searching technique was used to find out more articles related to the topic.

4.5 Backward Searching

Backward-searching is also known as chain searching. According to Levy and Ellis (2006), chain searching or backward-searching means identification of the relevant articles or

literature by looking at the references or works cited in an article. Backward-searching was also used to identify further research articles related to the topic.