



**DOCTOR OF BUSINESS ADMINISTRATION**

**Nottingham Business School**

**Decision Making Under Uncertainty: The Case of Middle  
East Gulf Dry Bulk Shipping Companies**

**Document Five**

A Thesis

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August, 2017

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## Abstract

This research focuses on middle management tactical decision-making under uncertainty in a highly volatile business/market environment. In particular, this research focuses on chartering managers in the dry bulk ship-owning and ship-operating companies in the Middle East Gulf region, while making their daily chartering decisions under uncertainty.

Under the umbrella of bounded rationality, the approach of this research goes through the managerial psychology of the chartering managers in Middle East Gulf (MEG) shipping companies, and the effect of the heuristics and biases on their decision-making.

Descriptive and normative approaches to decision making, heuristics, biases, dual process decision-making model, control over heuristics, analytical intervention, and explicit reasoning are the key concepts constructing this research's framework.

The aim of this research is to design a ship-chartering decision-making model that can streamline chartering managers' decision-making process, assist MEG ship owners and operators in improving the value proposition for their ships while underway, and contributes to the enhancement of their efficiency.

This research employs a mixed-methods approach, where both qualitative and quantitative techniques have been used to collect the required data. After applying suitable analyses' techniques, this document synthesizes the qualitative and quantitative findings to develop the components of the looked-for decision-making model.

The findings of this research reveal the chartering managers' predominant decisions, the heuristics frequently used by chartering managers in MEG, the emanating biases in ship chartering decisions, and the task-related factors affecting the initial intuitive stage. The findings of this research also identify the factors affecting the top-down control over heuristics in ship chartering decisions in MEG dry bulk shipping companies, and the sources of the bottom-up control.

Building on the work done by Jonathan Evans on dual process modeling, and the recent work done by Gordon Pennycook, Jonathan Fugelsang, and Derek J. Koehler on the three-stage dual process modeling, this research introduces a revised three-stage dual-process decision-making model that is specifically designed for ship chartering decision-making in Middle East Gulf shipping companies.

## Acknowledgment

This thesis could not have been completed without the great support that I have received from so many people over the past four years. I wish to express my most heartfelt thanks, appreciation, and gratitude to the following people:

To my family members for their emotional support, encouragement, and belief.

To my supervisors, Dr. Michael Zhang and Dr. Paul Gardiner for their guidance, motivation, and support throughout the long journey.

To my DBA cohort colleague Maged Shoukry for the help and advice when it was most needed.

To Prof. Dalvir Samra-Fredericks, Prof. Helen Shipton, Prof. Carole Tansley, Prof. Alistair Mutch, Dr. Susan Kirk, Dr. Amanda Hay, Dr. Daniel King, Dr. John Buglear, Dr. Michael Hewitt for the inspiring, stimulating, and enlightening workshops and sessions.

To my colleagues at work, Ahmad Alkattan and Sayed Ahmad Rajab for backing me up when I was seriously in need for ‘the time’.

To the DBA administrative team for their prompt and outstanding support.

To my dear friends in the Middle East Gulf shipping companies for sharing their ship-chartering experiences.

To all the participants in the interviews and the focus groups for their time, great discussions, and valuable inputs.

To all respondents to the survey questionnaire for sparing the time and accepting to be part of this project.

To all my colleagues at the DBA cohort for their friendship, feedback, and cooperation.

## 1. Introduction

This chapter presents an overview of the research study. It summarizes the nature and the context of the topic under consideration, the problem under investigation, and the overall approach of the research. This chapter also recaps on the research plan for Document 5.

### 1.1 Research Context

This research is addressing a managerial problem that is facing chartering managers in the dry bulk ship-owning and ship-operating companies in the Middle East Gulf region (MEG) while making their daily chartering decisions under uncertainty. Gigerenzer (2016) argues that the term ‘uncertainty’ can be used for circumstances when not all alternatives, outcomes and probabilities are known or can be predicted.

In document 1, maritime transportation and the dry bulk shipping industry were discussed in an adequate detailing. Nonetheless, when talking about the shipping industry, the reader may appreciate the fact that ships are carrying over 90% of the global trade in terms of volume, which makes sea transportation the worldwide leading mode of transportation (Tsouknidis, 2016). This industry consists of ship-owning, ship-operating, ship-brokerage, ship-management, and maritime consultancy companies. The ship-owning and ship-operating companies are the significant parts of the industry, as they physically contribute to the international trade and to the global industrial growth (Panayides et al., 2011). Ship-brokerage, ship-management and maritime consultancy companies also play important roles in facilitating, serving and organizing the shipping trade.

In this industry, dry bulk shipping represents more than one-third of all international seaborne trade, with about 4 billion tons of dry bulk cargo being transported by sea on a yearly basis. Dai et al. (2015) affirm that “global dry bulk shipping market is an important element of global economy and trade” (p.353).

As explained and justified in document 1, this research covers the ‘tactical shipping decisions’ only (strategic and operational decisions are not covered). Thus, middle management and mainly ‘chartering managers’ are the target of this research, as they are the responsible persons for making these daily decisions. According to Magirou et al. (1992), “tactical decisions involve the allocation/utilization of ships owned by the operator, including the issue of which charter should be fixed, whether to offer the ship in the spot market or in the term market, whether the ship should be laid up, how the ship should be ‘positioned’ to be best used in future charters, and so on. Tactical decisions have a shorter planning horizon, on the order of a few months to 2 years” (p.6). Shipping tactical decisions are more dynamic than the strategic decisions and more crucial than the daily operational decisions.

Stopford (2009) explains that in each ship-owning and ship-operating company the chartering manager is the person responsible for negotiating and finalizing all chartering contracts related to the company's ships employments. Ship chartering decision-making under uncertainty has psychological and task related characteristics, hence, it is important to consider the differences between chartering managers working in different geographical zones around the world and in different types of sea transportation sectors.

The choice of studying chartering managers in the Middle East Gulf (MEG) region, and in dry bulk shipping companies was explained and justified in document 1. Also, the bonds connecting the researcher to this industry were highlighted.

At the heart of this research is the question: How can the ship-owning and ship-operating companies in the Middle East Gulf region achieve the best possible chartering decisions on their ships in the dry bulk shipping market, under uncertainty?

To investigate this subject, the approach of this research goes through the managerial psychology of the chartering managers in MEG shipping companies, and the effect of the heuristics and biases on their decision-making.

It is important at this stage to differentiate between the 'risk' and the 'uncertainty' surrounding and threatening the rationality of the chartering managers' decisions. In Neth and Gigerenzer's (2015, p.1) words, "We distinguish between situations of 'risk,' where all options, consequences, and probabilities are known, and situations of 'uncertainty,' where they are not. Probability theory and statistics are the best tools for deciding under risk but not under uncertainty, which characterizes most relevant problems that humans have to solve. Uncertainty requires simple heuristics that are robust rather than optimal".

Bounded rationality is the umbrella of this research. Chartering managers in MEG shipping companies were studied within their boundaries' limits, and all types of heuristics and biases affecting their decision-making processes were investigated.

Descriptive and normative approaches to decision making, heuristics, biases, dual process decision-making model, control over heuristics, analytical intervention, and explicit reasoning will be the key concepts constructing this research's framework.

## 1.2 The Significance of the Research

The contribution to knowledge is a continuous process, and good researchers always build their work on knowledge gaps.

At the preparation stage for this research, the researcher has conducted an intensive search on the published work related to ‘shipping’. It can be said that, until the time of writing this document, there is no single shipping academic research has been done on Middle East Gulf region that addresses a managerial problem. Also, it was noticed that all of the work done on shipping decision-making was focused on ‘top managements’ and at ‘strategic level’, such as mergers and acquisitions, sale and purchase of ships, ship investments and new building projects.

This research should be unique by covering ‘MEG ship-owning and ship-operating companies’. Also, it is unique by studying ‘the tactical decision-making’ processes and by targeting ‘chartering managers’ as middle managements.

This research covers chartering decision-making in the dry bulk shipping as the most volatile and risky shipping market, with an attempt to assist the chartering managers in achieving unbiased/balanced decisions.

Shipping is a highly volatile and cyclical industry that imposes a burden on decision makers (Drobetz et al., 2016). As affirmed by Adland et al. (2016), ship-owners and ship operators are striving for survival in current markets. Arslan and Papageorgiou (2017) further elucidate that the major challenge facing ship-owners and ship-operators is the deployments of their ships at best possible return under market uncertainty. The freight –or the daily hire- as return on the ship from chartering contracts is the only source of income for ship owners and operators. Thus, enhancing the efficiency of the chartering decision-making will directly increase the return on shipping investments.

Axarloglou et al. (2013) believe that, “in the capital intensive, highly cyclical and volatile shipping industry, chartering managers are asked to make decisions such as how long to commit their ships by choosing the time duration of the charter contracts, considering the current level of demand for transportation services, along with the growth prospects of the market” (p.37). This is only a sample of many difficult decisions -under uncertainty- that chartering managers are frequently facing.

As explained in document 1, most of the ships around the globe have been built or bought against finance scheme or loan arrangements; hence, stable income is vital for company’s continued existence. Wrong or bad chartering decisions can threaten the company’s continuity and its financial survival.

From the researcher’s personal experience, chartering decisions can make or break the shipping firm. A lot of opportunities were lost because of wrong decisions and biased judgments. Also, a lot of sad stories could have been avoided if right calls have been made on time.

### 1.3 Research Aim and Objectives

In his recent work, Gigerenzer (2016) encourages researchers to call for a shift toward 1) Uncertainty, by analyzing the decision makers under uncertainty, where optimal choice cannot be attained. 2) Process, by designing formal theories/models that explain the decision-making process, rather than as-if theories.

The aim of this research is to design a ship-chartering decision-making model that can streamline chartering managers' decision-making process, assist MEG ship owners and operators in improving the value proposition for their ships while underway, and contribute to the enhancement of their efficiency.

Decision makers -under uncertainty- of a certain business/industry and a specific geographical location need first to discover the heuristics that might affect their decisions subconsciously. Then, they need to follow a model of decision making that is specially and prudently designed for their nature and their type of business. In other words, "because people must cope with their bounded rationality, and will do so in different ways in different contexts, we cannot expect one parsimonious model of decision-making to explain human behavior" (Pingle 2016, p.96). Hence, the decision-making model in this research will be designed to suit chartering managers in MEG ship-owning and ship-operating companies in the dry bulk market. Evans (2006) analytic-heuristic dual process model will be a starting point.

To attain this research aim, the researcher was required to achieve the following objectives:

- Identify/investigate the main 'heuristics' subconsciously and frequently used by chartering managers in Middle East Gulf companies while making their judgments/decisions in the dry bulk ship chartering.
- Examine the impact of 'heuristics' on the decisions of chartering managers in MEG shipping companies in the dry bulk shipping market.
- Highlight the biases related to chartering managers' decision-making in MEG dry bulk shipping companies. Also, any missing bias from the literature will be described and added.
- Identify/investigate the 'task-related factors' affecting the chartering managers' decisions in MEG shipping companies in the dry bulk shipping market.
- Examine the effect of the 'task-related factors' on the heuristic process and specifically the step of constructing the most relevant model.

- Identify/investigate and possibly adjust the factors known to influence the likelihood of the ‘analytic intervention process’ in the designed decision-making model.
- Examine the possibility of adopting new ideas for better control over heuristics, which demonstrate and characterize the ‘explicit reasoning and evaluation process’.
- Investigate the ‘sources of control’ that can enhance the explicit reasoning and evaluation process among chartering managers in the MEG dry bulk shipping companies while making their ship chartering judgments/decisions.
- Fill the gaps and apply enhancements to Evans’s model to ensure its efficiency and workability for chartering managers in Middle East Gulf shipping companies and their judgments and decision-making.

#### 1.4 Research Questions

This research’s questions are structured to be tightly related to the above discussed objectives. The questions listed below are the main questions under investigations:

- 1) What are the main ‘heuristics’ subconsciously and frequently used by chartering managers in MEG companies while making their judgments/decisions in the dry bulk ship chartering?
- 2) To what extent and in what way are ‘heuristics’ impacting the decisions of chartering managers in MEG shipping companies in the dry bulk shipping market?
- 3) What are the emanating ‘biases’ in chartering decision-making from the perceived ‘heuristics’?
- 4) What are the ‘task-related factors’ affecting the chartering managers’ decisions in MEG shipping companies in the dry bulk shipping market?
- 5) To what extent and in what way are the ‘task-related factors’ affecting the heuristic process and specifically the step of constructing the most relevant model?
- 6) What are the main factors affecting the top-down control and are able to enhance the analytic intervention in the proposed decision-making model?
- 7) What are the sources of the bottom-up control that can enhance the explicit reasoning and evaluation process among chartering managers in the Middle East Gulf dry bulk shipping companies while making their ship chartering judgments/decisions?

## **1.5 The Previous Documents**

In document 1, the aim to design a chartering decision-making model that can streamline decision-making process for MEG ship owners and operators was established. Apart from the preliminary literature review and the preliminary conceptual framework, document 1 offered an overview of the shipping industry and the dry bulk shipping market. Also, document 1 shed some light on the shipping dilemma and the uncertainty surrounding this industry.

Document 2 critically reviewed the literature on the key concepts of the research and the preliminary conceptual framework. Consequently, the preliminary conceptual framework was revised, research questions were formed, and a preliminary dual process decision-making model was drawn.

Document 3 utilized the preliminary work established in the previous document as a guide frame for the qualitative work conducted throughout several focus groups and interviews. The analysis and findings of the interviews and the focus groups enabled the researcher to adjust the preliminary ‘decision-making model’ established in document 2.

Document 4 was a quantitative piece of work based on a survey questionnaire. The analysis and findings of the survey questionnaire allowed further scrutinizing to be adopted to refine, legitimize, and generalize some of the qualitative findings. The aim was to ensure these findings’ applicability and validity for chartering managers in Middle East Gulf dry bulk shipping companies.

## **1.6 The Purpose of This Document**

This document -the thesis- presents the fifth stage of the investigation into the decision making of chartering managers -under uncertainty- in Middle East Gulf dry bulk shipping companies.

This document will be synthesizing the qualitative and quantitative findings from the previously conducted interviews, focus groups and the survey questionnaire to develop this research’s decision-making model.

Also, in this document, further refinements and enhancements will be applied to this developed decision-making model. One of the main notions, which will be implemented in this document, is to divide the dual process model into three stages, allowing a better understanding of the model and its ability for practical/efficient applications.

The ‘control’ (or the analytic process) will be the leading characteristic of these enhancements. In the previous documents, the ‘control’ was expressed by the ‘analytical intervention’ and the ‘explicit reasoning and evaluation’ processes. Both processes will be at the heart of this document’s investigations with an attempt to achieve better control over heuristics by decision makers in Middle East Gulf dry bulk shipping companies, and consequently, reduce biases. The idea is to improve the ‘explicit reasoning and evaluation process’, by introducing the ‘sources’ of the bottom-up control.

This research does not discourage decision-makers from relying on heuristics, but encourages them to place those heuristics under ‘control’ to avoid decisions’ biases.

The researcher adheres and acknowledges Neth and Gigerenzer’s (2015) statement that, under uncertainty, heuristics can lead to more accurate inferences than approaches that use more information and computation. However, it is appropriate to recall Bazerman and Moore’s (2009) words that “when managers become aware of the potential adverse impact of using heuristics, they become capable of deciding when and where to use them and, if it is to their advantage, eliminating certain heuristics from their decision-making repertoire” (p.7). The revised ‘control stages’ in this document’s enhanced decision-making model should make Bazerman and Moore’s words possible to be implemented by chartering managers in MEG ship-owning and ship-operating companies.

This document will also offer a better understanding of the ‘bias threat’ throughout the decision-making processes. The bias threats arising from the three possible failures at the ‘analytic engagement’, the ‘response inhibition’, and the ‘decoupling’ stages will be incorporated in this document’s discussions section. Moreover, conflict monitoring, rationalization, and the decoupling processes will be discussed and explained in this document before being harmonized with the enhanced model’s components, as it is believed that they can offer better explanations for the decision maker on the model’s workability.

Furthermore, positioning the ‘analytic system intervention stage’ under the heuristic processes by Evans (2006) in his revised model, and subsequently, in the previous documents, will be challenged and confronted in this document.

This research does not aim for a theoretical model only, but to a technically practical business model that has a solid theoretical stand.

Document 5 presents the last stage of the research into developing the looked-for decision-making model. Hence, the outcome will be ready to be placed into a real-life testing.

When talking about uncertainty and the development of a decision-making model for chartering managers in MEG shipping companies, we recall Pingle (2016, p.106) words in his recent work, “there is still room for improvement, particularly with regards to understanding how boundedly rational decision-makers cope with uncertainty”.

## **1.7 Outline of This Document**

This document, the thesis, consists of seven chapters. After this introductory chapter, discussions and updates will take place in chapter 2 for the main elements which are constructing this research’s conceptual framework and the developed decision-making model. Chapter 3 will address discussions on the most appropriate methodological stands for this research. In that chapter, the research’s philosophical position will be discussed and the research’s design will be shaped. Chapter 4 will describe the processes that were involved in the making of this research. The analysis and synthesis will be covered in chapter 5. Chapter 6 will be discussing this research’s findings, and at the end, the conclusion will be drawn in chapter 7.

## 2. Review of the Main Concepts

A detailed literature review has been conducted throughout documents 2, 3 and 4. In this chapter, the main elements which are constructing this research's conceptual framework and the designed decision-making model will be discussed, updated and further investigated. Except for the new concepts, this review offers only brief discussions on the selected concepts. The reader may refer to document 2 for more detailed review which includes history, explanations, debates, and criticism of each concept and its related area of research.

### 2.1 Rational Decisions, and the Normative/Descriptive Distinction

Decision-making has been the center of attention for several areas of human knowledge in recent years. Having said that, Hoch et al. (2001) argue that despite the achievements over the past three decades of systematic research on decision science, various areas of the decision-making field still need to be uncovered. The same has been reconfirmed by Celona (2017), by stating that although the decision analysis research drew over the past 50 years from statistical decision theory, economics, cognitive psychology, and system engineering to develop a philosophy, theory, and methodology for making better decisions in complex and uncertain situations is still seems to be viewed as an 'uncompleted job'.

On the importance of the decision-making field, Doyle & Thomason (1999) and Seethaler (2016) elucidate that decision theories have exerted significant influence over almost all the social, biological, and cognitive sciences by embodying several prevalent concepts and models. For that reason, many scholars have studied the characteristics of the decision-making science. Oliveira (2007) suggests that 'decision' and 'behavior' are the main physiognomies of decision-making phenomena. They include the process of the individuals' thoughts and their reactions to the surrounding world, being the past or the future incidents, and the psychological consequences of those incidents to the decision maker.

In the recent years, most of the models and theories pertaining judgment and decision making established strong emphasis on psychological theories and concepts. Tetlock (2002, p. 451) points out that "research on judgment and choice has become psychology's leading intellectual export to the social sciences as to a host of applied fields".

Simon (1993) asserts that psychologists have a significant interest in decision making as a process, as they always search for actual/real situations for the source of their research problems. Simon further argues that while attempting to comprehend decision making, a core question arises immediately: Where rationality comes into the picture?

According to Simon, "rationality is the set of skills or aptitudes we use to see if we can get from here to there to find courses of action that will lead to the accomplishment of

our goals. Action is rational to the degree that it is well adapted to those goals. Decisions are rational to the extent that they lead to such action” (Simon 1993, p.393).

Compatibility between the value and choice, this is how Oliveira (2007) defines rationality. He argues that behavior is rational when it attempts to improve the value of the results, concentrating on the process of choosing instead of stressing on the selected alternative.

In another research in the early seventy’s, Simon (1972) explained that “rationality denotes a style of behavior that is appropriate to the achievement of given goals, within the limits imposed by given conditions and constraints” (Simon 1972, p.161). Simon further argued that theories of rational behavior maybe ‘normative’ or ‘descriptive’. They may recommend how managers should behave in order to attain their goals under certain circumstances, or they may purport to describe how managers actually behave.

Over (2004) argues that the ‘normative approach’ states for the decision maker the ideal way that must be taken while making a judgment or taking a decision. Conversely, the ‘descriptive approach’ try to describe how the decision maker actually thinks.

According to Oliveira (2007), the ‘normative’ and the ‘descriptive’ decision-making approaches hold distinct characteristics and have different methodologies for selecting the desired action. Normative approaches to decision making are based on fundamental axioms. On the other hand, descriptive paradigms believe in the psychological elements influencing the decision maker.

When making a choice among alternatives from different scenarios using rational decision-making models, the decision maker will start analyzing the alternatives which will be weighted by probabilities, and the choice will be for the alternative with the highest probability of an outcome. Normative processes of decision-making clarify how decision makers engage a specific set of alternatives to reach his choice (Goodwin & Wright, 1998; Hoch et al., 2001).

Having said that, Hoch et al. (2001) refute the applicability of the logical processes while making a decision in real life situations. They argued that variations in human behavior might not find any notional basis in the normative processes. Hoch et al. (2001) believe that these fluctuations in behavior patterns are more recognizable when uncertain and unexpected scenarios influence decision makers to neglect probabilities and, consequently, the normative process.

The logic of choice does not offer an acceptable foundation for a descriptive approach to decision making. Tversky and Kahneman (1986) argue that “the deviations of actual behavior from the normative model are too widespread to be ignored, too systematic to be dismissed as random error, and too fundamental to be accommodated by relaxing the normative system” (p.252).

Stanovich (1999b) believes that there is a significant response variability exhibited on most tasks. Hence, the explanation of the gap between normative and descriptive processes can be achieved by studying the gap between mean or modal performance and the normative response. “Even on tasks where the modal response is non-normative, some subjects do give the normative response. It is argued here that the nature of these individual differences has implications for explanations of the gap between normative and descriptive models” (Stanovich 1999b, p.350).

It can be said that the gap between normative and descriptive approaches to decision making is extensive, and has been broadening. The question will be: How to deal with this gap?

The work done by Payne et al. (1993) suggests that there are two possible ways by which the gap between normative and descriptive approaches can be narrowed. The first way is by convincing the decision maker to adopt more normative techniques. The second is by integrating characteristics of human limitations and behavior into the normative approaches.

In their review of the approaches that attempt to bridge the gap between normative and descriptive decision making, Elqayam & Evans (2011) suggest that the best way to produce something useful is by developing normative theories for the desired cases via descriptive study of the decision makers involved.

This research attempts to achieve a contribution with a similar objective in bridging the gap between normative and descriptive approaches. The aim is to achieve a ‘rational decision’ as an end-product of a modified ‘descriptive decision-making process’.

## **2.2 The Bounded Rationality**

Bounded rationality is not about human failure, it is an explanation as to how and when individuals can make good decisions by using less information (Gigerenzer, 2016). Furthermore, Gigerenzer (2016) explains that bounded rationality does not only highlight the descriptive inquiry of how do individuals make decisions, but also a normative one of how should individuals make decisions under uncertainty.

In his Nobel Prize-winning work, Herbert Simon (March & Simon, 1958; Simon, 1957) elucidated that by describing and explaining actual decisions instead of concentrating solely on normative decision analysis, the decision maker will reach to a better understanding of the decision-making process. According to Simon, individuals need to realize that their judgments are bounded in its rationality.

Many definitions and interpretations can be found in the published literature for the term ‘rationality’. For the researcher, ‘rationality’ denotes the decision-making process that is logically anticipated to lead to the best result.

As per the rational models, the decision maker needs to be equipped with a full understanding of the problem, the alternatives, possible actions, the consequence of each action with the associated probability, and the preferences related to the consequences. It is obvious to state that it is not possible to have a complete understanding of those things, let alone all of them at the same time. (Simon, 1983).

The rational models assume that an optimal decision is always attainable, and must be taken. This is not the only problem with the rational models, as there are limitations on the available information together with the fact that people have limited cognitive abilities to integrate and assimilate all the information in such manner as to provide them with the anticipated utility function (Conlisk, 1996; Etzioni, 1988, 1993; Evans et al, 1993; Simon, 1983). Decision makers are human; they don't have a perfect intelligence nor the unfaultable memories. They have limited capacity to think about probabilities in terms of Bayesian's theorem (Conlisk, 1996).

It can be said that people perform rationally within the bounds placed upon them by their limited cognitive capacities and the surrounding environment, i.e., bounded rationality. Therefore, the boundedly rational decision makers satisfy something of an incongruous term rather than optimum (Etzioni, 1988; Simon, 1983). Simon's bounded rationality, thus, gives up some of the characteristics of the rational models of choice, to produce a far more descriptively accurate theory of decision making (Conlisk, 1996).

Gigerenzer (2004) agrees that models of bounded rationality put us back into our human skin, and give an explanation as to how humans with limited time and knowledge actually behave. Using simple words, Basel and Bruhl (2013, p.747) clarify that "a perfect and ideal solution might exist for our problems, but because of our bounded mind, we are not able to conduct the necessary cognitive steps to reach this goal. Paying respect to this fact, we use satisficing decisions and systematically deviate from ideals of unbounded rationality. With this strategy, we can reach satisfactory but not perfect outcomes."

In line with that, but with a highlight on the environment effect, Fiori (2016) believes that Simon's work has explained how rationally bounded decision maker interact with, and learn from, an environment by making a choice among alternatives that are not optimal, but satisficing.

Gigerenzer (2016) affirms that bounded rationality was linked only to cognitive limitations in early writings. However, the later studies added the environment as a key influencer.

This research will benefit from the fact that bounded rationality requires decision makers, according to Whalley (2005, p.9), to "construct simplified models of real world situations and while they may behave rationally relative to their constructed models, their real world behaviour may not be well approximated by utility and profit maximization models since in practice various rules of thumb typically guide behaviour."

The concept ‘satisficing’, as initiated by Simon, was the start of a large body of pragmatic evidence for other classes of heuristics and their formal models (Gigerenzer & Gaissmaier, 2011). “Satisficing can deal with uncertainty, that is, with situations where not all alternatives and consequences can be foreseen” (Gigerenzer 2016, p.34).

Bounded rationality will be the umbrella of this research. The decision makers will be studied within their boundaries’ limits, and all types of heuristics and biases will be investigated.

### **2.3 Heuristics and Biases**

The core notion of Simon’s bounded rationality is that the limited cognitive capacity of the decision maker and his surrounding environment entail the use of simple strategies that lead to selective and straightforward usage of the available information to take the necessary decisions, which generally produce ‘satisfactory’ results. What Simon meant by those ‘simple strategies’ is ‘heuristics’. According to Neth and Gigerenzer (2015) “optimization is not possible under uncertainty, but good decisions are. Heuristics are tools toward this end, which, as far as we know, humans have always relied on to solve adaptive problems” (p.14).

Neth and Gigerenzer (2015) define heuristics as adaptive tools which act as simple strategies that ignore part of the information to make fast, frugal, robust, and relatively accurate decisions under the situations of uncertainty. They further assert that decision makers regularly depend on heuristics, not because they are irrational, but because they must make choices under uncertainty, where risk is not calculable.

Payne and Bettman (2004) suggest that the use of heuristics by decision makers as simplification mechanisms may attribute to several constraints. They believe that the limited cognitive capacity, the time available, and the cost of information may act as restraints on reasonable processing under the surrounding environment, and consequently favoring an intuitive judgment. They also argue that the decision maker may use ‘shortcuts’ because they have produced reasonable outcomes in the past and are readily available in memory.

In Maitland and Sammartino’s (2015) words, “heuristics focus the decision maker’s attention on specific decision task elements or cues and exploit core cognitive capacities encoded in schemas to make sense of a complex, uncertain environment. From this perspective, heuristics underpin the strengths of human cognition to adapt to different contexts and make effective decisions, despite having incomplete representations in their mind of a problem environment.” (P.1556)

Daniel Kahneman and Amos Tversky (Kahneman & Tversky, 1972, 1973; Tversky & Kahneman, 1972, 1974) proposed that intuitive judgments under uncertainty are characteristically dominated by judgmental ‘heuristics’ instead of the proper laws of probability. “Kahneman and Tversky were not the first to suggest that classical ‘rational’ models of statistical reasoning fail to describe actual human reasoning in many settings, but their program of research has been both more radical and more influential than most others” (Griffin et al. 2001, p.208).

In their early researches, it was not clear if Kahneman and Tversky’s judgmental heuristics were deliberate and under the control of the decision maker or they take place at the unconscious level. Later interpretations (Kahneman & Frederick, 2002) appear to advocate that the mechanisms underlying heuristics are basically automatic, and evidently do not function under decision makers’ awareness (Keren and Teigen, 2004).

Heuristics offer time-pressured decision makers a simple -but often flawed- approach to deal with complex situations. According to Bazerman and Moore (2009), heuristics assist in simplifying the decision process, but the dependence on heuristics generates problems, mainly because decision makers are naturally unaware that they rely on them, and the misuse of heuristics, regrettably, leads people astray.

Deviations from the logical principles which is attributed to cognitive ‘heuristics’ are described as judgmental ‘biases’ (Gigerenzer and Gaissmaier, 2011). According to Keren and Teigen (2004), a bias is a systematic deviation from a norm or leaning towards one judgment rather than another. They believe that biases can result from perceptual organizing principles, specific motivations, cognitive styles, an egocentric perspective, cognitive limitations, affects, and processing strategies.

In the heuristics and biases tradition, ‘biases’ are regarded as a regular by-product of some more general principles of decision making, termed ‘heuristics’ (Tversky & Kahneman, 1974).

As Kahneman (2003) explained in his Nobel Memorial Lecture: “Our research attempted to obtain a map of bounded rationality, by exploring the systematic biases that separate the beliefs that people have and the choices they make from the optimal beliefs and choices assumed in rational-agent models” (p. 1449).

Heuristics and biases program was a subject of dispute and investigation by many researchers over the past 40 years, with aims to highlight the main heuristics affecting decision makers, the related biases, and the extent to which the heuristics and biases should be regarded as evidence for failures of rationality (e.g., Cohen, 1981, 1983; Evans & Over, 1996; Gigerenzer, 1996; Stanovich & West, 2002; Hutchinson & Gigerenzer, 2005; Kahneman & Frederick, 2005; Gigerenzer and Brighton 2009). The findings on biases and its related heuristics explained the conditions and circumstances under which specific biases would appear and sometimes disappear, owing to the impact of the related heuristic (Keren and Teigen, 2004).

Bazerman and Moore (2009) affirm that “When managers become aware of the potential adverse impact of using heuristics, they become capable of deciding when and where to use them and, if it is to their advantage, eliminating certain heuristics from their decision-making repertoire” (p.7).

The common, well-researched biases affecting judgment and decision making were highlighted, summarized and presented as a list in document 2. In this document, the research highlights the biases related to chartering managers’ decision making in MEG dry bulk shipping companies. Therefore, any missing bias from the literature will be highlighted and added.

Heuristics need to be defined in order to be tested and understood. According to Gigerenzer and Gaissmaier (2011) “To test how well heuristics perform... one needs formal models of heuristics. Such tests are not possible as long as heuristics are only vaguely characterized by general labels, because labels cannot make the precise predictions that statistical techniques can” (p.453).

Though the understanding of heuristics is imperative to all decision makers, this research focusses on the heuristics that affect chartering managers in Middle East Gulf shipping companies and their judgment and decision making. Moreover, this study intends to use ‘heuristics and biases’ as the main feed for the selected theoretical approach, and not as dominating model.

This research covers only the well-established, well researched and implemented ‘heuristics’ that are believed to be relevant to manager’s reasoning, judgments, and decision making. From the reviewed literature, the below stipulated seven heuristics found to be the most popular heuristics. To reconnect the terminologies, the table hereunder outlines a very brief description of each heuristic. The reader may refer to document 2 for more detailed definitions, discussions, and examples.

**Table 1: Brief descriptions for the most popular heuristics**

Heuristic	Brief Description
Representativeness	The basic idea of the representativeness heuristic is that decision makers judge probability by similarity (Baron, 2008). It is a decision making shortcut that employs the use of past experience to guide the decision-making process (Keren & Teigen, 2004).
Availability	Kahneman and Tversky (1973) distinguish availability from representativeness by stating that in the case of availability heuristic, events are not compared to a model in terms of similarity, they are instead assessed according to the simplicity in being imagined or retrieved from memory.
Anchoring and Adjustment	On the case of anchoring and adjustment the decision maker firstly makes a guess on the most likely estimation, and then performs inadequate upwards adjustments and downwards adjustments to include the uncertainty involved. Otherwise, the lower estimate may function as an anchor for the upper estimate, or vice versa (Alpert & Raiffa, 1982).
Affect	Most of managerial judgments are induced by an affective, or emotional, assessment that takes place even before the starting of any higher-level reasoning (Kahneman, 2003). While these affective assessments are usually not conscious, Slovic et al. (2002) offers evidence that people nevertheless use them as the basis of their decisions rather than conducting a more thorough examination and analytical process.
Recognition	The aim here is to depend on recognition retrieved from memory to make inferences about issues that is not directly available to the decision maker. According to Goldstein & Gigerenzer (2002), for two alternatives, the recognition heuristic is defined as: If one of two alternatives is recognized and the other is not, then infer that the recognized alternative has the greater value when it comes to the criterion.
Fluency	The fluency heuristic was formulated for situations “when both alternatives are recognized, that is, when the recognition heuristic cannot be applied. If both alternatives are recognized but one is recognized faster, then infer that this alternative has the higher value with respect to the criterion” ([Schooler & Hertwig, 2005] in [Gigerenzer & Gaissmaier 2011, p.462]).
Take-The-Best Heuristic	The take-the-best heuristic “is how people infer which of two alternatives has a higher value on a criterion, based on binary cue values retrieved from memory. For convenience, the cue value that signals a higher criterion value is 1, and the other cue value is 0” (Gigerenzer & Gaissmaier 2011, p.464). Gigerenzer & Gaissmaier (2011) further explain that take-the-best assist in making the decision making simple by stopping the process after the first cue and ordering cues unconditionally according to validity.

## 2.4 The Heuristic Analytic Theory

In document 2, the relevant single-process models have been investigated and the reasons for excluding such theories from the choices list were highlighted (See Document 2, p.38-39). After that, a review of dual-process models was presented, and the relevance of each model to this research’s objective was discussed in an adequate detailing (See Document 2, p.40-45). Jonathan Evans’s dual process decision-making model was found to be the most suitable frame for this research. Therefore, Evans’s ‘heuristic-analytic theory’ was chosen as the research’s theoretical lens. Having said that, adjustments will be applied to this model to ensure its ability in achieving this research’s desired results.

Jonathan Evans designed the heuristic-analytic theory, as first published (Evans, 1984, 1989), to clarify the confusing fact that logical competence established on one task frequently failed to be exhibited on another, due to the prevalence of the cognitive biases. Based on the heuristic-analytic theory, there are two types of cognitive process are involved: heuristic processes, which produce selective depictions of the problem, and analytic processes, which originate inferences from these depictions (Evans, 1989).

As explained by Evans (1989), “the sequential nature of this early version of the heuristic-analytic theory contrasts with parallel and interactive forms of dual-process theory, although many of the proposed features of the two processes correspond to those of the generic System 1 and 2: Heuristic processes are fast, automatic, and belief based, whereas analytic reasoning is slow, sequential, and can make an effort at deduction.” (p.14).

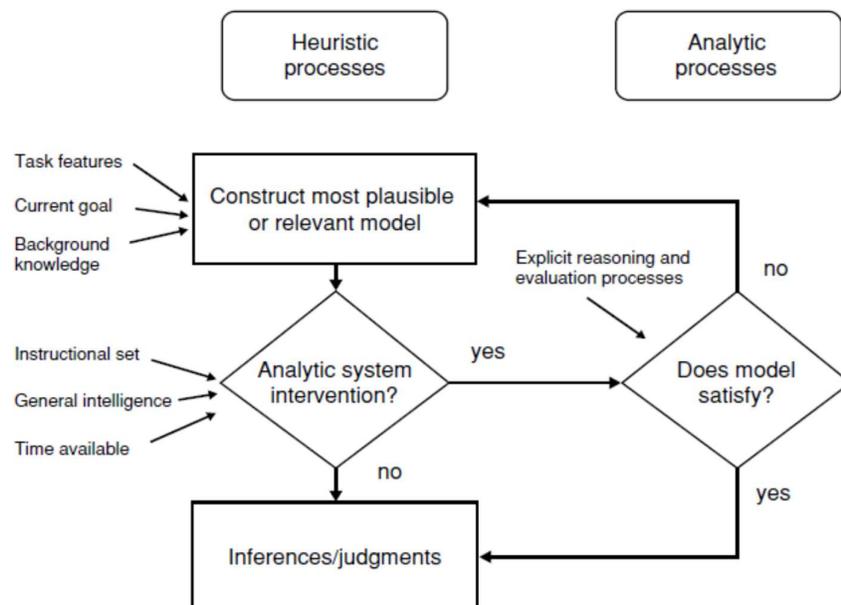


Figure 1: Evans’s revised and extended heuristic-analytic model (Source: Evans 2006, p.381).

Jonathan Evans made a major revision to the heuristic-analytic theory in 2006, he maintained the title, but applied extensive developments to the processes in an effort to describe precisely the nature of the interaction between the two processes and to allow the model to participate in the creation of experimental predictions about specific reasoning tasks (Evans, 2006). Evans's revised and extended decision-making model is shown in figure 1 above.

This model is the starting point of this research's investigations into the development of a chartering decision-making model that can streamline decision-making process for chartering managers in MEG dry bulk shipping companies. Hence, this model will be reviewed, analyzed, amended, and reasonably improved throughout this study.

Evans' model will be briefly discussed under the selected and characterized sub-titles below.

#### **2.4.1 The Control over Heuristics**

The design of the dual-process theories and whether systems are interactive, sequential, or parallel is a critical matter in such theories (Evans & Over, 1996). "Evans does not subscribe to the view that heuristic and analytic processes are parallel thinking styles that can be adopted at will, in the manner of the proposed distinctions between rational and experiential thinking" (Epstein & Pacini 1999, p.472) or "between holistic and analytic thinking styles that may be culturally determined" (Nisbett et al. 2001, p.291). Overall, "the two systems are interdependent, since preconscious heuristic (or pragmatic) processes supply content continuously to consciousness for analytic processing. However, the simple sequential structure of the original heuristic-analytic theory cannot be retained either. From a functional point of view, heuristic and analytic processes often seem to compete for control of behavior" (Evans 2006, p.381).

Evans (2006) acknowledges that "the revised heuristic-analytic theory can continue to account for some cognitive biases in a way similar to that of the original theory (Evans, 1989). That is, biases can arise because the heuristic system fails to represent logically relevant features of the problem or represents features that are logically irrelevant to the problem. The evidence suggests that such heuristically generated biases can be inhibited, at least to some extent, by analytic system intervention, which is now proposed to include the ability to reset default epistemic mental models. However, the analytic system is also prone to biases of its own, especially due to the operation of the satisficing principle" (p.392).

Evans (2006) further clarifies that "although heuristic processes may still bias and shape analytic thinking by the nature of the contextualized representations they generate, they do not compete as parallel processes. Rather, what is proposed is that heuristic process often cue default mental models that imply -with only shallow analytic processing of the task requirements- default responses, inferences, or decisions" (p.392).

For that reason, this research will suggest enhancements to the ‘control’ processes over heuristics. In Evans’s model, the ‘control’ is expressed by the ‘analytical intervention’ and the ‘explicit reasoning and evaluation’ processes. Both processes will be at the heart of this research’s investigations with an attempt to achieve a better control over heuristics by decision makers in the Middle East Gulf dry bulk shipping companies, and consequently, reduce biases.

#### **2.4.2 The Analytical Intervention**

In the heuristic-analytic theory, “the idea was that heuristic processes selectively focused attention on task features that appeared relevant, introducing relevant prior knowledge in the process. Since analytic processing could only be applied to these selective representations, biases would be observed when either (a) logically relevant information was excluded, or (b) logically irrelevant information was included by heuristic processing” (Evans 2006, p.378).

In Evans (2006), the revised heuristic-analytic theory incorporated three principles of hypothetical thinking. “The theory assumes that reasoning and judgment are facilitated by the formation of epistemic mental models that are generated one at a time (singularity principle) by preconscious heuristic processes that contextualize problems in such a way as to maximize relevance to current goals (relevance principle). Analytic processes evaluate these models but tend to accept them unless there is a good reason to reject them (satisficing principle). At a minimum, analytic processing of models is required so as to generate inferences or judgments relevant to the task instructions, but more active intervention may result in modification or replacement of default models generated by the heuristic system.” (Evans 2006, p.378).

Evans (2006) aimed to reconcile his theory with conflict models by the proposal that unless analytic reasoning intervenes, heuristic responses can control behavior directly. In other words, “heuristics provide default responses that may or may not be inhibited and altered by analytic reasoning. Analytic system intervention may be cued by strong deductive reasoning instructions and may be more likely to occur when individuals have high cognitive ability or a disposition to think reflectively or critically” (Evans 2006, p.379).

Evans (2006) explains that heuristic processes can produce responses with little or no intervention by analytic processes. Surely, “a strong feature of the writing on contemporary dual-systems theory is the emphasis on the ability of the analytic system to inhibit default heuristic responses, a key concept in the explanation of why higher IQ individuals more often come up with normatively correct solutions to reasoning and judgment problems” (Stanovich 1999a, p.355). Evan’s attempts -in his extended heuristic-analytic theory- to promote the fact that the analytic system may or may not intervene.

When reviewing Evans's analytic system intervention's step as shown in Fig.1, it is appropriate to recall Pennycook et al.'s (2015) words that dual process theories assumed that system 2 processing is effectively caused by itself and did not reasonably explain vital features of cognitive architecture. This is a problem of particular importance because the usefulness and the descriptive value of dual-process theories depend, at least partially, on individuals' understanding of the sources of analytic reasoning and the factors affecting it.

According to Evans (2006), the analytic system intervention is affected by several factors, "The factors known to influence the likelihood of such intervention are: cognitive ability (or working memory capacity/general intelligence), the use of instructions requiring abstract or logical reasoning, and the time available for this more effortful and reflective form of thinking. There are several studies in the literature showing that when participants are required to respond quickly to reasoning problems, default heuristics dominate responding" (p.382). In line with this view, Pennycook et al. (2015) suggest in their recent study that the level of system 2 involvement can be affected by factors such as individual differences in thinking nature, instructions, and the amount of time permitted to think.

Pennycook et al. (2015) stressed on the fact that investigations of the factors that undermine intuitive decision making may lead to effective analytic intervention, which could avoid decision errors.

In this research, Evans (2006) list of factors affecting the likelihood of the analytic system intervention will be further investigated, verified, and possibly adjusted.

Also, positioning the 'analytic system intervention stage' under the heuristic processes by Evans (2006), in his revised model, will be challenged and further discussed.

### **2.4.3 The Explicit Reasoning and Evaluation**

Despite being a significant part of the control over heuristics, nothing of an added value was found in Evans's (2006) theory to write on this subject.

This gap in Evans's (2006) work will be filled partially with Pennycook et al.'s (2015) interpretations while discussing their three-stage dual process approach below. Also, a specific research question will be addressed during this research -as shown in section 1.4- to shape this vital stage of the control processes.

This is not the only gap in Evans's (2006) work. Thus, more research questions were designed to fill the gaps in Evans's model to ensure its workability and efficiency for chartering managers in Middle East Gulf shipping companies and their judgment and decision making. All questions will be answered, and a revised decision-making model will be presented in the discussion's chapter of this study.

## 2.5 Task-Related Factors

Evans (2006) elucidates that ‘constructing the most plausible or relevant model’ being the first step in the decision-making processes as shown in Fig.1, lies under the heuristic process (system 1), This step is directly affected by task features, current goal, and background knowledge.

In the preliminary decision-making model as presented in document 2, the term ‘task-related factors’ was used. Those factors include -under different labels- the task features, the current goal, and the background knowledge of the decision maker, as proposed by Evans. In addition, the ‘task-related factors’ will include other factors from Ozer & Cetin (2012), which are tailored for shipping decision-making.

Table 2 shows the factors adapted from Ozer & Cetin (2012). Those factors will be the starting point for this research and will be considered as a preliminary “task-related factors” list, which will be further adjusted during this study’s investigations to ensure its suitability for the heuristics process as part of the developed decision-making model, and to the chartering managers in MEG dry bulk shipping companies.

**Table 2: Preliminary list of the task-related factors**

(Adapted from: Ozer & Cetin 2012, p.219)

<b>TRF Factor grouped according to their similarities</b>
<b>Risk in the market</b>
Risk in the selected charter type
Sustainability of the trade revenue
Need of arranging the cash flow by the shipowner
Uncertainty in economic crisis periods
Fluctuations in freight and hire rates
<b>Qualifications of the charterer</b>
Operational proficiency of the charterer
Cargo potential in the worked region
Controllability of the charter contract by the shipowner
<b>Proficiency of scientific market estimation</b>
Use of scientific market assessments
Use of statistical market modeling
Estimation of the economic crisis by the shipowner
<b>Knowledge and experience of the shipowner</b>
Knowledge of the shipowner about ship charter types
Experience of the shipowner in certain charter type
Strategy of the shipowner in ship chartering
Market intuition of the shipowner
<b>Prejudgment</b>
Having prejudgments due to previous unsuccessful contracts
<b>Corporate structure and asset-related situation</b>
Corporate structure of the shipowner
Concern of imitating competitor companies
Demands on the charterer with regard to the charter type
Fleet size of the shipowner
<b>Reliability of the charterer</b>
Reliability of the charterer
Raising market conditions
<b>Technical sufficiency of the ships</b>
Availability of cargo handling equipment in the ships
Age of the operated ships
Condition of the operated ships
Profitability of the trade
<b>Daily market changes</b>
Daily market conditions
Financial power of the shipowner

## 2.6 A Three-Stage Dual Process Model

According to Pennycook et al. (2015), “the distinction between intuitive and analytic thinking is common in psychology. However, while often being quite clear on the characteristics of the two processes (‘System 1’ process is fast, autonomous, intuitive, etc. and ‘System 2’ process is slow, deliberative, analytic, etc.), dual-process theorists have been heavily criticized for being unclear on the factors that determine when an individual will think analytically or rely on their intuition” (p.34).

This research intends to identify the main ‘heuristics’ affecting chartering managers’ decisions throughout the initial stage of ‘constructing the most plausible or relevant model’. Also, the factors known to influence the likelihood of analytic intervention will be investigated. Moreover, a further step will be taken to examine the possibility of adopting new ideas for better control over heuristics, which demonstrate and characterize the explicit reasoning and evaluation process. Accordingly, Evan’s decision-making model will be adjusted and improved.

Having said that, this document will offer a further enhancement to the adjusted model by accommodating the latest ‘adequate’ criticism to dual process modeling. Without a doubt, the development of knowledge is a continuous process with very widespread boundaries.

It is believed that the work done by Pennycook et al. (2015) deserves to be considered while developing a dual process decision model. Pennycook et al. (2015) introduced a three-stage dual process model that clarifies new perspective on the top-down factors and the bottom-up processes that lead to system 2 engagement.

Pennycook et al. (2015) combine insights from a number of relatively recent dual process decision models into a three-stage decision model of analytic engagement. Pennycook et al.’s (2015) work stands on and complements the previously developed models by De Neys (2012), Stanovich (2009), Thompson (2009), and Evans (2006).

Pennycook et al. (2015) believe that the previous authors on the subject of dual process decision models have shown that the level of system 2 involvement can be affected by top-down factors such as instructions, the amount of time permitted to think, and individual differences in thinking disposition. However, Pennycook et al. (2015) argue that the lower-level cognitive processes (the bottom-up) have been isolated in previous studies. In their opinion, these processes are more important in the understanding of the dynamic relationship between system 1 and system 2 processes, as they can determine which system’s processes will dominate.

According to Pennycook et al.’s (2015) model, “multiple system 1 processes may be cued by a stimulus (Stage 1), leading to the potential for conflict detection (Stage 2). If successful, conflict detection leads to system 2 processing (Stage 3), which may take the form of rationalization (i.e., the system 1 output is verified post hoc) or decoupling (i.e., the system 1 output is falsified)” (p.34).

Pennycook et al. (2015) believe that conflict detection and decoupling are dissociable sources of system 2 processing. Moreover, they believe that conflict detection sometimes fails.

Pennycook et al. (2015) argue that “considering the potential stages of reasoning allows us to distinguish early (conflict detection) and late (decoupling) sources of analytic thought. Errors may occur at both stages and, as a consequence, bias arises from both conflict monitoring and decoupling failures” (p.34). They claim that conflict monitoring was not included as a separate component in most formal dual process decision models, even the work done by De Neys (2012, 2014) which incorporate conflict monitoring, focus entirely on the processes that lead to successful conflict detection and consequently ignored the incorporation of the differences in the quality of system 2 processing.

The primary goal of Pennycook et al. (2015) work is to develop a dual-process model that contains both a conflict monitoring stage and a decoupling stage that distinguishes between diverse levels of analytic engagement. “This model could then accommodate both major perspectives on the primary cause of biased responding: (1) A failure to engage system 2 processing (e.g., Evans, 2007; Kahneman, 2003), and (2) successfully engaging system 2 processing following conflict detection, but failing to override the biased response (e.g., De Neys, 2012)” (Pennycook et al. 2015, p.37).

Pennycook et al. (2015) admit that authors such as Evans (2007, 2008) does not reject the presence of conflict detection, and authors such as De Neys (2012, 2014) believe in the existence of analytic engagement failures.

Fig.2 below represents the theoretical model of Pennycook et al. (2015), this model was designed to deal with a decision-making problem or cue that elicits several conflicting outputs. It consists of three stages as previously explained, and the results depend on the efficiency of the conflict monitoring, rationalization, and the decoupling processes.

Monitoring the conflict is the first step into the analytic processing. If it fails, the decision maker will rely on the output of stage 1 and the decision will be taken intuitively. However, if the conflict is successfully detected, the next step will be either ‘rationalization’ or ‘decoupling’.

Rationalization, in Pennycook et al.’s (2015) words is “a form of system 2 processing where, despite successful conflict detection, the reasoner focuses on justifying or elaborating the first initial response (IR1) without seriously considering the system 1 output that was cued by the stimulus, but that did not come to mind as quickly and fluently (IR2) as the first initial response (IR1)” (p.40).

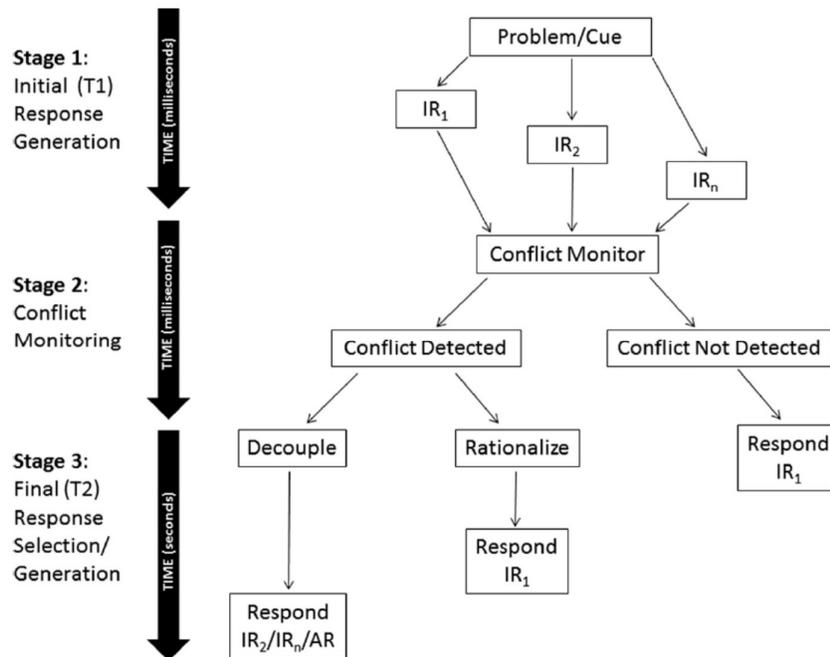


Figure 2: Three-Stage dual-process model (Source: Pennycook et al. 2015, p.39)

“The second class of system 2 processes that could result from conflict detection is cognitive decoupling (e.g., Stanovich, 2004, 2009). This is perhaps the most prototypical ‘analytic’ process and, as such, has dominated the literature on reasoning. Decoupling refers to the additional processing necessary to inhibit and override an intuitive response (primarily, IR1)” (Pennycook et al. 2015, p.40).

Pennycook et al. (2015) advise that rationalization has been long discussed by authors such as Wason and Evans (1975) in the context of dual processing, and the same applies on decoupling (e.g., Stanovich, 1999a). However, Pennycook et al. (2015) claim that rationalization and decoupling have not been included before in the same dual process model, as separate classes of system 2. They further added that “although the distinction between conflict detection and cognitive decoupling has not, until now, been formally built into a dual-process model, it is also not inconsistent with any current model” (Pennycook et al. 2015, p.61).

Pennycook et al. (2015) argue that their three-stage model is unique among other dual process models as it accommodates a more nuanced approach to the problem of bias, owing to the fact that it allows for mechanism of failures linked to two diverse/competing dual process elucidations for the pervasiveness of bias in decision making which are failures of analytic engagement and failures of response inhibition.

“The traditional dual-process view is that bias primarily results from a failure to sufficiently engaging analytic reasoning mechanisms that might be used to override intuitive responses. This view is typically associated with Evans’s default-

interventionist model which emphasizes the need for system 2 processing to intervene against a default intuitive response (e.g., Evans, 2007; see also Stanovich, 2009). Thompson's metacognitive model also fits into this category as well, as it highlights the role of salient feelings of rightness that pre-empt system 2 processing (e.g., Thompson, 2009). These models assume that humans often fail to detect the need to engage the very processing that could potentially undermine bias" (Pennycook et al. 2015, p.62).

The idea of the three-stage model and its efficiency in the dual process model's applications found to be suitable for this research. However, the bias threats arising from the two possible failures at the 'analytic engagement' and the 'response inhibition' stages will be debated and challenged in this research's discussion's chapter. Besides, conflict monitoring, rationalization, and the decoupling processes will be harmonized with this research's model components, as they can offer better explanations for the model's workability.

Pennycook et al.'s (2015) ending statement will be the start of our further research in this document; they suggested that "Obtaining a stronger understanding of the bottom-up factors that lead to analytic thought could lead to more efficient debiasing interventions and, as a consequence, better decision-making. Our principle goal in the current work was to inspire and guide such research" (Pennycook et al. 2015, p.68).

Pennycook et al.'s (2015) work can be criticized for stating that decision maker's initial response is generated by a stimulus at stage 1, without giving this stage any further attention. In this research, the heuristics -as the source of the intuitive response- will be extensively investigated, in addition, the task-related factors affecting the decision makers' subconscious choice of heuristics at this 'intuitive stage' will be explored.

Furthermore, Pennycook et al. (2015) did not study the top-down factors that affect stage 2 (conflict monitoring), and settled for highlighting few titles, while this research will thoroughly examine those factors. Pennycook et al.'s (2015) concern was limited to the existence of such factors, without further explanation/investigation into the role of these factors in ensuring smooth and widespread applications for the model.

The same applies to the bottom-up source of control (decoupling), which will be at the heart of this document's investigations.

This research is part of a DBA study; hence, it is important to present a solution that is appropriate to the research's problem and can be applied by MEG chartering managers in real life. Hence, Pennycook et al.'s (2015) explanations as to 'how the dual process models actually work' will be incorporated in this research discussions and consequently in the revised decision-making model as presented at the end of this document.

## 2.7 The Revised Conceptual Framework

Rocco and Plakhotnik (2010) suggest that the conceptual framework adopted by the researcher should relate the concepts, the empirical research and the pertinent theories in a way that elucidates, shapes and enhances the knowledge of the researched subject.

The following framework consists of the notions of Herbert Simon's 'bounded rationality' and the 'heuristics/biases' program which was developed over the past three decades by Tversky, Kahneman, Gigerenzer, and others. The concepts of Jonathan Evan's revised dual process theory also included, with emphasis on the 'control' element. The relation between the concept 'control' and its components was derived from Gordon Pennycook, Jonathan Fugelsang, and Derek J. Koehler's recent work on the three-stage dual process modeling.

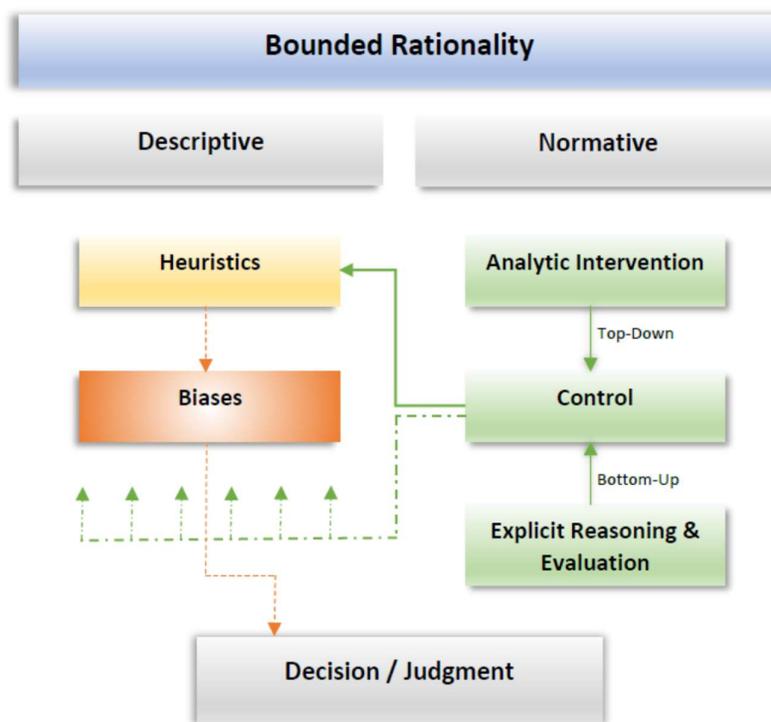


Figure 3: The revised conceptual framework

This framework offers a road map for this research, starting with the bounded rationality throughout the descriptive/normative distinction and the dual process modeling of decision making via three-stage heuristic-analytic processes, with biases being an actual threat to the desired rational outcome.

### **3. Research Methodology**

This chapter addresses discussions on the most appropriate methodological stands for this research study.

The first section of this chapter covers a discussion on the research's philosophical position, while the second section -through five subsections- explains this research's design.

#### **3.1 The Research Philosophical Position**

To validate a researcher's claim and assumption about reality, there is a variety of strategies that can be applied in a research study, and diverse methods for collecting the desired data (Hart, 2013).

For a researcher to decide on the most appropriate strategy, Hart suggests that "it is important to grasp the philosophical meaning of ontology and epistemology. This is because alternative views of reality lead to different propositions about what reality is (ontology) and different ways of establishing what can be accepted as real (epistemology)" (Hart 2013, p.51).

In documents 3 & 4, the researcher has defined and discussed the two well-known epistemological traditions (positivism and interpretivism), and the two ontological positions (objectivism and constructionism). In document 3, the qualitative study was in favor of interpretivism and constructionism philosophies, while in document 4 the positivism and objectivism stands were more appropriate for the quantitative nature of the study.

In this document, paradigmatic flexibility is required particularly in data collecting strategies and methods. The researcher will require mixing methods from the two competing camps, qualitative and quantitative, in order to achieve this research aim.

According to Creswell (2003), "substantial discussion has taken place in the mixed methods literature about the 'compatibility' of quantitative and qualitative research and whether paradigms of research and methods can be mixed. For example, can a qualitative philosophical perspective, such as the existence of multiple realities, be combined with a quantitative study that uses a closed-ended survey to gather data and restrict the perspectives of the participants?" (p.168). The connection of paradigms and methods has been denoted to as the 'paradigm debate' (Bryman and Bell, 2011).

The paradigm debate, in Creswell's (2003) view, has substantially dwindled owing to the usage of mixed-methods despite the paradigm standpoints. However, he acknowledges that "the discussion helped to raise the issue of whether philosophical perspectives should be explicitly stated and acknowledged in mixed methods studies" (Creswell 2003, p.168).

Doyle et al. (2016) believe that this debate advocates the ‘incompatibility thesis’ which poses a challenge on “how can researchers mix methods when the paradigms on which they are based have vastly different ontological, epistemological and methodological assumptions?” (Doyle et al. 2016, p.625).

As a solution for the ‘incompatibility thesis’, Shannon-Baker (2016) suggests the implementation of a dialectical approach which supports the use of two or more paradigms simultaneously. Greene (2007) believes that the correct answer to that question should come via the adoption of an alternative paradigm, that holds a plurality of assumptions and methods.

Critical realism is one of the paradigms that support the belief that qualitative and quantitative research can collaborate to offer strategies for mixed-methods researchers to better comprehend the context of what they study (Doyle et al., 2016; Maxwell and Mittapalli, 2010; Shannon-Baker, 2016).

Transformative paradigm is another approach that integrates value-based goals within the mixed-research study and acts as the framework of belief systems that position human rights and social justice as priorities (Doyle et al., 2016; Mertens, 2010; Shannon-Baker, 2016).

Having said that, in the methodology literature, numerous mixed-methods researchers connect ‘pragmatism philosophy’ with the mixed-methods strategy, such as Greene & Caracelli (1997), Bazeley (2003), Maxcy (2003), Tashakkori & Teddlie (2003), and Johnson & Onwuegbuzie (2004).

On the mixed-methods and pragmatism relation, Cameron (2009) argues that the advocates of mixed-methods research have strong associations with those who classify with the pragmatic paradigm. “Pragmatism has a strong philosophical foothold in the mixed methods or methodological pluralism camps” (Cameron 2009, p.141). Biesta (2010) suggests that “Pragmatism provides the philosophical foundation for mixed methods research” (p. 95).

Hathcoat and Meixner (2015, p.3) argue that “though such ideas have sought to justify integrating quantitative and qualitative data within a single study in response to the incompatibility thesis, in many respects these views have supported an anti-philosophical penchant to ‘stop asking questions about reality’ in the pursuit of doing what works to address research questions”.

Hathcoat and Meixner (2015) have done a decent review on Howe (1988), as one of the most influential researchers within the mixed-methods research field. They stated that Howe (1988) appeals to pragmatism in his own ‘compatibility thesis’, arguing that “no incompatibility between quantitative and qualitative methods exists at either the level of practice or that of epistemology and that there are thus no good reasons for

educational researchers to fear forging ahead with ‘what works’.” [(Howe 1988, p. 10) in (Hathcoat and Meixner 2015, p.4)]

According to Hathcoat and Meixner (2015), “Central to Howe’s argument is the presumption that researchers must make choice between competing philosophical perspectives, such as positivism and interpretivism” (p.4). Howe (1988) discards this false dichotomy and in its place, endorses pragmatism as an alternative view so that the conversation among researchers may move past questions about “whether combining positivistic and interpretivist elements is legitimate to how this combination can be accomplished” [(Howe 1988, p. 14) in (Hathcoat and Meixner 2015, p.4)]

To know more about pragmatism, Table 3 below summarizes Creswell’s (2003) interpretations for Cherryholmes (1992) and Murphy (1990) work on pragmatism and the knowledge claims that this paradigm provides a basis for.

**Table 3: A list of knowledge claims that pragmatism provides a basis for (Source: Based on Creswell 2003, p.12)**

No.	Knowledge Claims
1	Pragmatism is not committed to any one system of philosophy and reality. This applies to mixed methods research in that inquirers draw liberally from both quantitative and qualitative assumptions when they engage in their research.
2	Individual researchers have a freedom of choice. They are ‘free’ to choose the methods, techniques, and procedures of research that best meet their needs and purposes.
3	Pragmatists do not see the world as an absolute unity. In a similar way, mixed methods researchers look to many approaches to collecting and analyzing data rather than subscribing to only one way (e.g., quantitative or qualitative).
4	Truth is what works at the time; it is not based in a strict dualism between the mind and a reality completely independent of the mind. Thus, in mixed methods research, investigators use both quantitative and qualitative data because they work to provide the best understanding of a research problem.
5	Pragmatist researchers look to the ‘what’ and ‘how’ to research based on its intended consequences, where they want to go with it. Mixed methods researchers need to establish a purpose for their ‘mixing’, a rationale for the reasons why quantitative and qualitative data need to be mixed in the first place.
6	Pragmatists agree that research always occurs in social, historical, political, and other contexts. In this way, mixed methods studies may include a postmodern turn, a theoretical lens that is reflexive of social justice and political aims.
7	Pragmatists believe (Cherryholmes, 1992) that we need to stop asking questions about reality and the laws of nature. "They would simply like to change the subject" (Rorty, 1983, p. xiv).

With Creswell's (2003, p.12) words in mind that "for the mixed methods researcher, pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as to different forms of data collection and analysis in the mixed methods study", pragmatism research philosophy found to be appropriate for this document's questions, objectives, and aim.

## **3.2 Research Design**

Research design can be described as a procedure for collecting, analyzing, interpreting, and reporting the data and the findings of a research (Creswell & Plano-Clark, 2007). This section covers the main elements of the research design.

Selecting the research's data-collecting strategy (qualitative, quantitative, or mixed-methods) depends -to a large extent- on research's objectives and questions. In document 3, the qualitative strategy was chosen as it was the most appropriate approach to achieving the document's objectives, while in document 4 the most appropriate strategy was quantitative. In this document, the thesis, a mixed-methods strategy will be applied to answer research's questions and, consequently, achieving the document's objectives and aim. The mixed-methods strategy will be discussed with more details in subsection 3.2.1 below. Thereafter, part of the criticism of the mixed-methods strategy will be highlighted and debated in subsection 3.2.2.

The rationale for using mixed-methods research is discussed in subsection 3.2.3. Subsection 3.2.4 will cover the sequential exploratory approach as a selected design for this research, after comparing the available options. Lastly, the approach to data mixing and analysis will be discussed in subsection 3.2.5.

### **3.2.1 Mixed-Methods Strategy**

According to Venkatesh et al. (2013), "Mixed methods research is an approach that combines quantitative and qualitative research methods in the same research inquiry. Such work can help develop rich insights into various phenomena of interest that cannot be fully understood using only a quantitative or a qualitative method" (p.21).

As stated by Kong et al. (2016), a mixed-methods research strategy can be used for designing and planning studies that require the employment of both qualitative and quantitative methods in an architectural intervention.

Creswell (2003) believes that there is a widespread accord that mixing diverse types of methods can strengthen a research study, "because all methods of data collection have limitations, the use of multiple methods can neutralize or cancel out some of the disadvantages of certain methods" (Creswell et al. 2003, p.15)

Owing to the complexity of the social phenomena, different types of methods are required to be employed to best understand these complexities. The researchers -with

all methodological beliefs- acknowledge the value of mixed-methods approach in the procurement of detailed contextualize information (Greene & Caracelli, 1997).

According to Tashakkori & Teddlie (2003), mixed-method research has a relatively short history as a recognizable methodological strategy which can be traced back to the early 1980's. Back then, it was termed as an innovative approach that can resolve the tensions between the qualitative and quantitative methodological strategies.

Mixed-methods research has been labeled as the third methodological paradigm, bearing in mind that quantitative strategy occupies the first place as an identifiable paradigm and qualitative strategy comes in second (Ridenour and Newman 2008; Teddlie and Tashakkori 2003, 2009).

Despite its short history, the mixed-methods strategy is considered as an emerging movement with mounting interest among many research fields with particular popularity in the applied social research (Bazeley, 2003).

Tashakkori and Teddlie (2003) elucidate that mixed-research strategy can benefit the researchers from the two competing camps in finding a common language. They argue that “the mixed methods research movement is a positive reaction to this split personality and to the excesses of both the QUAN (quantitative) and QUAL (qualitative) camps. We believe that mixed methods will eventually pave the way for more commonality in research language that will benefit both the QUAL and QUAN camps” (p.699).

### **3.2.2 Criticism to the Mixed-Method Strategy**

Despite the belief of the mixed-methods' advocates in its superiority over single-method design in several research areas, there has been an intense debate on the appropriateness of combining multiple methods that are regularly based on radically different paradigmatic assumptions (Denzin and Lincoln 1994; Guba 1987).

This debate is part of a wide range of criticism to mixed-methods strategy from the quantitative and the qualitative camps.

Bryman and Bell (2011) summarize this debate against mixed-methods strategy in two main arguments. The first argument is based on the idea that research methods convey epistemological obligations, and the second argument is based on the idea that quantitative and qualitative research are distinct paradigms.

The first position suggests that research methods are ineluctably entrenched in epistemological and ontological commitments. Hence, “every research tool or procedure is inextricably embedded in commitments to particular versions of the world and to knowing that world” [(Hughes 1990, p.11) in (Bryman and Bell 2011, P.629)].

Smith (1983) argues that “each of the two research strategies sponsors different procedures and has different epistemological implications, and therefore researchers are advised not to accept the unfounded assumption that the methods are complementary” [(Smiths 1983, p.12, 13) in (Bryman and Bell 2011, P.629)].

The second position conceives that quantitative and qualitative strategies as paradigms, “in which epistemological assumptions, values, and methods are inextricably intertwined and are incompatible between paradigms. Therefore, when researchers combine participants’ observation with a questionnaire, they are not really combining quantitative and qualitative research, since paradigms are incommensurable, that is, they are incompatible. The integration is only at a superficial level and within a single paradigm” (Bryman and Bell 2011, p.629).

Notwithstanding the criticism of the mixed-methods strategy and “the several challenges associated with methodological pluralism based on the notion of the incompatibility thesis, it has been justified that it is practicable to conduct research that cuts across multiple methodologies and paradigms (Mingers 1997, 2001; Ridenour and Newman 2008; Teddlie and Tashakkori 2003, 2009)” (cited in Venkatesh et al. 2013, p.24). “Several researchers have reviewed prior calls for methodological combination and suggested that a peaceful coexistence of multiple methodologies is possible (Datta 1994; House 1994; Ridenour and Newman 2008; Rossi 1994). Others have called for a combination of research methods, particularly triangulation of qualitative and quantitative data, to develop a deeper understanding of a phenomenon (Denzin 1978; Jick 1979; Mingers 1997, 2001; Reichardt and Rallis 1994)” (Venkatesh et al. 2013, p.24).

### **3.2.3 Rationale for Mixed-Methods Research**

As discussed earlier, research questions should be the decisive factor in selecting the research’s data collecting strategy. Doyle et al. (2016) suggest that “it is critically important that the research question is one that lends itself to a mixed methods design; ideally one in which using quantitative or qualitative methods alone would be insufficient” (p.624).

Choosing mixed-methods strategy on the basis that ‘two’ is better than ‘one’ does not work in academic researching. Also, the supposition that mixed-methods strategy is characteristically superior to a mono-method strategy is being challenged and confronted (Sandelowski, 2014). Thus, researchers need to be clear about the add-on value of using mixed-methods strategy to reinforce their approach (Creswell, 2015).

Bryman and Bell (2011) suggest that researchers are required to adequately justify their choice of mixed-methods research.

Doyle et al. (2016) advise that “the justification of mixed methods designs has been considered in depth by Greene et al. (1989), who identified five main purposes for

mixing methods (triangulation, complementarity, development, initiation, expansion), and by Bryman (2006), who further expanded upon this scheme” (p.624). The most commonly identified rationales for mixed-methods studies are presented in Table 4.

**Table 4: Rational for mixed-methods research (Source: Doyle et al. 2016, p.624)**

Triangulation (convergence):	<ul style="list-style-type: none"> <li>Using quantitative and qualitative methods so that findings may be mutually corroborated.</li> <li>This may also be an unanticipated outcome of the study where a mixed methods study was undertaken for another reason, but convergence was evident.</li> </ul>
Expansion:	<ul style="list-style-type: none"> <li>The first phase has findings that require explanation qualitatively.</li> <li>Unexpected findings that need to be explained.</li> </ul>
Exploration:	<ul style="list-style-type: none"> <li>An initial phase is required to develop an instrument or intervention, identify variables to study or develop a hypothesis that requires testing.</li> </ul>
Completeness:	<ul style="list-style-type: none"> <li>Provides a more comprehensive account of phenomena under study.</li> </ul>
Offset weaknesses:	<ul style="list-style-type: none"> <li>Ensures that weaknesses of each method are minimised (Creswell, 2015a).</li> <li>Caution is required when identifying this as a primary rationale as each method should be sufficiently rigorous in its own right (O’Cathain, 2010).</li> </ul>
Different research questions:	<ul style="list-style-type: none"> <li>Both quantitative and qualitative questions may be posed at the beginning of the study in addition to mixed methods questions (Creswell, 2015b).</li> </ul>
Illustration:	<ul style="list-style-type: none"> <li>Qualitative data are used to illuminate quantitative findings.</li> <li>Putting ‘meat on the bones’ of dry quantitative data (Bryman, (2006).</li> </ul>

In this research, where the ‘different research questions’ rationale applies, some of the research questions can be answered qualitatively. However, other questions cannot be answered with mono-method strategy. Also, the ‘offset weakness rationale’ is applicable to a certain extent. Moreover, the ‘exploration rationale’ is found to be very consistent with this research where an initial phase is required to develop an instrument or intervention, and to identify variables to study. These points will be illustrated and further discussed/justified in chapter 5.

### 3.2.4 Choosing an Appropriate Mixed-Methods Design

According to Creswell and Plano-Clark (2011), while constructing a research design, the researcher needs first to decide on the research’s strategy. If the researcher’s choice is to conduct a mixed-methods research, backed up by a valid rationale, the second step will be selecting a particular mixed-methods design appropriate for the research problem.

Creswell (2015) elucidates that a plethora of mixed-methods designs have emerged in recent years, which can be puzzling for researchers. There is a call for mix-methods researchers to return to the basic mixed-methods designs with the option of seeking out variants of them if required.

There are four basic mixed-methods research designs (triangulation, embedded, sequential explanatory, and sequential exploratory) and several advanced designs based on a precise focus (Creswell, 2015). Table 5 below summarizes the four major mixed-methods designs.

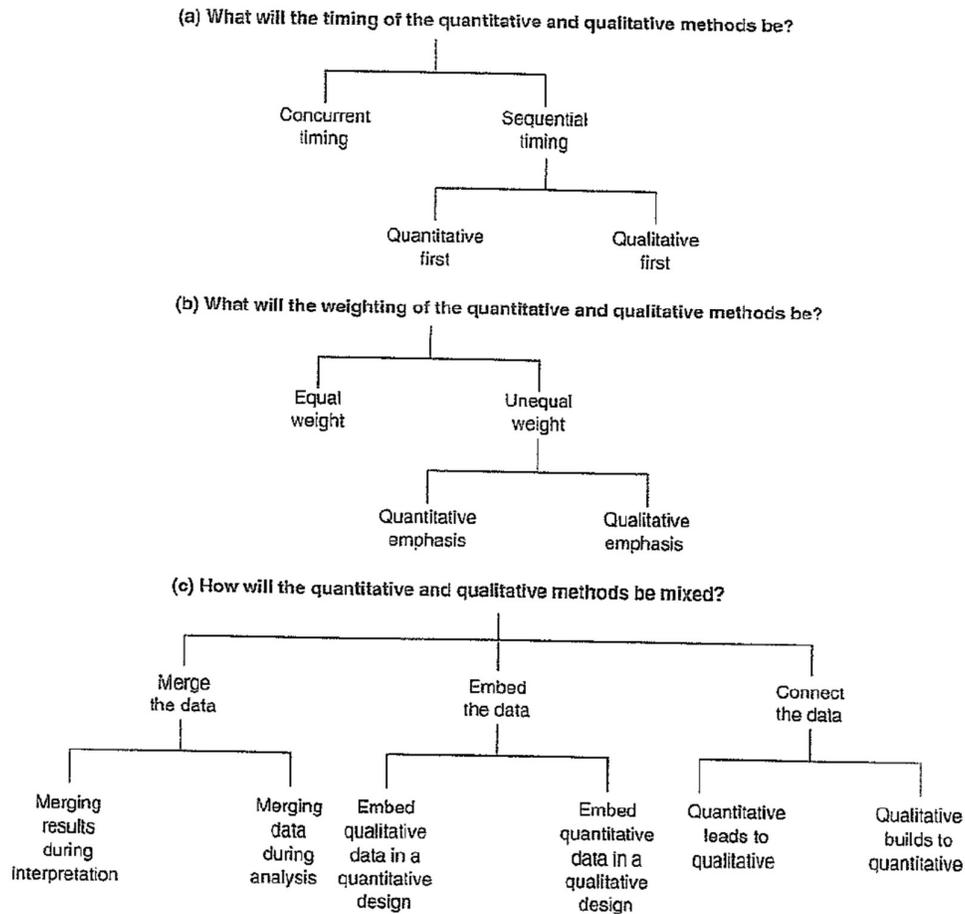
**Table 5: Major mixed-method design types (Source: Cameron 2009, p.145)**

Design Type	Timing	Mix	Weighting/ Notation
<b>Triangulation</b>	Concurrent: quantitative and qualitative at the same time	Merge the data during interpretation or analysis	QUAN + QUAL
<b>Embedded</b>	Concurrent and sequential	Embed one type of data within a larger design using the other type of data	QUAN(qual) Or QUAL(quan)
<b>Explanatory</b>	Sequential: Quantitative followed by qualitative	Connect the data between the two phases	QUAN → qual
<b>Exploratory</b>	Sequential: Qualitative followed by quantitative	Connect the data between the two phases	QUAL → quan

According to Kong et al. (2016), the selection of an appropriate type of mixed-methods research design that can properly address the research problem is vital so that the study is more practical to implement. The three important considerations when choosing an appropriate design are as follows:

- **Timing:** which denotes the chronological relationship between the quantitative and qualitative components in a research study, which can be either concurrent or sequential (Greene et al., 1989).
- **Weighting:** Which refers to the relative importance of the quantitative and qualitative methods to answer the study's questions (Creswell and Plano-Clark, 2011).
- **Mixing:** Stands for the approach to mixing the two data sets and the process of relating the two data sets explicitly (Creswell and Plano-Clark, 2011).

Researchers need to decide on timing, weighting, and mixing in order to choose the most appropriate research design. The famous decision tree of Creswell et al. (2003), as shown in Fig.4 below, can assist researchers in identifying the choices for each of these three decisions.



**Figure 4: Decision tree for mixed-methods design criteria for timing, weighting, and mixing. (Source: Creswell and Plano-Clark 2007, p.80)**

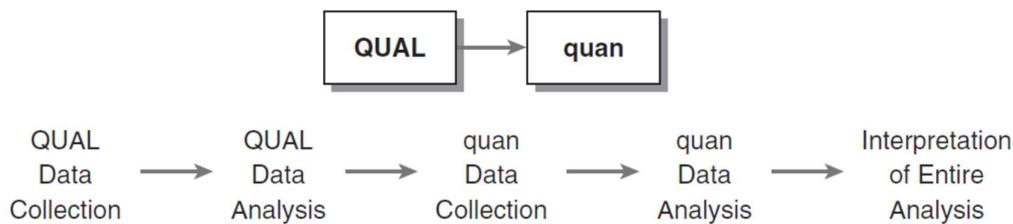
The processes of the present study started in 2013 with document 1, and the last step will be in 2017 with document 5. The accomplishment of each phase of the research was imperative to enable the start of the subsequent phase. The qualitative data collection and analysis in document 3 was the starting point for the quantitative work done throughout document 4. Hence, the sequential timing (that begins with the collection and analysis of qualitative data followed by the same for quantitative data) is the most appropriate choice for this research.

The aim of this research study is to produce a ship-chartering decision-making model that can streamline chartering managers' decision-making process. Research objectives and questions were carefully considered to achieve this study's aim. First, the researcher attempted to answer research questions using qualitative strategy. However, there was a need to adopt quantitative techniques at a later stage to legitimize and generalize the findings. Qualitative data were not enough, but, it plays a vital role in the mixed-methods design. "Because the research design begins qualitatively, data gathered from this approach are considered to hold greater importance" [(Creswell & Plano-Clark, 2011) in (Kong et al. 2016, p.5)]. In the present study, "qualitative data

are used to formulate theories or variables that are subsequently verified or developed through quantitative methods” [(Bryman, 2004; Creswell, 2003) as cited in (Kong et al. 2016, p.5)]. Thus, “quantitative data play a less dominant role by acting as a supplement to qualitative research (Creswell, Shope, Plano-Clark, & Green, 2006). Notably, the quantitative data help enhances the generalizability, replication, reliability, and validity of the mixed-methods research design” (Kong et al. 2016, p.5). Therefore, when talking about ‘weighting’, It is fair to state that this research relies more on the qualitative methods to answer research questions.

As for the mixing decision, the findings from the quantitative and qualitative methods will be ‘connected’ using a carefully selected technique. This part will be further discussed in subsection 3.2.5.

From the above discussion on timing, weighting, and mixing, and by looking back at Table 5, it can be stated that ‘sequential exploratory’ is the most appropriate mixed-methods design for this research. The sequential exploratory design can be illustrated in Fig.5 below.



**Figure 5: Sequential exploratory design (Source: Creswell et al. 2003, p.180)**

### 3.2.5 The Approach to Data Mixing and Analysis

The previous subsection covered the ‘data gathering design’ pertaining the qualitative and quantitative phases of this mixed-methods research, and concluded that the most appropriate design for this document is the ‘sequential exploratory research design’.

In this subsection, the approaches to ‘data (Quan & Qual findings) mixing and analysis’ will be discussed and an appropriate design will be selected.

As discussed and presented in previous documents, the approach to data analysis in the qualitative part of the study (document 3) was ‘thematic analysis’, while in the quantitative part of the study (document 4) the approach was ‘descriptive analysis’.

In this document, the researcher will be connecting the qualitative and quantitative findings by synthesizing the findings of the previous phases of the research. Heyvaert et al. (2013) define mixed-methods research synthesis as “a synthesis in which researchers combine qualitative, quantitative, and mixed methods studies, and apply

mixed methods approach in order to integrate those studies, for the broad purposes of breadth and depth of understanding and corroboration” (p.662). According to Sandelowski et al. (2012), “mixed methods–mixed research synthesis is a form of systematic review in which the findings of qualitative and quantitative studies are integrated via qualitative and/or quantitative methods” (p.317).

Heyvaert et al. (2013) further elucidate that “it is a systematic review, which means that it reviews available research data that has been systematically searched for, studied, assessed, and summarized according to predetermined, transparent, and rigorous criteria” (p.662).

The synthesized ‘data’ in the mixed-methods research are in reality ‘findings’ extracted from the primary qualitative and quantitative studies. In another word, in a primary level study, the participants are persons, while in a synthesis level study the participants are primary level studies (Heyvaert et al., 2013).

On the types of the research synthesis methods, Sandelowski et al. (2012) explicate that “an array of qualitative and/or quantitative methods has been advanced for synthesizing qualitative research findings alone, quantitative research findings alone, and qualitative and quantitative research findings together. These methodological approaches to research synthesis have themselves been variously conceived as philosophically and/or operationally qualitative or quantitative” (p.318).

According to Pope et al. (2007), the most popular research synthesis methods can be clustered into three groups in accordance with their types, as follows:

- (1) Quantitative approaches to findings synthesis: The Bayesian approach, content analysis, quantitative case survey, and comparative analysis.
- (2) Qualitative approaches to findings synthesis: Grounded theory, comparative case study, and meta-ethnography.
- (3) Mixed-methods approaches to findings synthesis: Thematic synthesis, narrative synthesis, and realist synthesis.

Petticrew et al. (2013) believe that there is a wide range of synthesis methods for reviewing and presenting the findings. Some of these methods follow quantitative approaches while others follow qualitative or mixed-methods approaches. “Specific contributions of statistical approaches include the use of meta-analysis, meta-regression, and Bayesian methods, whereas narrative summary approaches provide valuable precursors or alternatives to these. Qualitative and mixed-method approaches include thematic synthesis, framework synthesis, and realist synthesis” Petticrew et al. (2013, p.1230).

Notwithstanding the other possible options, thematic synthesis, framework synthesis, realist synthesis, and narrative synthesis were addressed by several authors as ‘popular’ mixed-research synthesis methods. It can be said that any of these four options is a workable/viable choice for this document.

Having said that, in this document, the synthesized qualitative findings are intended to be taken as the comparative reference point to ascertain the relationship of the quantitative findings to them. In a similar case, Voils et al. (2008) explain that “because most of the qualitative findings feature factors favoring adherence or nonadherence, we could translate the quantitative findings into those terms for further comparison and combination” (p8). Having this fact in mind, and since the qualitative part (the first phase) of this ‘sequential exploratory’ study was analyzed basis a thematic approach, the ‘thematic synthesis’ will be the most appropriate synthesis method for this document.

For the researcher to apply the selected synthesis method to this research, a general framework needs to be chosen. Sandelowski et al. (2006) identify three general frameworks through which a researcher can conduct the mixed methods systematic review, which are: segregated, integrated and contingent.

According to Pearson et al. (2014), the ‘segregated design’ maintains the conventional binary distinction between quantitative and qualitative studies as sources of data, and necessitate separate primary syntheses to be conducted before the final ‘mixed method’ synthesis.

In the case of the segregated design, the assumption is that there is more than one qualitative study which need be synthesized using a suitable qualitative synthesis method, and there is more than one quantitative study which need be synthesized using a suitable quantitative synthesis method. After that, a suitable mixed-method will be applied to synthesize the two sets of the ‘synthesized findings’.

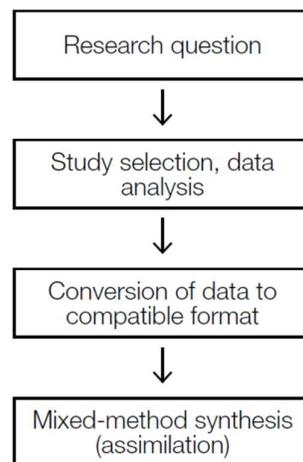
According to Sandelowski et al. (2006) “the segregated design is most appropriate when: (a) qualitative and quantitative findings in a designated body of research are viewed as complementing (as opposed to either confirming or refuting) each other and when (b) mixed research synthesis is defined as the configuration (as opposed to the assimilation) of research findings” (p.30).

The segregated design is not suitable for this document, as there is a single source for the qualitative data (document 3) and another single source for the quantitative data (document 4), which can be synthesized directly in one step using a mixed-method synthesis method. Also, the two sources (document 3 & document 4) were designed to confirm/refute the findings rather than complementing.

On the other hand, the ‘integrated design’ as explained by Pearson et al. (2014), circumvents distinct qualitative and quantitative syntheses and instead combine both forms of data into a single mixed method synthesis. “A primary condition for the development of an integrated mixed method systematic review is that both quantitative and qualitative data are similar enough to be combined into a single synthesis. As opposed to segregated design, where the final synthesis involves a configuration of data, integrated design is almost always confirmatory or refuting in nature and involves

an assimilation of data” (Pearson et al. 2014, p.9). The assimilation of the data will require either the quantitative findings to be transformed into codes and themes and/or that the qualitative data is converted into numerical forms. This type of data aggregation will allow the researcher to investigate the differences and similarities between the qualitative and quantitative findings.

This design, as illustrated in Fig.6 below, found to be compatible and suitable for this document’s synthesis process.



**Figure 6: Integrated design (Source: Pearson et al. 2014, p.10)**

The third framework is called ‘contingent design’, and it is not suitable for this document’s synthesis process due to the nature of this research’s data sources, questions, and objectives. Sandelowski et al. (2006) describe the process of the contingent design as “the results of synthesizing the findings in a designated group of studies to answer one research question determine the next group of studies that will be retrieved and analyzed to answer a second research question the results of which, in turn, may lead to the analysis of a third group of studies retrieved to answer yet another research question” (p.31). This cycle of systematic review may continue until the researcher is satisfied with the outcome of his synthesis.

## **4. The Research Process**

This chapter delivers a brief illustration of the processes that were involved in the making of this research. The two main sections of this chapter cover the qualitative and quantitative parts of the research respectively. Under each section, there is a number of subsections covering the sampling, participants, data collection, and data analysis techniques associated with each part of the research. The last section of this chapter is dedicated for the ethical considerations throughout the research processes.

### **4.1 The Qualitative Part of the Research**

Based on the timing, weighting and mixing discussions in section 3.2.4, the ‘sequential exploratory’ design was chosen as the most appropriate mixed-methods design for this research. According to this selected design, the research starts with a qualitative study in an attempt to answer all research’s questions.

In document 3, the main qualitative research methods were presented and discussed. Amongst the workable options, semi-structured interviews and focus groups were selected as the data gathering methods for the qualitative part of the research.

This section will cover the main processes carried out during the qualitative part of the research.

#### **4.1.1 Research Participants**

In qualitative studies, samples are usually selected based on suitability or opportunities owing to the difficulties in population’s accessibility, or due to restrictions often placed by the targeted sub-groups (Chau, 2012).

As stated in document 3, the “selection of participants in the research’s semi-structured interviews and focus groups should be relevant to the topic and the selection should represent occupational grouping that has an interest in the topic concerned” (Document 3, p.22).

For the qualitative part of this research, ‘purposive sampling’ was found as the most appropriate sampling approach. Fisher (2010) argues that “purposive sampling is essentially strategic in approach, seeking specifically to establish a good correlation between the research questions and the sampling. In essence, it is to sample on the basis of seeking to conduct interviews and focus groups with individuals who are deemed by the researcher to be relevant to the research questions” [(Fisher, 2010) in (Document 3, p.22)].

There were five one-to-one interviews conducted with chartering managers working in dry bulk shipping companies located in the Middle East Gulf countries. The selected five chartering managers represent companies of different sizes and structures, some working as ship-owners and others as ship-operators. Also, the researcher ensured to have participants of both genders and with different working experiences.

Considering the exploratory nature of this research, the amount of information required, and the time allowable for this phase to be completed, the selected number of interviews believed to be suitable.

Interviewee’s experiences, genders and the type of companies they are working for are summarized in Table 6 below.

**Table 6: Interviewee’s details (Adapted from document 3, p.29)**

Participant Name	Company	Years of experience	Gender
Chartering Manager 1	Operator	4	Female
Chartering Manager 2	Operator	8	Male
Chartering Manager 3	Owner	10	Male
Chartering Manager 4	Owner	11	Female
Chartering Manager 5	Owner	15	Male

In addition to the interviews, two focus groups were conducted. “Participants in the first focus group were shipping consultants, who are the most respected players in the industry due to their role and experience. They are not the decision makers targeted in this study, but they were –long time back- chartering managers and have witnessed many cases and lived many experiences” (Document 3, p.29).

There were five participants in the first focus group, all coming from reputable consultancy houses in the Middle East Gulf region, and each one of them is carrying with him 20-35 years of ship-chartering experience.

In the second focus group, the participants were experienced shipbrokers, “their role in the shipping industry is to act as mediators in ship chartering deals between ship owners (or operators) and charterers. They witness all negotiations between chartering managers, and they observe the entire decision-making process in each deal” (Document 3, p.30).

There were four participants, representing four major brokerage houses in the Middle East Gulf. All participants are well known in the shipping industry, with experiences ranging from 15 to 20 years in dry bulk ship-brokerage.

#### 4.1.2 Applying the Selected Data Collection Methods

As declared earlier, the five semi-structured interviews together with the two focus groups characterize the data gathering methods for this qualitative part of the research.

The five chartering managers' interviews were held at their premises, all in the meeting rooms. "None of the interviews has taken place at the trading desk or at the chartering manager's own desk. That was the choice of chartering managers, which is attributed – in researcher's opinion- to the high level of noise at the trading desk and the amount of interruptions" (Document 3, p.28).

The length of each interview and the numbers of words in each interview's transcript is shown in Table 7 below.

**Table 7: Interview's details (Adapted from document 3, p.29)**

Participant Name	Interview Length	No. of words
Chartering Manager 1	43 minutes	5,232
Chartering Manager 2	40 minutes	5,120
Chartering Manager 3	53 minutes	6,590
Chartering Manager 4	41 minutes	5,467
Chartering Manager 5	60 minutes	6,045

The decent form and the fair amount of information gathered by conducting the five semi-structured interviews add credibility and prove the suitability of this selected method and the chosen sample.

The second applied data gathering method was 'focus group'. Instead of having one focus group that combines shipping consultants and shipbrokers, the researcher elected to conduct two separate focus groups. The participants of the first focus group were shipping consultants and the second were shipbrokers. The main reason in dividing the shipping experts into two groups is to have homogeneous participants in each group, which would enable the researcher in extracting the maximum possible data in the limited time available for the focus group meeting. This approach ensured maximum interaction among participants, "each group discussion produces data and insights that would be less accessible without the interaction achieved in a homogenous group

structure. Participants found themselves more comfortable sharing their verbalized experiences, stimulates memories, ideas, and much more” (Document 3, p.29).

The first focus group took place in Kuwait, at Gulf Maritime Shipping Consultants Company’s office, in the meeting room. This focus group was attended on time by all 5 participants, in addition to the researcher as moderator.

Great discussion and fruitful contributions made the two hours meeting time runs fast, with more than 15,650 words in this focus group transcript.

The second focus group was held in Dubai. The researcher has booked a meeting room in ‘Movenpick Hotel Jumeirah Lakes Towers’ for the purpose of conducting this focus group. This hotel was chosen deliberately, as it is close to all participants’ offices.

To ensure that ship brokers stay away from their phones as much as possible, this focus group was held on a Sunday and at early morning hours. It is worth highlighting the fact that shipping market in MEG runs at its slowest base on Sunday morning of every week.

An apology call was received at 7:30 AM on the day of the meeting from one of the participating shipbrokers for not being able to join the focus group meeting due to urgent family matter. As it was not possible to replace him with such short notice, the focus group took place with four participating shipbrokers only, in addition to the researcher as moderator.

The focus group lasted for about one hour and a half. Transcript of this focus group contains about 13,120 words.

Participants were well prepared, and the researcher was grateful for the valuable contribution. “This contribution couldn’t be achieved by one-to-one interviews with the shipbrokers or shipping consultants. They are important shipping players in the industry, but they are outsiders to the chartering decision-making process, nonetheless, in close contact with the chartering managers (the decision maker). The focus group was the right choice indeed” (Document 3, p.29).

The language used in all interviews and focus groups was English, and all discussions were recorded and transcribed.

For coding purposes, Table 8 below shows participants nicknames, the event they are participating in, and their codes. This process found to be the most appropriate way for coding the participants.

**Table 8: Participants' codes (Source: document 3, p.31)**

No.	Participant Nickname	Participation	Participant's Code
1	Chartering Manager 1	Interview 1	CM1
2	Chartering Manager 2	Interview 2	CM2
3	Chartering Manager 3	Interview 3	CM3
4	Chartering Manager 4	Interview 4	CM4
5	Chartering Manager 5	Interview 5	CM5
6	Shipping Consultant 1	Focus Group 1	SC1
7	Shipping Consultant 2	Focus Group 1	SC2
8	Shipping Consultant 3	Focus Group 1	SC3
9	Shipping Consultant 4	Focus Group 1	SC4
10	Shipping Consultant 5	Focus Group 1	SC5
11	Shipbroker 1	Focus Group 2	SB1
12	Shipbroker 2	Focus Group 2	SB2
13	Shipbroker 3	Focus Group 2	SB3
14	Shipbroker 4	Focus Group 2	SB4

#### **4.1.3 Data Analysis Technique Used in the Qualitative Study**

As explained and justified in document 3, the ‘applied thematic analysis approach’ was chosen as the main framework for the qualitative data analysis.

After completing the transcribing process for all of the interviews and the focus groups, “all transcripts and recordings have been reviewed -by the researcher- at least two times to ensure that all the words written in these transcripts reflect the recordings accurately. The reading was also beneficial for the researcher in becoming familiar with the data and in paying specific attention to any potential pattern” (Document 3, p.31).

Afterward, initial codes were generated by documenting the occurrences of the patterns. The researcher’s approach was to frame the analysis using a number of themes and subthemes as identified and recognized from the transcripts.

The codes used in data review/reduction process contains the participant’s name, the theme’s name, and the subtheme’s name. Example: CM3/Heuristic/Type of heuristics.

“After completing the coding process of all transcripts, an Excel sheet was created and used in data reduction process, where the researcher copied all relevant code’s texts into this excel sheet and sorted it into categories. This process can be called ‘data fragmentation’ as well. Information from all interviews and focus groups was categorized in this excel sheet, which made any type of sorting –as required for the analysis- an easy step to take” (Document 3, p.31).

## 4.2 The Quantitative Part of the Research

Based on the ‘sequential exploratory design’, the second phase of this research will be a quantitative study. In document 4, the main quantitative research methods were presented/discussed and the ‘survey questionnaire’ was selected as the data gathering method for the quantitative part of the research.

This part of the research was carefully designed to ensure the quantitative data compatibility with the ‘integrated design’ as the selected general framework for the mixed-methods findings synthesis. As discussed in section 3.2.5, the integrated design necessitates that:

- (a) Quantitative and qualitative data are similar enough to be combined into a single synthesis.
- (b) Quantitative and qualitative data are always confirmatory or refuting in nature.

As advised in the previous chapter, the researcher attempted to answer research questions using qualitative strategy. However, there was a need to adopt quantitative techniques at a later stage to legitimize and generalize the findings. “The quantitative data help enhance the generalizability, replication, reliability, and validity of the mixed-methods research design” (Kong et al. 2016, p.5). By confirming/refuting the qualitative findings of phase 1, this quantitative part of the research (phase 2) is attempting to ensure the findings’ applicability and validity for chartering managers in Middle East Gulf dry bulk shipping companies.

For the purpose of the quantitative study, three parts of the decision-making model were selected to be tested/examined throughout the quantitative piece of work.

These parts are:

- Main heuristics in ship chartering
- The analytic intervention
- The control over heuristics

While the qualitative study’s goal was to answer all research questions, the quantitative study has the following objectives, as explained and justified in document 4:

- To validate the qualitative findings on the main heuristics frequently used by chartering managers in MEG while making their decisions in dry bulk ship chartering.
- To validate the factors that can enhance the analytic intervention process.
- To validate the discovered new ideas that can generate more control over heuristics during the explicit reasoning and evaluation process.

This section will cover the main processes carried out during the quantitative part of the research.

### **4.2.1 Research Respondents**

As stated by Bryman and Bell (2011), increasing the sample size in a quantitative study will assist in minimizing the sampling error.

According to Gulf Maritime Shipbrokers and Consultants data bank, and to the best of researcher's knowledge, there are 116 chartering managers working in the existing 47 dry bulk owning/operating shipping companies in the Middle East Gulf at the time of conducting the survey. These records have been re-checked through intensive communications with almost all MEG dry bulk shipping players.

It was decided that the entire population of the dry bulk ship-chartering managers in MEG to be targeted in this study's questionnaire, to best generalize and legitimize the qualitative findings.

### **4.2.2 Applying the Selected Data Collection Method**

In document 4, the research's dependent and independent variables were highlighted/tabulated and three research's propositions were declared.

The quantitative part of this research has applied a structured approach, and a pre-coded questionnaire was used as the data gathering method. The questionnaire was designed to achieve the following targets:

- To maximize the response rate.
- To obtain accurate and relevant information for this research.

As discussed and explained in document 4, the Likert-type scale was selected to be applied in the study's questionnaire, as it is found to be the most suitable measure for participants' responses. The applied scale offered respondents 'five' pre-coded responses for each question: Strongly agree, agree, uncertain, disagree, and strongly disagree.

Like the study's questions and propositions, the questionnaire was designed to examine the correlations between the identified dependent and independent variables.

The questionnaire starts with a brief introduction stating the identity of the researcher, the purpose of the research, and research title and objectives. The questionnaire was divided into four parts: A, B, C, and D.

Part A: The main heuristics

Part B: The analytic intervention

Part C: The control over heuristics

Part D: Demographic information

Before the start, “a pilot survey was conducted prior sending the questionnaire to potential respondents. Five chartering managers were asked to review the questions to confirm its validity and effectiveness in generating the required response. A number of words have been replaced, and few questions have been revised accordingly” (Document 4, p.37).

The survey was conducted using ‘Survey Monkey’ software, and a link to the uploaded online questionnaire was sent to all potential respondents. Phone calls and follow up emails also used to ensure the maximum possible participation from the targeted sample.

The reader may refer to document 4 (pages 33-37) for more details/discussions on the questionnaire’s design. The complete questionnaire can be found in document 4’s appendix.

After 50 days of intensive follow-up, “the number of chartering managers responded to the questionnaire was 89, but only 84 of them have completed the survey in full. Nevertheless, this gives the research a 94% completion rate. This completion rate supports the validity and effectiveness of the survey’s questions and the way it was written and supports the questionnaire design overall” (Document 4, p.37).

For the selected sample of 116 chartering managers, 84 complete responses represent a response rate of 72%. This means that 72% of all chartering managers in MEG dry bulk shipping companies have responded with a complete survey. “To achieve this percentage, the researcher spent 50 days of continuous/intensive follow-ups and personal reminders by emails and phone calls to all potential respondents to ensure their participations” (Document 4, p.39).

#### **4.2.3 Data Analysis Technique Used in the Quantitative Study**

Due to the quantitative nature of this study, statistical analyses were conducted for the surveys collected data. For data analysis, only complete questionnaire responses were considered. Therefore, N=84.

The data of the 84 complete responses were imported from the online server of Survey Monkey into an excel sheet. Thereafter, this sheet was exported to SPSS for the purpose of data analysis.

For analysis purposes, the pre-coded responses for the survey’s questions were given numerical values as follows: strongly agree = 5, agree = 4, uncertain = 3, Disagree = 2, and strongly disagree = 1

The researcher acknowledges that the selected analysis technique must be capable of confirming/refuting the qualitative findings during the data assimilating process, and must generate outcomes that are similar enough to the qualitative outcomes in order to be combined into a single synthesis. Also, the analysis techniques used must be suitably

matched to the types of variables created through the research and appropriate for the type and the size of the selected sample (Bryman and Bell, 2011).

Each of the first three parts of the questionnaire (Parts A, B, and C) has a single research question and a single proposition attached to it. The dependent and independent variables related to each research's question/proposition were grouped in their particular section. For that reason, the researcher did not require to conduct any further 'factor analysis' using SPSS.

The first gauge applied by the researcher on the collected data was 'Cronbach alpha'. "Cronbach's alpha determines the average correlation or the internal consistency of items in a survey instrument to measure its reliability. From this questionnaire's data, Cronbach's alpha is calculated to be 0.79, which is within the range of an 'acceptable' internal consistency" (Document 4, p.40).

The questionnaire was designed to stimulate respondents' level of agreement on the carefully selected statement of each question, which represent this research's independent variables. The sources of the dependent variables were the respondents, being the industry's decision makers.

In order to achieve this quantitative study's aim in legitimizing and generalizing the qualitative findings, describing chartering managers' level of agreement on each independent variable was found to be the best way in analyzing the questionnaire's data. "Therefore, the researcher elected to conduct descriptive analysis on each question including the frequency tables, the means, and the standard deviations. Also, bar charts will be used to illustrate the results of each question" (Document 4, p.40).

The researcher did not apply 'bivariate analysis' while analyzing the quantitative data, as confirming/refuting the qualitative findings can be sufficiently done using descriptive analyses.

### **4.3 Ethical Considerations**

As stated in document 1, the researcher is not an employee of any of the targeted companies in this study. This study is targeting chartering managers in the ship-owning and the ship-operating companies in the Middle East Gulf area.

The researcher is an owner and CEO of a ship brokerage and maritime consultancy company, also, an owner of a ship management company, both based in Kuwait.

There is no conflict of interest whatsoever, the researcher's owned line of businesses and his daily work are servicing the ship-owning and the ship-operating companies, and do not conduct the same type of business activities. On the contrary, the companies employing the participated chartering managers will benefit from this study's results at no cost.

Data collections processes throughout this research's journey were divided into two phases: phase one was during the qualitative study (document 3), and phase two was during the quantitative study (document 4).

Fisher's (2010) advice was followed throughout the data collection processes in this research, when he stated that "no one should be a participant or a source of information in a research project unless they have agreed to be so on the basis of a complete understanding of their participation will involve and the purpose and the use of the research". (Fisher 2010, p.74)

For the first phase of this research, ethical approval form was filled by the researcher prior to collecting any field data, and all necessary approvals were obtained prior conducting the qualitative study.

All participants in the qualitative phase of the research were provided with the 'interview guide' (see document 3 - Appendix 1) or the 'focus group guide' (see document 3 - Appendix 3) and the 'information form for research participants' (see document 3 - Appendices 2 & 4) by minimum 15 days prior to the meeting date.

All participants have filled and signed an 'informed consent form' (sample in document 3 - Appendix 5) at the beginning of each interview or focus group meeting.

For the second phase of this research, similar measures were applied. Ethical approval form was filled by the researcher prior to collecting any field data, and all necessary approvals were obtained prior conducting the quantitative study.

For the respondents, "the questionnaire starts with an introductory page advising the respondents with their rights to withdraw without giving a reason to do so. They have been provided with the email address of the researcher, and in case they want to withdraw, they are requested to send an email and ask for their data to be withdrawn from the study. Participants have been advised that the participation is totally voluntary, confidential and anonymous" (Document 4, p.38).

All survey participants have been introduced properly to this research's objectives and the reasons for conducting it. Fisher (2010) advocates that it is essential that survey participants be aware of the objectives of the study.

Immediately after the questionnaire's introduction, and mandatory prior to proceeding to the first part, participants were asked to confirm the following:

- They have read and understood the purpose of this research.
- They understand that their participation is totally voluntary and they have the right to withdraw their data at any point.
- They confirm that they are at least 18 years of age and they accept to take part in this research.

This research followed Fisher (2010) guidelines on the necessity of treating all participants fairly, and in protecting their privacy by securing the information related

to them, and ensuring that the collected information will not be used in any way that might cause any harm for participants.

Also, this research follows the regulations of the College Research Degrees Committee and the College Research Ethics Committee at Nottingham Trent University which are composed of both policy people and academics.

## 5. Analysis and Synthesis

In this chapter, the researcher connects the qualitative and the quantitative findings by synthesizing the findings of the previous phases of the research. As discussed and justified in chapter 3, ‘thematic synthesis’ is found to be the most appropriate synthesis method for this document.

The findings of the qualitative part of the study (Document 3) and the findings of the quantitative part of the study (Document 4) will be assimilated in this chapter. It is essential to highlight that, in this chapter, the synthesized qualitative findings are intended to be taken as the comparative reference point, and the quantitative findings will be used to confirm/refute them. This chapter combines both forms of data into a single mixed method synthesis, using the previously selected ‘integrated design’.

The assimilation of the data will necessitate that the quantitative findings to be transformed into codes and themes, and when required, the qualitative data is converted into numerical forms. In this chapter, the researcher integrates the quantitative data within the identified/adjusted themes and subthemes as shown in Table 9 below. This type of data aggregation will offer this research the desired legitimization/generalization for the qualitative findings, by applying the previously discussed ‘confirmatory/refuting’ approach.

To avoid any confusion in the researcher’s interchangeable use of the terms ‘data’ and ‘findings’, it is appropriate to recall Heyvaert et al. (2013) words that the synthesized ‘data’ in the mixed-methods research’s review are ‘findings’ extracted from the primary qualitative and quantitative studies.

**Table 9: Research’s themes & subthemes**

Section	Theme	Subsection	Subtheme(s)
5.1	Decision	5.1.1	Types of ship chartering decisions
5.2	Heuristics	5.2.1	Types of heuristics
		5.2.2	Cases and examples
5.3	Bias	5.3.1	Types of biases
5.4	Task-Related Factors	5.4.1	Ineffective factors in the provided list
		5.4.2	Additional factors to the provided list
		5.4.3	Role in selecting the relevant heuristic
5.5	Top-Down Control	5.5.1	Factors affecting the top-down control
5.6	Bottom-Up Control	5.6.1	Ideas for the bottom-up control
5.7	Model’s Soundness	5.7.1	Validity and workability of a model/process

The sections/subsections below cover the synthesis of the research’s findings under the titles of the identified themes/subthemes.

## 5.1 Decision

This section synthesizes the findings which are categorized under the first theme ‘decision’. Decision making is the “cognitive process of selecting a course of action from among multiple alternatives. The decision-making process produces a choice of action or an option that determines the decision maker’s behavior and therefore influence on task performance.” (Bazerman and Moore 2009, p.7)

This first theme represents the ship chartering managers’ decisions that need to be studied and investigated.

As stated by Axaroglou et al. (2013) in the “capital intensive, highly cyclical and volatile maritime industry, chartering managers are asked to make decisions such as how long to commit their ships by choosing the time duration of the charter contracts, considering the current level of demand for transportation services, along with the growth prospects of the market.” (p.37). There are many other types of decisions under uncertainty that chartering managers are required to face frequently in the shipping market, Axaroglou et al. have only mentioned an example.

As highlighted in section 1.2, most of the ships around the globe have been built or bought against finance scheme or loan arrangements; hence, stable income is vital for company’s continued existence. Wrong or bad chartering decisions can threaten the company’s continuity and its financial survival.

### 5.1.1 Types of Ship Chartering Decisions

In document 3, it was clarified that “knowing the type of ship chartering managers’ decisions that need to be investigated is an important building block in the decision-making model. Understanding this subtheme is a vital step enabling the researcher to shape the parameters of the ship chartering decision-making process” (Document 3, p.32).

During the interviews and the focus groups, chartering managers, ship brokers and ship consultants have expressed their views and opinions on the chartering managers’ decisions that need to be studied and investigated.

In simple and straightforward words, CM5 expressed his views:

*“The decision which had to be studied and investigated by a chartering manager are how they decide to fix the vessel or contract a charter? Whether to go for time charter or for voyage? Long-term time charter or short-term time charter? ..... Choosing from alternatives as well.”*

CM2 affirmed that the charter type and choosing from alternatives are among the important decisions that a chartering manager face, and added that the ‘timing’ of entering the market is an important decision by itself:

*“That is what depends on the cargo as well as the freight, then we choose which vessel, i.e, choosing among alternatives. As you know, come in the market timing. What is the charter type ... time charter or voyage?”*

CM1 added the levels of risk and profitability as dimensions for the type of decisions for a ship operator. CM1 believes that a chartering manager needs to decide first on the maximum level of risk he might accept and the minimum acceptable profit margin:

*“Being an operator, I think basically what everyone thinks about firstly is, how risky is the business or how much profitable it is. Being an operator, I think, in our case it is that we need to take over a vessel in TC or we need to just perform voyages and, in case we're operating a vessel, which cargo to choose, what is the market currently, which one is more profitable, what's more risky. The market changes rapidly in shipping, so we have to go through a certain process for selecting a particular cargo for a vessel, or a particular vessel for our cargo”*

CM4 believe that positioning the ship and planning for the next employments are decisions need to be carefully considered:

*“We have to see the number of ships available in that market and if the repositioning of our ships is okay or not. I would say -also- while deciding on a fixture, on the employment of the ship. We have to think of many things like first the revenue. Whether the freight or the hire that you get is-- whether you can get a better freight or better hire by going somewhere. Then the second, we can say the repositioning, by going into that area, what are you going to get back? You get a lot of coal into India but now back from India you don't get any cargos.”*

CM3 believe that chartering manager is governed by a situation that dictates on him the range of decisions he might take. Also, CM3 pointed out the same boundaries’ dimensions as stated by CM1, being the decisions on the acceptable level of risk and reward:

*“What you mean by chartering decisions can be different things depending a bit on the situation you're in. Are you trying to fix a spot vessel for example, or are you looking at fixing COA, you looking at taking a vessel in, chartering a vessel in, or chartering a vessel in for a long period? They're all complex decisions and analysis in their own rights ..... It may differ quite a lot between the different options and that can be actually difficult to account for. I think we also look quite a bit on the risk side, the most obvious things ...at the end of the day, you look*

*at the options, and you try to collect the options. Try to understand how rewarding they are, how well they're paying, but also the risk side."*

Throughout a very interesting focus group, ship consultants shared their views on the chartering managers' decisions that need to be studied and investigated.

SC2 was generous in sharing his long experience and expressed his opinion on the focal decision that makes the difference in the process of decision making for the chartering managers in the Middle East Gulf:

*"From my experience with chartering managers in the Middle East Gulf, there are certain elements which I feel-- they play a vital role in the chartering manager's decision and are instrumental to the decision that he takes. One, he has to decide if he has to stay spot or go for the closest opportunity that is available to him. This closest opportunity sometimes might not be optimal for the company's standards."*

SC1, efficiently, listed the decisions he believes need to be studied while constructing a decision-making model for ship chartering in MEG:

*"The methods of coverage, the period or a spot or time charter or voyage. These are the types of fixture. If it's spot, period, short period strategy like three to six months, or up to one year, the type of the fixture, is it on TC - time charter - or on voyage? Also COA, or period. It's part of the period coverage as well, but different type of fixtures."*

The employment of the ship, the trading limits, and the duration of the charter are the decisions which need to be studied, according to SC3:

*"A chartering manager's basic concern would be the employment of the vessel. Second is the management decision whether the vessel is to be employed within the Gulf or internationally. Third, also really important, the period which is available to the chartering manager to work the ship - whether it would be long term, short term, voyage, time charter."*

SC4 affirmed the same points mentioned by SC3 on the trading limits and duration of the charter. SC4 added the type of cargo as a decision worth considering:

*"The period of taking this vessel for charter, the type of cargo I would consider, trading in the Gulf or outside the Gulf, do I go with the short term or long?"*

SC5, as well, highlighted the same sort of decisions on trading types and cargo destination, and gave an example on the importance of cargo type:

*"The type of trade. The type of trade as far as the location and as far as the traded commodity. To give an example, trading in a specific region, with various commodities will require a lot of effort by the crew."*

*Changing holds-- preparing the holds from one cargo to another so that I should keep in mind. It should be part of the decision process for a chartering manager."*

In the second focus group, ship brokers shared their own views on the chartering managers' decisions that need to be studied and investigated.

SB1, being on the daily hot trading seat as an active ship broker, is referring to the current volatile market while describing the chartering manager's important decisions, in his opinion. He also clearly differentiates the local players from the international players in decision-making priorities:

*"I would say, probably the hardest decisions to make is whether to go for long or short strategies in this kind of very volatile market. I think some of our clients are struggling a lot whether they should go for, let's say, a short-term spot strategy or they should look at it long-term. Whether its voyage-- again, most of our clients here are industrial clients, so it's all voyage-orientated anyway. We don't deal much with operators in the region, and the operators in the region we're dealing with are mostly European-based operators that have offices here, which is a completely different way of making a strategy or taking decisions than the local clients here. So I would say our clients, the big decisions are the macroeconomic - it's the long-term use rather than the short-term use."*

SB2 believe that the choice between tramping and industrial shipping is one of the important ship chartering decisions, which is governed by geography:

*"One of the decisions is, geography, where do they want to keep their ships? Do they just want to tramp them around the world just trying to get the best number, or do they just specifically want to stay in certain areas?"*

## **5.2 Heuristic**

This section synthesizes the findings which are categorized under the second theme 'heuristics'. Heuristics have been discussed and defined in section 2.3 of this document, and Table 1 provided brief descriptions for the seven most popular heuristics.

From the interviews and the focus groups findings, 'types of heuristics' and 'cases and examples' were found to be the two main subthemes on this subject.

### 5.2.1 Types of Heuristics

Prior to the meeting date, all participant in the interviews and the focus groups were provided with a list of the seven heuristics under investigation, together with their definitions. This list summarizes the research's theoretical findings on the relevant heuristics as expansively addressed in the previous documents.

During the interviews and the focus groups, "participant were asked to express their views and opinions on the main heuristics subconsciously and frequently used by chartering managers in MEG companies while making their judgments/decisions in dry cargo ship chartering" (Document 3, p.36).

CM2 feels that recognition and fluency heuristics are less relevant to chartering managers' daily decisions in Middle East Gulf:

*"Representativeness heuristic. Number one is relevant. And second, also, it's relevant, availability heuristic. And third, the anchoring and adjustment heuristic, yes, it is also relevant. Affect heuristics, yes, this is also relevant. Recognition heuristic, I feel it is along the 50-50 chance... less relevant. And, fluency heuristic, I also think similar to that... less relevant. Take-the-best heuristic, number seven, which I feel that it's fine, I think this is a bit relevant."*

A different view was expressed by CM3, as he believes that all seven heuristics are valid and frequently used by chartering managers in MEG:

*"Representativeness heuristic. Now that's certainly valid. Availability heuristic. This is certainly valid .... Anchoring and adjustment, yeah, this is also valid. Affect heuristics, certainly. Recognition heuristic. Yeah. Recognition heuristic I think is valid too. More comfortable thinking, there is something. Yeah. Fluency Heuristic is probably valid too, yeah. Take the best heuristic, yeah, sure."*

Similarly, CM1 believes that chartering managers, at the stage of making decision or judgment, do fall under the effect of heuristics subconsciously:

*"Representatives, yes, it is. Availability, yes, always. Because no matter if you don't make rational decisions, then also you follow your judgment and your instincts. Anchoring and adjustment, Yeah, sometimes. Affects heuristics ... Yes. I think all seven they are relevant in the first stage at least."*

Representative and fluency heuristics need to be deleted from the list, according to CM5, as he believes that they are not relevant to him:

*“Representativeness heuristic I do not find quiet to myself of guidance in my judgment on my business and my decisions. So this one I would take it out [...] Also...I will eliminate the fluency heuristic”*

CM2 believe that we can add an important heuristic –in his opinion- to the list:

*“I believe we can add a very important heuristic ... we can call it ‘vibrational harmony’ between two individuals. i.e., the charterer and the ship operator are thinking in the same or similar wave length.”*

‘Vibrational Harmony’ is a thought to be considered, although it can be reflected under the affect heuristic.

Participants in the first focus group, the shipping consultants, also gave their opinions -as observers to chartering managers- on the types of heuristics. Without exception, all of the participants in this focus group were of the opinion that all of the seven heuristics are relevant.

Most of the answers were in similar forms to SC2’s statement:

*“From the list of heuristics that I have at hand, all of them have their own weightage and importance. In fact, I personally feel all of them contribute to a certain percentage in the chartering manager's decision-making at the time of decision-making.”*

Or, in a straightforward and brief reply, as in SC5 statement:

*“I believe all of them is part of the decision-making.”*

SC3 was slightly different in his view. While confirming that all heuristics are relevant, he was weighing the importance of the heuristics for chartering managers in MEG, and chose the top three:

*“All the seven heuristics mentioned here have their own identity and usefulness. But particular to this region I think the first three, which is representative, availability, and anchoring and adjustment, are quite important. To a lesser extent, recognition heuristics. And least of all I believe is the affect, fluency, and take-the-best heuristics.”*

Participants in the second focus group, the ship brokers, also affirmed that all of the seven heuristics are relevant and applicable. All participants in this focus group believe that their clients –the chartering managers- do fall under heuristics’ subconscious effect.

SB4 was one of the three ship brokers who gave identical views:

*“I also take the stand that all of them, more or less, are taken into consideration and at the end of the day the person - the man in charge - is only a person who has feelings and he will be following them. Either this is because he's had a bad experience or whatever it is - his decision*

*making is taken upon his feelings, and his gut feeling at the end. So yeah, I believe all of them.”*

SB3 was the only slightly different stand. He affirmed that all the seven heuristics are relevant, but he gave less importance to take-the-best heuristic.

*“All of them are applicable. From my experience, I recognize that more or less all of them are using all that is written here. And yes maybe the one which I reckon has a bit less than the other as well is number seven, take the best heuristic but otherwise, I think all of them can work.”*

The above qualitative findings can be transformed into a numerical form, by counting the number of times each heuristic was chosen -by the 14 participants- as one of the ‘main heuristics’ frequently used by chartering managers in MEG companies while making their judgments/decisions in dry cargo ship chartering. The numerical results for each heuristic can be summarized as follows:

The representative heuristic was selected 13 times, availability heuristic 14 times, anchoring & adjustment heuristic 10 times, affect heuristic 14 times, recognition heuristic 11 times, fluency heuristic 9 times, and take-the-best heuristic 7 times.

From the qualitative findings, it can be claimed that the main heuristics subconsciously and frequently used by chartering managers in MEG while making their decisions in dry cargo ship chartering are: representativeness, availability, affect, and recognition.

In the survey questionnaire, part A, the respondents were asked seven questions; each question represents one of the seven heuristics. Each one of the seven questions assumed that its specific heuristic is one of the main heuristics subconsciously and frequently used by chartering managers in MEG while making their decisions in dry bulk ship chartering. Respondents have shown their level of agreement with such assumption by selecting one of the pre-coded answers (on a scale from 5 to 1, with ‘5’ being strongly agree and ‘1’ is strongly disagree). The applied statistical analyses uncovered chartering managers’ opinions on the main heuristics that they frequently use in their daily chartering decisions, which can be summarized as follows:

Representativeness heuristic: 71.4% of the respondents acknowledged that ‘representativeness’ is one of the heuristics that they truly use in their day-to-day ship chartering decision making, while 21.4% showed disagreements. The mean of respondents’ answers was 3.94 (with ‘5’ being strongly agree and ‘1’ is strongly disagree). Therefore, representativeness heuristic is elected to be one of the main heuristics used by chartering managers in MEG shipping companies.

Availability heuristic: 91.7% of the respondents supported the assumption that ‘availability’ is a heuristic that they use in their ship chartering decisions, while only 7.2% expressed their disagreements. The mean of respondents’ answers was 4.38. Hence, availability heuristic is proven to be one of the main heuristics used by chartering managers in MEG shipping companies.

Anchoring and adjustment heuristic: Only 46.4% of total respondents believe that ‘anchoring and adjustment’ is a heuristic that they use in their ship chartering decisions, 21.4% were uncertain, and 32.2% showed disagreements. It is interesting to notice that this heuristic was on the ‘edge’ to be included as one of the ‘main heuristics’ as shown in the above qualitative investigations, and it is again on the ‘edge’ in the quantitative analysis. Even the mean of respondents’ answers was on the edge, with a value of 3.21. Statistically, this heuristic will not be considered as one of the main heuristics.

Affect heuristic: 59.5% of total respondents accepted that ‘Affect’ is one of the heuristics that they actually fall under while making their regular ship chartering decisions, whereas 27.3% showed disagreements. The mean of respondents’ answers was 3.62. In general, managers tend to deny the fact that they mix emotions and feeling with their business decisions, thus, 59.5% confession rate is considered to be on the high side. It can be stated comfortably that affect heuristic is one of the main heuristics used by chartering managers in MEG shipping companies.

Recognition heuristic: 77.4% of the respondents supported the supposition that ‘recognition’ is a heuristic that they use in their daily ship chartering decisions, while 13.1% stated their disagreements. The mean of respondents’ answers was 4.11. Hence, recognition heuristic is verified to be one of the main heuristics used by chartering managers in MEG shipping companies.

Fluency heuristic: Only 22.6% of total respondents believe that ‘fluency’ is a heuristic that they use in their ship chartering decisions, 13.1% were uncertain, and 64.3% showed their disagreement. The mean of respondents’ answers was 2.5. Looking at these numbers, it can be clearly said that this heuristic is not one of the main heuristics used by chartering managers in MEG shipping companies.

Take-the-best heuristic: Only 15.5% of total respondents believe that ‘take-the-best’ is a heuristic that they use in their day-to-day ship chartering decisions, only 4.3% were uncertain, whereas 79.7% showed disagreements. The mean of respondents’ answers was 2.31. It is the highest rejection rate seen in this study. Therefore, this heuristic will not be considered as one of the main heuristics.

The above assimilation reveals that the quantitative findings are ‘confirming’ the qualitative findings.

### **5.2.2 Cases and Examples**

During the interviews and focus groups, the 14 participants have been asked as to what extent and in what way ‘heuristics’ are impacting the decisions of chartering managers in MEG shipping companies in the dry bulk shipping market. In addition, they were encouraged to share cases and examples from their real lives’ experiences.

The 14 participants have shared 37 remarkable stories about heuristics and their effects on ship chartering decision making in Middle East Gulf companies. All of these stories

will be of great value for this research and for the planning of decision-making model's applications, but in this section, only a few samples will be discussed and analyzed.

Before addressing the participants responses on this subtheme, and to add a numerical flavour to the previous subsection's findings, it is worth highlighting that out of the total 37 stories/examples, there were 11 examples (which equates to 30% of total stories) for representativeness heuristics, 9 examples (24%) for the availability heuristic, 8 examples (21%) for the affect heuristic, 6 examples (16%) for the recognition heuristic and single example (3%) for each of the anchoring & adjustment, fluency and take-the-best heuristics. It is interesting to note that participants conscious and subconscious choices -on the main heuristics- seems to be reconciled with each other to a certain extent.

CM5 shared a real-life example of representativeness heuristic and its effect on his decision making:

*"I had a very bad experience loading in Thailand during special period, the raining period, where my vessel stayed for over 3 months to load 20,000 tons of bagged sugar, and at the end of the day, we ended with no demurrage. I will avoid fixing my vessel to such business in the future, to any Thailand ports, even if they pay me \$10 over the market because this \$10 per ton will not cover even my demurrage if I consider it as demurrage for two months, 60 days."*

Another example of representativeness heuristic and its effect on chartering manager's decision was illustrated by CM3:

*"Just an example of chartering managers from X country known to be difficult or back trading, or in the past difficult in terms. So people have this picture in mind about this people from this country. Of course, it's generalizing but it works. In the absence of time, when you're pushed for time, then you need to apply these heuristics sometimes to make a decision."*

CM3, in more than one occasion during the interview, stressed on the fact that he prefers a specific type of charter over other types, regardless of the other details of the deal:

*"I feel more comfortable with TC versus, fixing on a voyage for sure."*

This is a clear example of a chartering manager falling under the availability heuristic.

CM1 has fallen under the affect heuristic, she admits that 'affect' does have a great influence on her decisions. She is recalling the following story, as an example:

*"The last aggregates that I fixed, there was a handymax vessel and the owner was Egyptian, but he was very arrogant and very rude that, despite of having the option to choose his vessels, I have never gone to him. I rather prefer to leave that cargo, but I did not go to him back. So, I think, yes, it does have a great influence on our decisions."*

Another statement on the affect heuristic was shared by SC4, as shipping consultant, he was trying to show to what extent this heuristic is monopolizing chartering manager decisions:

*“It has a lot to do with it as well. The mood of the person at that time. The day, how was it, is it sunny, is it gloomy, is it rainy, it has a lot to do with it. Everybody's-- most of us as family people, wake up in the morning and we have some problems with the kids or with the wife, so it will affect a little bit. Okay, you try not to affect, try to leave it out but it has to do with it. Affect heuristics. It has a lot to do with the owner / chartering manager, a lot to do with it. But it depends on the person that day, that time, not to get this involved in his decision. You try but it is built in. How to overcome it, it is a different way of using it.”*

CM2 believes that himself, and MEG chartering managers in general, do fall under recognition heuristics while making ship chartering decisions:

*“very often that we have two choices to go with, and one we trust and we have good experiences with, and one looks a lot riskier ...frankly, we go with the one we recognize.”*

As an example on the take-the-best heuristic, CM4 stated that:

*“I think if it's somebody we trust, some good brand comes in for either when we're fixing out ... good reputation comes when either we're fixing out fixing in, that I quite often make the decision very quickly. Stop the analysis and make a decision. Yeah”*

Chartering managers consider take-the-best as a useful tool, which can be utilized by experienced chartering managers, only.

This subconscious process that influences the decision maker does not follow any systematic order when its taking place, there are cases when chartering manager fall under more than one heuristic at the same time or on the same occasion. SB2 shared an example when a mix of availability, representativeness, and affect heuristics are in action:

*“We used to do a lot of business with Iranians and what I found is a lot of them they are a lot more emotional....they were doing a lot of business with Chinese. So I think with the Chinese the approach would always be very different than -for example- if they were dealing with Greeks, because their experience with Chinese that they were a lot more flexible with, let's say, terms and negotiating-- let's say, Charter party terms are more interested with just numbers, and I think they found a lot of-- let's say, European owners, they're a lot more focused on discipline and charter party terms rather than-- especially the numbers were important but a lot more stricter with charter party terms as well. So their own*

*bias was always to deal more with Chinese owners than, let's say, European. This is a mix of availability, representativeness, and affect."*

One last example to share here presented by SB1, it concerns recognition heuristic. It shows how ship brokers can easily feel that their client –the chartering manager- is falling under the heuristic effect:

*"Recently I was trading with one of our clients, and it was a one year period and we had one ship but they have had other ships on from this owner. They know the owner, they know the ships, and they know the flexibility they get. They know that they can ask for things outside of the charter party, and it will always be evaluated and given in good faith and there will always be cooperation. On the other hand, we had another ship where we personally as brokers, know that the owner have this but our client does not know. And of course in some cases they can follow the advice of the broker but the client end up saying, 'But listen, I'd rather go for the one that I recognize, the one that I have dealt with many times instead of going with a ship because there's an uncertainty in this and I don't want to be a part of that'."*

### **5.3 Bias**

This section synthesizes the findings which are categorized under the third theme 'bias'. As stated by Gigerenzer and Gaissmaier (2011) "deviations from logical or statistical principles became routinely interpreted as judgmental biases and attributed to cognitive heuristics". (p.452)

As elucidated in document 3, probable biases or as frequently called 'errors' in decision making "should not be viewed as fragile effects that can easily be made to disappear; they are important regularities in decision behavior. These cognitive, as opposed to motivational, aspects of decision errors have important implications for evaluating and aiding decisions" (Payne and Bettman 2004, p.114).

Understanding the biases that are emanating in ship chartering decisions and the heuristics causes them is an important building block in the designed decision-making model. Having said that, the researcher admits that discovering the frequent biases that are affecting MEG chartering managers' decisions appeared as difficult to be achieved through direct questions to participants. Nonetheless, the discussions have highlighted some new biases that were not listed earlier in the literature and benefited the participants in knowing more about the significance of this subject to their business.

### 5.3.1 Types of Biases

Before every interview and focus group, the researcher was explaining to the participants the threat of biases to ship chartering decision-making, and the fact that those biases are resulting from the use of heuristics. “Chartering managers, shipping consultants and ship brokers as participants in this research’s interviews and focus groups were asked if they can think of some biases in chartering decision making and if they can relate these biases to specific heuristics that might cause them” (Document 3, p.41).

Few participants answered passively when they were asked about biases in decision making; an example will be CM5’s reply:

*“Yes, sure there are biases. But, no I do not have any in mind now”*

CM4 believe that, sometimes, recognition heuristic might lead to ‘reduced income’ bias. Among two alternatives, he’ll choose the charterers that he recognizes -under the time pressure and the uncertainty- which might be lower in return’s value:

*“If you present it internally and say, ‘We're earning less for this vessel but it's a good charterer.’ you can get away with a little bit, I think. This is kind of bias, its income bias. You did not reach the optimum, but you prefer the security and the stability.”*

CM3 believe representativeness heuristic can lead to what it might be called an ‘avoidance bias’, or sometimes ‘prejudicing bias’:

*“Quite often, we attach regional traders or even national traders Koreans, Greeks, Indian operators for example ...And sometimes people mention that they avoid them, so it's avoiding bias. And reversely, I think if you're dealing with-- some extent German, you expect perfection.”*

CM1 also blames the representativeness heuristic for the ‘avoidance bias’:

*“It's just because one Turkish owner I met and he was so nice that now I like all Turkish people. One Greek owner so arrogant that I don't like any Greek owners now. One Chinese charterer was so difficult that now I find every Chinese very difficult ... It's the picture you have in mind. It is a bias, yes, it is a bias.”*

SC2 believe that heuristics like recognition and fluency can lead to what he called a ‘racial bias’. A very interesting note:

*“Owners in the Middle East tend to prefer fixing charterers in this region. Sometimes they avoid better names ... international names.. I call this racial bias ...and it is a result from recognition heuristic in my opinion, or maybe fluency heuristic.”*

A number of biases were introduced by SC1. He believes that representativeness heuristic is the main cause of these biases:

*“Losing better business opportunity by eliminating clients, by eliminating products because of just his negative image of a certain nationality, or a certain ship owner, or a charterer, or a certain product, that one time it was lifted and things went wrong, that from that now on he is not going to carry such material or deal with such nationality. Not expanding their charterer's list or number of clients. It's definite bias because of representative heuristics.”*

SC1 also blames chartering managers for their overuse of availability heuristics resulting in limiting their trade to MEG area only:

*“They are not opening new doors, for different commodities, trades, regional trading, i.e.: not in this Gulf, maybe you try to trade the ship in the Far East or in the Mediterranean or in the western hemisphere. I think it's very much availability heuristics magic.”*

SB4 is relating the loss of new business opportunities and avoidance to develop new trades to the recognition heuristic, these are biases in his opinion:

*“I believe so, yes. I mean with recognition heuristics, if we go with the cargo, let's say, somebody, follows aggregates lot because it's easy and he's in his comfort zone and he's using this time and again and again. When the market is picking up and he needs to go to South America, and he's never done it with the Panama let's say. Because he's so stuck here, he might lose the opportunity of enjoying the other market and trying it out. So maybe that would give him a negative, I would imagine, out of it. Especially in the Middle East.”*

#### **5.4 Task-Related Factors (TRF)**

This section synthesizes the findings which are categorized under the fourth theme ‘task-related factors’.

Table 2 shows the factors that affect the ship chartering decisions as adapted from Ozer & Cetin (2012). As discussed earlier in section 2.5, those factors will be the starting point for this research and will be considered as our preliminary ‘task-related factors’ (TRF) list.

This table -together with a proper explanation- was sent in advance to all participants in the interviews and the focus groups prior to the meeting dates. During the interviews and the focus groups, the participants were asked to share their experiences and opinions on the listed factors that believed to be not affecting chartering managers’ decisions in MEG shipping companies. Also, participants were encouraged to add any missing factor to the provided list.

Moreover, participants were asked as to what extent and in what way the task-related factors (TRF) are affecting chartering managers' subconscious step of selecting the relevant heuristics. All participants were enthused to share some examples.

Based on participants' contributions, three subthemes were identified: 'Ineffective factors in the provided list', 'additional factors to the provided list', and 'role in selecting the relevant heuristic'.

#### 5.4.1 Ineffective Factors in the Provided List

Chartering managers were very specific and displayed full attention to the provided list of task-related factors during the interviews, and were carefully selecting their answers on the 'ineffective factors' in the list.

CM1 believes that the fleet size of the ship owners will not have an effect on her decision, all of the other TRF as listed in the table are relevant:

*"I think this fleet size of the ship, it won't influence my decision. If an owner has one vessel or a couple of vessels, that doesn't matter. The rest I think it is applicable. As per my experience."*

CM2 was really well prepared for the answer, he had a list in hand contains his opinion on the ineffective TRF's on the decision maker. According to CM2, the ineffective factors are:

*"I believe that the following factors should be deleted from the list: need of arranging the cash flow by the ship owner, controllability of the charter contract by the ship owner, use of statistical market modelling, estimation of the economic crisis by the ship owner, knowledge of the ship owners about ship charter type, corporate structure and asset related situations, corporate structure of the ship owner, concern of imitating competitor companies, fleet size of the ship owner."*

CM3 decided to delete the 'knowledge of the ship-owner' only, the rest of the TRF are relevant in his opinion:

*"Knowledge of the ship-owner about ship charter types, I think I'd take that out. That's not something that actually affects me. The rest are all relevant."*

CM4 believe that 7 factors from the list are not relevant:

*"knowledge of the ship owners about the ship charter types, the experience of the ship owner in certain charter types, the strategy of the ship owners and the ship chartering, the market intuition of the shipowner are not relevant. The demand on the charter with regards to*

*the charter type, concerned of imitating competitor companies, and corporate structure. They are not relevant as well.”*

The ‘need of arranging the cash flow’ and ‘the concern of imitating competitors’ are not in CM5’s consideration, and he does not have such concerns in his career:

*“The need of arranging the cash flow by the ship owner, I would take it off I don't have in my consideration. Because if I am working for a managing company, I need to get the best, always, from the ship for the benefit of the ship owner. Also, I would take out the concern of imitating competitors. I don't have such concern in my career, or in my view to the ship.”*

Shipping consultants, as participants in the first focus group, had their views on the provided list of task-related factors. Their long experience and knowledge in MEG ship chartering made their answers of great value. The start was with SC1:

*“I think the use of a statistical market modelling, actually it's not used by the chartering decisions in the Gulf, after dealing with so many of them, whether government companies or private companies, rarely I have seen any of the chartering managers or any of these companies, they worry about the market modelling.”*

SC2 has an interesting comment on the ‘need of arranging cash flow by ship owners’, as he believes it is an irrelevant factor:

*“The need of arranging the cash flow by the ship owner, this particular point is beyond the realm of a chartering manager's concern, because his chartering manager's perspective ends until the stage of employing the ship or finding a suitable employment for the vessel.”*

In short reply, SC3 decided that:

*“I would delete the risk in the market, scientific market estimations, knowledge and experience of the owners.”*

The professionalism of the charterers was the core of SC5’s reply. He also believes that scientific market assessment, statistic modeling, and imitating competitors should be taken out of the list:

*“I believe operational proficiency of the charterer should be exempted from this list. To justify that opinion, the dry cargo, in the Gulf region, mainly dealing with smaller size company which will not give them the privilege of having professionals. On that basis, I believe that it should be stricken out. I also second that scientific market assessment, statistic modeling, it should not be included because this is not a general concern. Imitating competitors, also, I feel that it should be stricken out of the list, as I don't see owners are concerned to be seen imitating others.”*

Ship brokers, as participants in the second focus group, suggested deleting almost similar factors which were cited by the chartering managers and the shipping consultants. All four brokers stated nearly similar points to SB4's statement:

*"The use of scientific market assessment, I don't think it's something that people actually use day-to-day basis. And also the concern of imitating competitor companies for sure I don't think if this program which is working, there's no need for anybody to fear to follow it when it's already proven itself many, many, many times, I think."*

#### **5.4.2 Additional Factors to the Provided List**

When participants were asked to add any missing factors -that they can come up with- to the provided TRF list, some of the answers were found to be very creative and eyes opening for the researcher.

Nonetheless, some of the answers were 'less creative', with CM5's reply, as an example:

*"No, I would not add, you have sufficiently put everything in general so I can see I don't want to go to less specific. In general, you have everything."*

Looking at the bright side of the contributions, CM4 is suggesting to add the risk in dealing with the counterpart as a factor, also, the change in international regulations and the new laws being imposed:

*"The credibility of the charterers -- credibility risk ... counterparty risk can be added. Also, the international regulations are points to be considered as factors maybe affecting the decision making."*

CM2, in his usual quiet and thoughtful replies, stated few factors which he believes worth adding to the TRF list:

*"I would add class and flag of the ship, H& M and P&I insurance, and History of PSC detentions."*

SC1 was very generous in his detailed answer. It is very obvious that SC1 has allowed a decent time to think of proper gaps in the provided list, as he has managed to add very interesting points:

*"I would like to add more points, the size of the cargo ... The volume has a great effect on the owner side to make a decision whether to go for the business or not. Is he given a small cargo quantity or a large cargo quantity? This affects his decision in entering into a business. Also, the type of the dry cargo or the product itself. There are plenty of cargoes that are traded in Middle East Gulf region that are not preferred for*

*certain owners, while it's the bread and butter for other ship owners. So, the type of the cargo does affect the manager's decision. Also, the political conditions of the charterers-- their companies, if they are sanctioned or they are not sanctioned, and most important of all-- the financial background of the charterers, in terms of paying the freight on time, no dispute over demurrage or unpaid freight of demurrage.”*

SC5 also touched on the type of cargo in term of specific gravity and safety:

*“I would add that the suitability of a cargo should affect the judgment, meaning light cargo, which means from a charterer's manager's point of view, if the ship will cube out, then it will be less freight, if it's on the short dollar per ton basis. If it's a corrosive type of cargo then I might need to pay extra money to clean the ship, etcetera, etcetera.”*

SB2 suggested adding an interesting factor about commodity pricing and another factor on the political situation of the charterers:

*“Commodity pricing, raw data. For example, iron ore prices are falling, so you might find ship owners looking at that and wanting to place a lot of their ships in let's say all loading ports because they assume that the Chinese may come in and take advantage of, let's say low commodity prices. So, I think that kind of information may come into account. The other thing is a political consideration. Because at the moment with sanctions in let's say Syria and Iran, that's a big factor.”*

SB3, in brief, suggested adding the relationship with charterers as a factor:

*“I would add relationship as a factor”*

### **5.4.3 Role in Selecting the Relevant Heuristic**

As discussed in section 2.5, it is believed that the task-related factors are the main affect and the driving force for the preconscious heuristic processes. “Participant in the interviews and the focus groups have shared their opinions and views on the TRF list and the related factors which are affecting chartering managers’ subconscious step of selecting the relevant heuristics” (document 3, p.47).

CM1 shared a good example on how can factors like ‘knowledge about charter type’ and ‘reliability of the charterers’ lead to the availability heuristics and eventually to avoidance bias:

*“I think this experience of this ship owner and certain charter type and knowledge of the ship owner about ship-- not the ship owner, but I might find charterers and they ask me to have one vessel on their behalf, but eventually, I got to know that they don't have sufficient knowledge about*

*that particular charter that they were requiring... I think that did influence that I quit working with that particular charterers and I've stopped working with them because it would eventually lead us to trouble. So, avoidance based on the availability was caused by one of the factors."*

Also, CM1 indirectly suggested that chartering manager's gender might be a factor affecting the heuristic process, she was giving an example of avoidance bias due to the affect heuristic, but she then said:

*"Maybe it's because that girls or ladies they're less rational, sometimes they avoid specific charterer based on feeling. Maybe you, or maybe my boss, or maybe the technical guy whom we have here - he's also male - he won't think like that. He will go to that business-- Yes, he will definitely push me also to go to that certain business or to certain company if we are having a good profit."*

CM2 believes that some of the factors from the list are not effective in the subconscious step of selecting the relative heuristic. Also, he adds few missing factors, in his opinion:

*"From the TRF table, I believe that most of these factors affect somehow the subconscious step of selecting the relevant heuristics. I would probably take off the last two categories: Technical sufficiency of the ships (the four points under this category), and the daily market changes (the two points under this category).*

*I would like to add few factors which I believe they are affecting the step of selecting heuristics: Professionalism and accuracy of technical language in the pre-fixture correspondence, tone and warmth of voice during conversation, and the geographical location of the vessel owner."*

CM3 believes that recalling stories from chartering manager's memory to assist in making a decision is a common practice in the shipping industry, which makes availability and representativeness heuristics very popular due to the factors given in the table:

*"I think quite often when we look at risks and we trade revenue and so on, we recall back what happened previously. Was this well planning? Was this risky? Did something go bad? Is there some horror story linked to it? I think the main heuristic probably we take this as availability, or mix of representativeness and availability heuristic. The shipping industry is to some extent because you always have very little time often to make a decision. You very often have to generalize so you start saying that all Geek owners are difficult to deal with so forget it. Because we don't have time we have to disregard all of them quickly."*

CM4 is happy with all the factors in the TRF table, and in her opinion, all of them are relative and are affecting chartering managers' subconscious step of selecting the relevant heuristics:

*"Yeah, I do think this list on the table are reasons of igniting these heuristics inside us. I think it is relevant."*

CM4 gave an example of another factor, the type of cargo, and how it can ignite the availability heuristic inside the chartering manager:

*"The factor 'type of cargo'. I know cargoes out of-- this was from Indonesia, Iron Ore cargo, and we had extremely bad case there ... So the next time when I see Iron Ore cargo there, we have in fact seen quite few, but then you have this in mind. Can we take? The same issues will come again."*

CM5 expressed his views on a number of factors having roles in selecting the relevant heuristic:

*"We can see the sustainability of the trade revenue. This one of the first factor to be considered. Because I have to make the calculation before going to decision, and using my heuristics, which will affect them. And secondly, we would look to the uncertainty in an economic crisis period. Also, the operational proficiency of the charterer. This will push all my availability heuristic about the charterers ... To come out and to guide me on my decision. I can say, prejudgment, having a prejudgment due to previous unsuccessful contracts."*

Charterers' reputation and the reliability of the charterers are the main concerns for SC3:

*"The most important thing owners do consider in this market, in this region, is number one -chose the charterers. There are a lot of different charterers in this region. Some perform, some don't. When picking up a charterer, it's very important-- that past experience, many of the charterers here have cash flow problems. So definitely, while picking up charterers, availability and recognition heuristics work."*

SC2 believe that company's rules sometimes put more pressure on the chartering manager and enhance his reliance on a heuristic. SC2 is giving an example when company's rules eliminate or blacklist some nationality as charterers in this small region, a chartering manager working for this owner will feel handicapped and easily falling under heuristic due to lack of varieties:

*"There are certain owners who have clear exclusions in their company's policies, like some of them are not allowed to trade Iran. Now the manager's biggest crisis and concern is how to circumvent this inbuilt handicap."*

## 5.5 Top-Down Control

This section synthesizes the findings which are categorized under the fifth theme ‘top-down control’.

In document 3’s analyses, the theme ‘control’ was representing system 2 in the dual process models. As it will be further discussed in chapter 6, document 3’s ‘control’ theme will be divided into three themes in this document: ‘top-down control’, ‘bottom-up control’, and ‘model’s soundness’.

This division is implemented for the purpose of introducing a three-stage dual-process decision-making model, which will be offering a better explanation to the decision makers on the ‘control’ part of the designed model, and an enhanced understanding of its real-life applicability.

This theme will offer an improved version of Evans’s (2006) factors that are affecting the ‘analytic intervention’. As it will be discussed in chapter 6, the analytic intervention will be described as the ‘top-down control’, and it will represent the second stage of the three-stage dual process model. According to Evans (2006), the analytic system intervention is affected by several factors, “The factors known to influence the likelihood of such intervention are: cognitive ability (or working memory capacity/general intelligence), the use of instructions requiring abstract or logical reasoning, and the time available for this more effortful and reflective form of thinking. There are several studies in the literature showing that when participants are required to respond quickly to reasoning problems, default heuristics dominate responding” (Evans 2006, p.382).

### 5.5.1 Factors Affecting the Top-Down Control

As investigated in previous documents, there are factors affecting and shaping the level of the ‘top-down control’ over the heuristic process, and are responsible for influencing the likelihood of the analytic intervention. These factors include:

- Chartering manager experience and his cognitive ability.
- Company’s instructional set.
- The time available.
- The level of uncertainty in the market and the amount of information available.

Participants in the interviews and the focus groups were asked if they see any of these factors ‘irrelevant’ and/or if they want to add more factors to this list.

Also, participants were requested to share some cases/examples on any of these factors affecting chartering managers’ control over the heuristic process.

CM5 commented on the factors affecting the level of control as follows:

*“All of them are relevant. I would also add ‘vessel condition and age’. It's very important, it's very important also. We can say ‘vessel suitability’.”*

CM5 further commented on the level of control and its relation with chartering manager's length of experience:

*“I believe that more experienced chartering managers can control heuristics more than less experienced chartering managers. Maybe the less experienced chartering manager will be more analytical, and he will go for studies, market research. Yes but it's not a control of heuristics. The long experience one can control his heuristics more and the less experienced he will use less heuristics, more analytical, but he cannot control this ‘less heuristics’.”*

CM4 also affirmed that all factors are relevant:

*“I think all these factors are relevant and are affecting the level of control over heuristics in our business.”*

CM3 believes that all factors are relevant. Moreover, he has suggested adding an additional factor:

*“I think all the factors you mentioned are relevant ...Also, it talks about chartering manager experience and cognitive availability. I think that could also be an organizational experience to some extent. That's what I was getting at before like the ability to collect and track. In addition to having chartering manager experience, we can add organization experience as well.”*

In his comment about the relation between control and length of experience, CM3 has stated a good real-life case:

*“More experience will lead you to use heuristics more, sadly, I think it leads towards more heuristics. It's meant to be that you control more. But you fall under heuristics when you have long experience ... you know more people, so you get affected by heuristics, representativeness, as many cases have been seen. Chartering managers that have been doing that job and the same chartering job for 20 years, sometimes. You can see them being probably the most applying heuristics. You can see that they are being too biased.”*

CM1 believes that all factors are applicable. Furthermore, she gave a good example of the effect of the ‘time available’ on the level of control over heuristics:

*“Absolutely, all these factors are valid ... I would give an example of the value of ‘time’ as factor ... one of my really close owners, he was really under pressure because his vessel was getting free and he was not getting a good cargo. So, he was asking me and we were not able to find*

*him a good cargo and he was also under pressure that he fix with one so-called French company, and he was so under pressure that he did not even bother to inquire about the company or get the fixture list or something, as he believe that western owners are all first class. He just fixed it and the vessel was delivered to the charterers, the charter party was signed everything was done. And after four or five days, he came to me inquiring about that particular charterer ... the French charterers. I was so shocked because I've never heard about them. We came to know that the French charterers were frauds only and it was a fake company with a fake identity and my owners they bear huge losses.”*

This example shows –in reality- how does the time pressure affect negatively the level of control over the representativeness heuristic.

In the first focus group, all shipping consultants without exception have expressed their belief that all four factors are relevant and are affecting the level of control over heuristics. In addition, during the very interactive discussions, they have commented on this subject and suggested adding few more factors.

SC1 suggested adding ‘the timing of making the decision’ as a factor affecting the level of control over heuristics:

*“Time of decision making which means sometimes he has to stay awake, trade at night to accommodate the charterers’ availability, who's probably in the other part of the globe. So, this might again hamper his clear sense of decision-making, because he has to do it at night, and urgency or maybe peer pressures.”*

SC5 touched on an interesting point related to the factors affecting control under the company’s instructional sets:

*“What I would add is to have a computerized system - I'm not sure if that's possible or not - but if there is some way to have a computerized system to take part of the decision under the company’s instructional sets, because of a simple matter, which is the computer is unemotional. Minimize the human touch or minimize the human emotion in decision taking. So, the numbers talk at the end of the day, the number talks.”*

An attention-grabbing point raised by SC1. In his opinion, the number of decision-makers involved in the decision-making process for a single decision affects the level of control over heuristics:

*“Some owners are, in this area that are one man show, so the decision is very much affected by heuristics. Other companies in the area are-- they have board members, different companies involved in this ship management company, so the decision is taken by several people. This definitely affects the control of heuristics. We will have more heuristics involved in a single decision, the one man show ... So number of decision*

*makers at the time, or involvement in decision making affect the level of control.”*

Another good point by SC1:

*“Some companies, or chartering managers for ship owners in the area, they wear two hats. Sometimes they are owners, sometimes they are charterers. This dual personality or dual chartering procedure definitely affects their heuristics. Because, although they own ships and he's a chartering manager of a ship owner, yet sometimes he acts as a charterer. This has an effect in taking the decision or shaping his heuristics. He could have more heuristics involved because he has been playing roles on both sides. Being a ship owner or being a charterer.”*

SC4 view that the level of comfort that the chartering manager has in his company affect his level of ability to control heuristics:

*“The comfort of the manager in his company...The working environment, it has a lot to do with it, because he's relaxed, in comfort, he will go into the details of the deal with more control.”*

In the second focus group, all ship brokers have also affirmed that the four factors are relevant and are affecting the level of control over heuristics. Many stimulating points has been raised as well.

SB3 believes that the chartering manager's level of experience is the center of all factors:

*“Thanks to experience. Because of course, the more chartering manager has experience, the more he is able to take a decision, and he has more time probably, and probably is also able to have more influence of the company's instructional sets to give him more authority so all are linked.”*

SB4 refers to the power that the head of chartering department has over his team, and his managerial strength. SB4 believes that if he is 'feared' by the team, they'll think twice before letting themselves fall under heuristics:

*“Maybe what could be done to affect them say per the level of control would be the authority - the hierarchy - the top guy has to be feared maybe. Maybe if he gave fear then the man in charge would think twice to put in front all of his heuristics feelings. Use more power.”*

Another good factor affecting the level of control over heuristics is the 'seating plan' at the chartering office, according to SB1:

*“Chartering managers should be sitting together, I think. For example, I'm sitting next to Faisal, and we both work for MKL Company. It's better. We're having dialogue, we have a quick passage of ideas. So, I'm thinking something quickly - I've got your information next to me. And*

*especially with the time constraint. You know, you don't have time to walk into the room and back again.”*

From the above qualitative findings, it can be concluded that all participants have expressed their agreement to the proposed four factors that are affecting the top-down control over heuristics and are responsible for influencing the likelihood of the analytic intervention.

In the survey questionnaire, there were four questions in section B; each question represents one of the four factors: Instructional sets, cognitive ability, the time available, and the level of the uncertainty.

Each one of the four questions assumed that its specific factor is one of the main factors affecting the top-down control and is able to enhance the analytic intervention in the proposed decision-making model.

Respondents have shown their level of agreement with such assumption by selecting one of the pre-coded answers (on a scale from 5 to 1, with ‘5’ being strongly agree and ‘1’ is strongly disagree).

The applied statistical analysis revealed chartering managers’ opinions and beliefs on the main factors affecting the top-down control and are able to enhance the analytic intervention, which can be summarized as follows:

**Instructional sets:** 90.5% of respondents believe that ‘instructional sets’ is one of the main factors affecting the top-down control and is able to enhance the analytic intervention process. Only 2.4% of respondents disagreed with that. The mean of respondents’ answers was 4.36.

**Cognitive ability:** This factor achieved 94.1% agreement rate to its valid effect on the top-down control and in enhancing the analytic process. 2.4% was the disagreement rate and the mean of respondents’ answers was 4.56.

**The time available:** 89.3% of respondents consider that ‘the time available’ is one of the main factors affecting the top-down control and is able to enhance the analytic intervention process. 3.6% of respondents showed their disagreement. The mean of respondents’ answers was 4.42.

**The level of uncertainty:** 92.9% of respondents expressed their agreement in considering ‘the level of uncertainty’ as one of the main factors affecting the top-down control and that the more information available to chartering managers (lower uncertainty) can enhance the analytic intervention process. 3.6% was the disagreement rate, and the mean of respondents’ answers was 4.4.

The above assimilation reveals that the quantitative findings are ‘confirming’ the qualitative findings.

## 5.6 Bottom-Up Control

This section synthesizes the findings which are categorized under the sixth theme ‘bottom-up control’.

As explained in the previous section, this theme ‘bottom-up control’ together with the previously discussed themes ‘top-down control’, and the coming last theme ‘model’s soundness’ were all parts of the theme ‘control’ in document 3.

The revised distribution and the amendments are done for the purpose of introducing a three-stage dual-process decision-making model in this document.

This theme is vital for this research’s development, as it consists of the research’s discoveries on the sources for the ‘bottom-up control’.

### 5.6.1 Ideas for the Bottom-Up Control

This subtheme encloses participants’ ideas that can be applied at the level of the chartering managers -being middle managements- for a ‘better control’ over heuristics. Participants were asked to suggest ideas to make the interaction between the analytical and heuristics processes more productive and effective in controlling heuristics, eliminating the biases, and in producing a rational outcome from a descriptive process.

CM4 suggests that every decision to be discussed in a group. Then the group to decide collectively. So, in case if a person is biased, most likely it will not affect the final decision because it is a group decision:

*“Everyday morning, we have a meeting - chartering meeting. There I discuss the employments of the ship, the next employments of the ships. So, if anybody has any concerns, like if the insurance team has any concern, operation teams have any concern, they discuss it out there. And then accordingly we go ahead on our decision.”*

CM5 suggests that chartering managers in different companies should arrange meetings outside working hours, this will help –in his opinion- in the enhancement of the analytical capabilities of the chartering managers:

*“I believe having yearly two meetings with other chartering managers from other companies, at least yearly - two times.... exchange, even dinner. Sharing the information, sharing the experience. A real-life experience hearing from the people directly.”*

CM3, as a chartering manager in one of the large ship-operating companies, shared several ideas on actual control tools which are implemented in his company that assist –in his opinion- chartering managers in controlling heuristics and more importantly, eliminating biases:

*“We have a separate system to actually assess this, which are more fundamental. We have, for example, trading limits, a credit team that*

*will tell us if the counterpart, if they are actually solid, and if they have the money or not. I think that is one way. As for the operational record, this is also something that we have an actual system around so we log information. The bias that we start with is something we can actually check. We do have, because of our long history and big operations we have data bank for operational track record, for financial health. Also, there's a bit of a checklist you're supposed to go through, and these other internal systems as well as many other colleagues you can deal with. If you suspect that you have doubts, you can always have a word and see if others share your opinion and thinking. So, those are ways to get around bias."*

Another idea to control heuristics is to 'rotate the staff', according to CM3. His company applies this strategy to avoid the over-dependence on the personal relation, and to encourage the chartering manager to use more analytical tools:

*"I think our company does mobilize people around the globe. This is also one of the ways to minimize heuristics, not to know too much in the one place, get change, keep the concepts but rotate around the globe with different clients."*

CM1 believe that process needs to be channelized, with the proper team in place:

*"I think the best way, in my opinion, is to channelize the process. If you have a good team, there are chances that these biases would be minimized."*

Further thoughts and ideas for better control over heuristics took place during the first focus group's discussions. SC5 suggests using 'logarithmic model' in the decision making, and inspires more reliance on a computerized system:

*"Admittedly it's a tough task, because of the subconscious. One suggestion would be to involve more the logarithmic models into the decision-making. For example, reliance on logarithmic processes to be part of the decision-making."*

In contrary, SC4 is against computerized process for practical reasons, in his opinion:

*"I am against the computerized stuff, which is you have to make the computer take the decisions, because a computer is giving a result. It doesn't give an input, the input comes from a person like us. So, the heuristics are involved in these kinds of things."*

SC3 recommends having a proper procedure in place to achieve better control over heuristics. He also suggests that chartering manager to discuss internally with his colleagues to minimize the dependence on heuristics:

*"To control this, we have to put procedures, and we go into these procedures and we will have a result [...] also we have to share it with colleagues. It is not a solo decision. Say, maybe I have a heuristic, and*

*the other colleague, he doesn't have that heuristic, so it will reduce the bias."*

SC5 gave an example of the use of ship chartering procedure at one of the largest ship-owning companies in the Middle East Gulf area:

*In XYZ Company, you have to follow a set of procedures, you have to list all the vessels offering bids, and also you have to include all the negotiations. It's part of the approval you get from the top management. The top management will have to sign on the approval note, to agree to it. So, there is some sort of control on how far the chartering manager can lean toward one or the other, or have to use a quick way to get the deal done and go home."*

SC1 suggests introducing shipping students with 'heuristics and biases program' at shipping schools, for them to know their 'enemy':

*"Know your enemy ... we should prepare a newer generation, that they will avoid dependence on heuristics and rather control their feelings on all the heuristics and take decision that is rational and applicable in each occasion."*

In the second focus groups, Ship brokers participated with their valuable ideas and thoughts for better control over heuristics. SB4 suggests that chartering managers talk to each other, and not to waste too much time in analysis, in his opinion:

*"Consult someone, take the information. As we know too much analysis is paralysis. So, in this market, in this present market, you've got to be quick. Quick and efficient and correct."*

Different view by SB1, as he believes that the 'spot part' and the 'analytical part' of the ship chartering decision-making process are both important. SB1 suggests that those two parts to be placed closer to each other with an enhanced interaction:

*"Between the analytical, which I would assume would be research or risk management and then the spot chartering desk... The only way that you can control it is by those two departments in some way emerging or at least having some strong communication between them [...] more meetings, short-term meetings, and maybe even more important also some team-building."*

In contrast to other participants promoting the detailed procedure and tight chartering checklists, SB3 is warning ship chartering managers from the overuse of control:

*"Like an example with XV questionnaire, XV Company is basically the main shipping company in their country, they have some request to have vessel acceptance to perform the voyages which are unbelievable. Something like 100 different points and making all the people crazy. They do that. They're missing a lot of things."*

SB2 proposed an idea that assists –in his opinion- in avoiding the reliance on heuristics and eventually eliminating biases in chartering decision making. He is proposing that chartering managers fix their ships basis published shipping indices:

*“Many ship owners they want to limit the decision making by simply fixing out their ships on index, because the analytical side of it is so hard to predict in this kind of market.”*

Participants have come up with some creative ideas for the ‘bottom-up control’ over heuristics. Participants have suggested ideas that can be applied in MEG shipping companies at the middle management level to make the interaction between the analytical and heuristics processes more effective, with an aim to control the heuristic system, eliminate the biases, and produce a rational outcome from a descriptive process.

To summarize the findings of this theme, and as instigated in document 3, the interpretations of the participants’ ideas are congregated under three groups: Chartering procedure, team decision-making, and preparing the decision maker.

#### Group 1: Chartering procedure

- Check lists
- Questionnaires
- Computerized process
- System to check the credibility of the charterers
- Channelized process
- Merging the market research and chartering teams

#### Group 2: Team decision-making

- The selection of a qualified team
- Seating plan of chartering managers in the chartering room
- Group decision making

#### Group 3: Preparing the decision maker

- Exchange knowledge and experience with counterparts in other companies
- The level of comfort of the chartering manager in his company
- Familiarizing decision makers with the heuristics and biases program

In the survey questionnaire, there were twelve questions in section C, divided into three sub-sections as follows:

C1) Chartering procedure: 6 questions

C2) Team decision-making: 3 questions

C3) Preparing the decision maker: 3 questions

Each question represents one of the 12 ideas (as stated in the qualitative findings above) that can be applied in MEG shipping companies at the middle management level to make the interaction between the analytical and heuristics processes more effective.

Respondents have shown their level of agreement with the proposed ideas by selecting one of the pre-coded answers on each question (On a scale from 5 to 1, with ‘5’ being strongly agree and ‘1’ is strongly disagree).

The applied statistical analyses revealed chartering managers’ opinions and beliefs on the proposed ideas for the bottom-up control. The analyses are divided into three parts (based on the initiated groups) which can be summarized as follows:

Chartering procedure: This group consists of six ideas, as covered in part C1 of the questionnaire. As shown in Table 10 below, respondents’ agreement rates on all of the six ideas were ranging from 71.5 to 92.8%, with means ranging from 3.79 to 4.33. Therefore, it can be said that all of the six ideas formulating the ‘chartering procedure’ group are ideas that can be implemented to generate more effective bottom-up control over heuristics in ship chartering decision-making process.

**Table 10: Summary of responses to the ideas grouped under ‘Chartering Procedure’ (Source: Document 4, p.54)**

<b>Ideas</b>	<b>Agreement</b>	<b>Disagreement</b>	<b>Mean</b>
The use of check lists	85.8	3.6	4.10
The use of questionnaires	75.0	6.0	3.87
Implementing computerized process	72.6	4.8	3.96
Establishing a system to check the credibility of the charterers	92.8	3.6	4.33
Implementing channelized and sequential process	88.1	1.2	4.10
Merging the market research and chartering teams	71.5	8.3	3.79

Team decision-making: There are three ideas formulating this group, as presented in part C2 of the questionnaire. As shown in Table 11 below, respondents’ agreement rates on all of the three ideas were ranging from 72.6 to 96.5%, with means ranging from 3.99 to 4.67. Thus, it can be stated that all of the three ideas formulating the ‘team decision making’ group are ideas that can be implemented to generate more effective bottom-up control over heuristics in the ship chartering decision-making process.

**Table 11: Summary of responses to the ideas grouped under ‘Team Decision Making’ (Source: Document 4, p.55)**

<b>Ideas</b>	<b>Agreement</b>	<b>Disagreement</b>	<b>Mean</b>
The selection of a qualified chartering team	96.5	1.2	4.67
Modifying the seating plan of the chartering team in the chartering room	76.2	7.2	3.99
Group decision making	89.3	4.8	4.36

Preparing the decision maker: This group comprised of three ideas, as covered in part C3 of the questionnaire. As shown in Table 12 below, respondents’ agreement rates on all of the three ideas were ranging from 92.8 to 96.4%, with means ranging from 4.17 to 4.39. Hence, those three ideas formulating the ‘preparing the decision maker’ group are verified to be ideas that can be implemented to generate more effective bottom-up control over heuristics in ship chartering decision-making process.

**Table 12: Summary of responses to the ideas grouped under ‘Preparing the Decision Maker’ (Source: Document 4, p.55)**

<b>Ideas</b>	<b>Agreement</b>	<b>Disagreement</b>	<b>Mean</b>
Exchanging knowledge and experience with counterparts in other companies	94.2	2.4	4.17
Increasing the level of comfort of the chartering PIC in his company	92.8	0	4.26
Familiarizing decision makers with the intuitive decision making and its errors	96.4	1.2	4.39

The above assimilation reveals that the quantitative findings are ‘confirming’ the qualitative findings.

### **5.7 Model’s Soundness**

This section synthesizes the findings which are categorized under the seventh theme ‘model’s soundness’. The findings of this theme will be considered only as guidance for the researcher on decision makers’ perceptions and trust in a decision-making model that might be used to support the ship chartering decision-making process. This theme will guide the process of the model’s execution and assist the researcher in measuring the level of decision makers’ resistance.

### 5.7.1 Validity and Workability of a Model/Process

As explained in document 3, “this subtheme consists of participants’ opinions and thoughts on the validity and the workability of a decision-making model or process. Participants were asked, if this model/process with ‘analytical & heuristics’ interactions is designed, to what extent do they think that this process/model can improve ship chartering managers’ decision making in Middle East Gulf” (Document 3, p.54).

Chartering managers, shipping consultants, and the ship brokers have expressed different views during the interviews and the focus groups.

CM5 believes that chartering manager don’t have time to read a process or study a model. Having said that, he trusts that if it is placed in a way suitable for chartering manager’s daily workload, it will definitely assist in enhancing the control:

*“If we can present it in a way that is falling into the process ... You don't have to go and read a paper... It's a process of a company, for example, a computerized system.... this will help and will affect in enhancing control.”*

SC5 believe that it is difficult to implement such model or process in the shipping industry, but it is a valid approach toward controlling heuristics. The challenge is in the way of implementation:

*“Theoretically, it will definitely control. However, is it possible, I question? Shipping is a people's business, so this might backfire. But will this model improve the decision-making without involving emotion? Definitely. To what extent? I believe shipping-- I still believe shipping is a people's business, and you give some and you take some. That's why I feel also it's difficult to implement.”*

A different view was expressed by CM3, as he believes that this model will eventually be accepted and will have a good effect on the long run after understanding its value:

*“This model, I'm sure will be -slowly- accepted and adopted, at least subconsciously in their minds, at least for the sake of upgrading themselves or honing their skills for better negotiations because from tomorrow onwards, if I'm taking a decision, I will subconsciously think, under which heuristic am I falling.”*

According to SC2, only by ‘implementation’, the workability of such model can be tested:

*“In my viewpoint, analytical and heuristics ... implementing both these factors is a very noble idea, and it has to be tried. Now, the success of this model can be established only after testing it in the market.”*

## 6. Discussion

As stated in chapter 1, the aim of this research study is to produce a ship-chartering decision-making model that can streamline chartering managers' decision-making process. Throughout this research's phases, it was explained that the heuristics and biases approach, as a single process, cannot satisfy the aim of this research. "It is not possible, using psychological approach, to achieve such aim with a single process model. Yes, it will be descriptive, but it will lack the 'control' or the 'corrective' process that can streamline the decision" (Document 3, p.50). Also, the heuristic and biases as 'single process approach' was challenged by many authors including Gigerenzer and Gaissmaier (2011), as they believe that it is difficult to develop a systematic single process model of the building blocks of heuristics.

For these reasons, this research investigates a dual process decision-making approach. According to Frankish (2010) "A dual-process theorist holds that there are two distinct processing modes available for a cognitive task, which employ different procedures and may yield conflicting results. One process (system 1) is characterized as fast, automatic and non-conscious, the other (system 2) as slow, controlled and conscious" (p.914).

As explained and justified throughout this research, Evans's (2006) work on the dual process modeling will be taken as the theoretical lens for this research. Having said that, there were gaps and weaknesses -as highlighted earlier- in this model which is being rectified in this research study.

This chapter will discuss the work done during this research's investigations to fill the gaps in Evans's (2006) model and to achieve the desired improvements. This will be done by discussing the findings presented in chapter 5, and by incorporating parts of Pennycook et al.'s (2015) three-stage dual process model's explanations -as to how the dual process models actually work- in this research discussions, and consequently in the revised decision-making model as presented at the end of this chapter. The outline of this chapter is demonstrated in Fig.7 below.

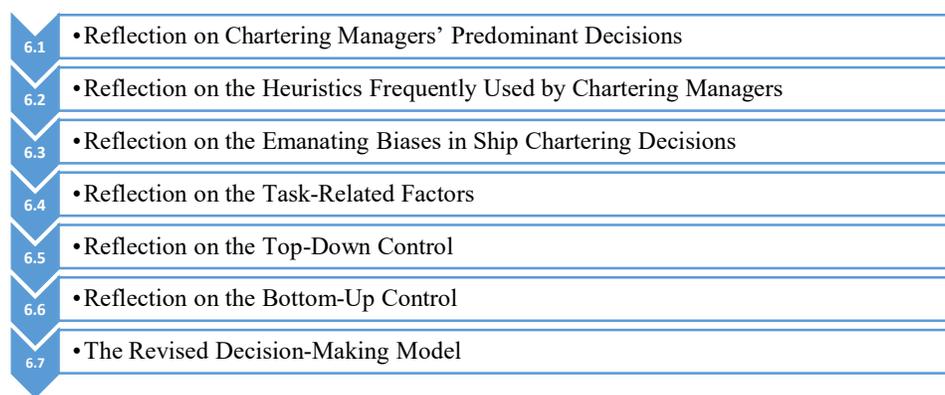


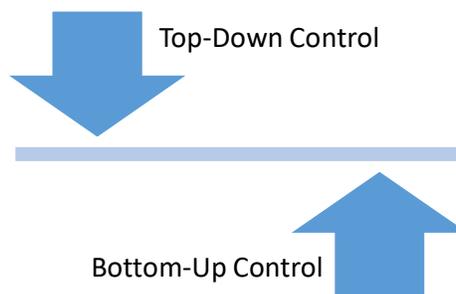
Figure 7: The outline of this chapter's discussions

In sections 6.5 and 6.6, the researcher elected to use the ‘top-down’ and the ‘bottom-up’ terminologies to illustrate the difference between the two types of control that are taking place at the two separate stages of the designed model. The second stage of the three-stage dual process model is called the ‘analytical intervention’ while the third stage is called ‘the explicit reasoning and evaluation process’.

Stage two is mainly affected by the company’s rules and the natures of the business and the decision maker. This stage is called ‘top-down control’ to reflect that the decision maker, as an individual middle manager, will not be able to adjust the factors affecting this stage of control.

While the third stage of the three-stage dual process model consists of chartering managers’ -the middle managements- ideas for better control. This is why it is called the bottom-up control.

As shown in Fig.8 below, the top-down control and the bottom-up control are coherently working together to streamline the ship chartering decision-making.



**Figure 8: The role of the top-down and the bottom-up controls in streamlining the ship chartering decision-making**

Dividing the ‘control’ into two stages in this document will be for the purpose of introducing a three-stage dual-process decision-making model, which will be offering a better explanation to the decision makers on the ‘control’ part of the revised model and an enhanced understanding of its real-life applicability.

This research’s questions were designed to fill the gaps in Evans’s model to ensure its workability and efficiency for chartering managers in Middle East Gulf shipping companies and their judgment and decision making. All questions will be answered, and a revised ‘three-stage dual process decision-making model’ will be presented in this chapter

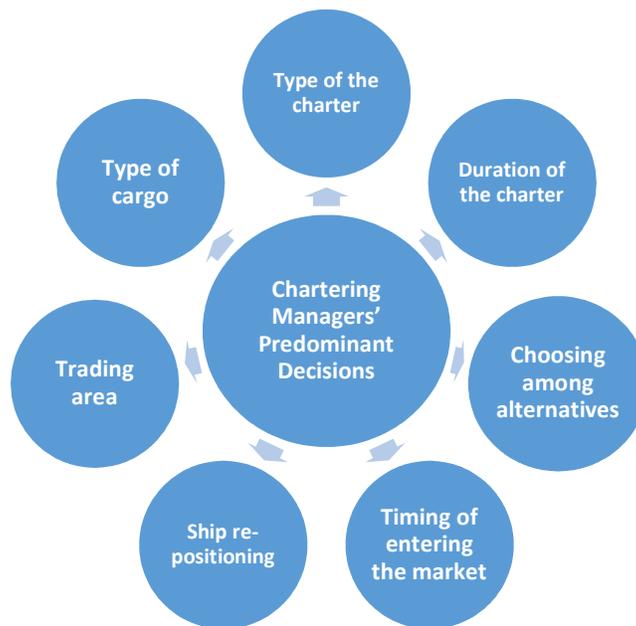
This model is an attempt to bridge the gap between the normative and the descriptive approaches to ship chartering decision-making, with an aim to achieve a ‘rational decision’ as an end-product of a modified ‘descriptive decision-making process’.

## 6.1 Reflection on Chartering Managers' Predominant Decisions

Chartering decisions are the anticipated outcomes of the designed model, and all of the preceding processes are constructed to achieve the desired 'rational outcome' from an unavoidable 'initial descriptive stage'.

To succeed in designing an effective decision-making model for chartering managers in Middle East Gulf dry bulk shipping companies, the researcher believes that it is essential to recognize the type/nature of the tactical decisions that this model is designed for, or as it is suitably termed in this section 'the chartering managers predominant decisions'.

The findings of section 5.1 on the predominant chartering managers' decisions in MEG dry bulk shipping companies can be summarized in Fig.9 below.



**Figure 9: Chartering managers' predominant decisions in MEG dry bulk shipping companies**

Participants in the interviews and the focus groups came with almost identical responses for the chartering managers' decisions that need to be studied and investigated. These types of decisions were also in line with the previously investigated types of chartering decisions -as published in the shipping related literature- throughout document 1's review. For that reason, no further quantitative investigations were required on this theme, as the findings of the qualitative part of the research do not necessitate generalization.

Realizing this theme -with its valuable content of the participants' inputs- assists the researcher in shaping the parameters of the ship chartering decision-making model. Moreover, the findings of this theme should be considered as an important feed, when actual business applications for the model takes place.

## **6.2 Reflection on the Heuristics Frequently Used by Chartering Managers**

Realizing the heuristics which are subconsciously and frequently used by chartering managers in Middle East Gulf dry bulk shipping companies while making their chartering decisions is an imperative milestone for this research. Those heuristics are an important feed for the first stage of this research's three-stage dual-process model, which will fill one of the previously discovered and deliberated gaps in Evans's (2006) and Pennycook et al.'s (2015) models.

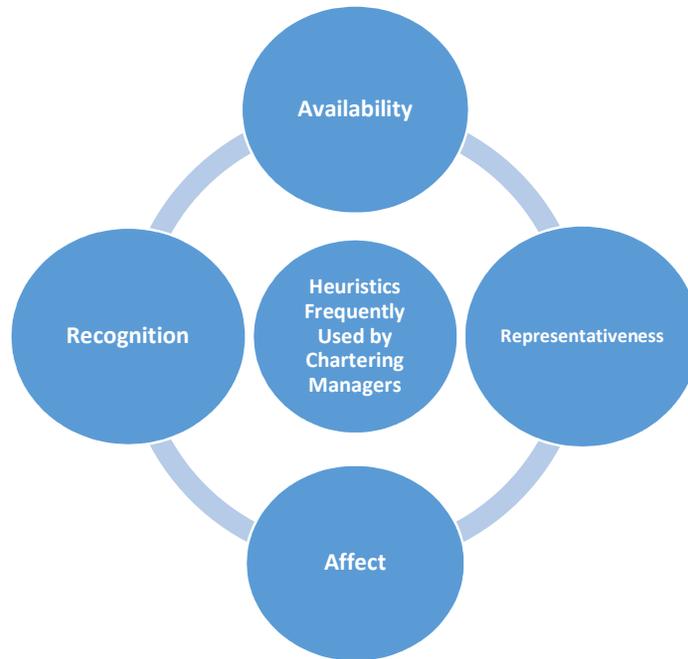
As discussed earlier, this research is implementing the theoretical lens of Evans's (2006) heuristic-analytic model, with enhanced processes as produced by Pennycook et al. (2015). Having said that, and as advised earlier, this research applies further enhancements and adjustments to the model's feeds and processes to ensure its workability and compatibility with its intended applications.

In his model, Evans (2006) have labeled the initial stage of 'constructing the most plausible or relevant model' as a 'heuristic stage' without further explanation or identification of those heuristics.

Also, Pennycook et al. (2015) work can be criticized for stating that decision maker's initial response is generated by a stimulus at stage 1, without giving this stage any further attention.

In this research, the heuristics -as the source of the intuitive response- were extensively investigated throughout document 2, and all of the well-established, well-researched, and implemented heuristics that are relevant to managers' decision-making -in the researcher's opinion- were highlighted and discussed.

In subsection 5.2.1 of this document, the synthesized qualitative and quantitative findings under the subtheme 'types of heuristics' have discovered the heuristics which are subconsciously and frequently used by chartering managers in Middle East Gulf dry bulk shipping companies while making their chartering decisions. Those heuristics are demonstrated in Fig.10 below.



**Figure 10: Heuristics frequently used by chartering managers in MEG dry bulk shipping companies**

Moreover, and as shown in subsection 5.2.2 pertaining the subtheme ‘cases and examples’, participants have shared 37 stories about heuristics and their effects on ship chartering decision-making in Middle East Gulf companies. Some of these stories are of great value for this research and for the planning of the decision-making model’s applications.

It is found to be of interest to highlight the fact that the 37 stories/examples were reflecting different heuristics. It might be a way to interpret participants’ subconscious preferences and beliefs on the ‘main heuristics’. Their choices on the shared stories might be a way to infer how the participants measure the importance of each heuristic, subconsciously.

It is interesting to note that participant conscious and subconscious choices -on the main heuristics- seems to be reconciled with each other to a certain extent.

Fig.10 above together with the great stories shared by participants are considered as sufficient answers to the research question No.1 and the research question No.2, as stated in section 1.4.

### 6.3 Reflection on the Emanating Biases in Ship Chartering Decisions

While exploring the heuristics, it was possible to investigate the well-established, well-researched and implemented heuristics from the trustworthy published literature, which resulted in a list of a widely recognized seven heuristics. After that, the qualitative and the quantitative parts of the research managed to discover the heuristics which are subconsciously and frequently used by chartering managers in Middle East Gulf dry bulk shipping companies while making their chartering decisions.

However, when the researcher attempted to apply the same approach on the managerial decisions' biases that are emanating from the use of heuristics, the list of the common and well-researched biases was much longer, as shown in document 2 (pages 35, 36, and 37).

It was not possible to ask the participants in the qualitative part of the research to detect the related biases to the ship chartering decisions from that list, as the permissible time for the interviews and the focus groups could not allow for such discussions on a relatively long list of identified biases.

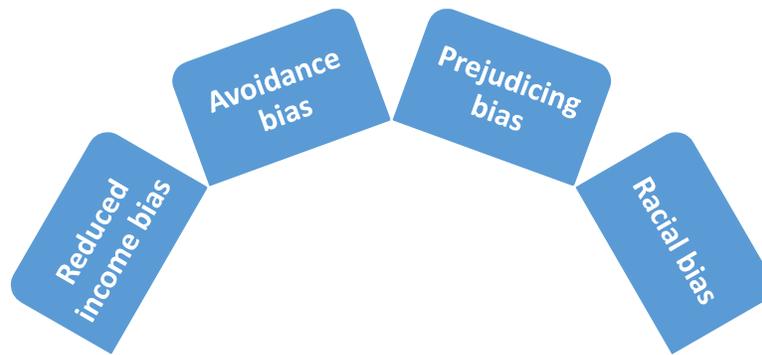
Hence, the discussions with the participants in this research's interviews and focus groups, as shown in section 5.3 under the theme 'bias', was focused on the biases that participants can recognize in ship chartering daily decision-making and if they can relate these biases to specific heuristics that might cause them.

The desired outcome of this research, as shown under the theme 'bias', was altered accordingly to reflect a possibly achievable target, which is identifying the biases that are affecting chartering managers' decision-making in MEG dry bulk shipping companies. Subsequently, the researcher evaluated the outcome and added to the previously identified list of biases the newly discovered bias that are not published or not discovered earlier.

The discussions with the chartering managers during the interviews were relatively less productive, with limited contributions from the interviewees. The focus groups' discussions were moderately better with some positive views on the type of biases that are affecting chartering managers' decisions in MEG shipping companies. This can be owed to the fact that not all chartering managers are capable of detecting their own biases, or maybe not in the way they have been asked during the interviews. Or, it might be defensive stands by the chartering managers to their decision-making ability. Shipbrokers and shipping consultants, as outsiders to the chartering decision-making process, were more comfortable talking about chartering manager's biases in decision making.

Nonetheless, the findings from the qualitative investigations revealed four biases that were repeatedly highlighted by participants. Those emanating biases in ship chartering decisions in MEG dry bulk shipping companies are demonstrated in Fig.11 below.

It is worth mentioning that those four biases were not included in the list of biases shown in document 2, which contains all biases gathered by the researcher from all investigated reliable sources.



**Figure 11: The emanating biases in ship chartering decisions in MEG dry bulk shipping companies**

As stated earlier, understanding the biases that are emanating in ship chartering decisions and the heuristics cause them is an important building block in the desired decision-making model. Having said that, the researcher admits that discovering the frequent biases that are affecting MEG chartering managers' decisions probably cannot be achieved by direct questions to participants. For this reason, the researcher elected not to perform any quantitative investigations to confirm/refute the qualitative findings. Further thoughts on this point will be presented in the conclusion's chapter.

The finding of section 5.3 as summarized in Fig.11 above are considered as an answer for this research's question No.3.

#### **6.4 Reflection on the Task-Related Factors**

As detailed earlier, Evans (2006) believes that 'constructing the most plausible or relevant model' being the first step in his decision-making processes as shown in Fig.1, lies under the heuristic process (system 1). According to Evans, this step is directly affected by the task features, the current goal, and the background knowledge. In this research's model, Evans's three factors will be incorporated -under different labels- in a more comprehensive and tailored ship chartering list of 'task-related factors'.

For the TRF list to be adjusted and legitimized, qualitative investigations were carried out throughout the interviews and the focus groups discussions as shown in section 5.4, which resulted in the sets of findings as categorized under the theme 'task-related factors'.

During the interviews and the focus groups, the participants have shared their experiences and opinions on the listed factors that believed to be not affecting

chartering managers' decisions in MEG shipping companies, which can be summarized in Table 13 below. In addition, participants have suggested adding some missing factors, those additions can be summarized in Table 14 below.

**Table 13: List of the ineffective TRF's (Source: Document 3, p.62)**

No.	Ineffective TRF's
1	Need of arranging the cash flow by the ship owner
2	Use of statistical market modeling
3	Knowledge of the ship owners about ship charter type
4	Concern of imitating competitors
5	Estimation of economic crises by the ship owner
6	Scientific market assessment

**Table 14: List of the proposed additional TRF's (Source: Document 3, p.62)**

No.	Additional TRF's
1	International maritime regulations
2	Suitability of the cargo in term of size and type
3	Political conditions at load and discharge ports
4	Commodity pricing

These findings enabled the researcher to adjust the preliminary task-related factors shown in Table 2, and to produce a revised list of the task-related factors that are affecting the chartering managers' decisions in Middle East Gulf dry bulk shipping companies.

This revised list of task-related factors is presented in Table 15.

The findings which are presented under the subtheme 'ineffective factors in the provided list' and the subtheme 'additional factors to the provided list', together with the revised list of task-related factors as presented in Table 15 below are appropriately answering this research's question No.4.

Furthermore, the participants in the interviews and the focus groups have shared some good examples to express their opinions and views on the TRF list and the related factors which are affecting chartering managers' subconscious step of selecting the relevant heuristics.

Those findings which are presented under the subtheme 'role in selecting the relevant heuristic' are sufficiently answering this research's question No.5.

The researcher did not require further legitimization/generalization for the qualitative findings under the theme ‘task-related factors’ through quantitative investigations, as the preliminary TRF list was adapted from Ozer & Cetin (2012) research, which is originally based on a quantitative approach. This preliminary TRF list was verified and adjusted during this research using a qualitative approach. Therefore, for the purpose of designing this research’s decision-making model, there is no requirement to investigate the findings of this theme any further.

**Table 15: The revised list of the task-related factors**

<b>TRF Factor grouped according to their similarities</b>
<b>Risk in the market</b>
Risk in the selected charter type
Sustainability of the trade revenue
Uncertainty in economic crisis periods
Fluctuations in freight and hire rates
Political conditions at load and discharge ports
International maritime regulations
<b>Qualifications of the charterer</b>
Operational proficiency of the charterer
Cargo potential in the worked region
Controllability of the charter contract by the shipowner
<b>Knowledge and experience of the shipowner</b>
Experience of the shipowner in certain charter type
Strategy of the shipowner in ship chartering
Market intuition of the shipowner
<b>Prejudgment</b>
Having prejudgments due to previous unsuccessful contracts
<b>Corporate structure and asset-related situation</b>
Corporate structure of the shipowner
Demands on the charterer with regard to the charter type
Fleet size of the shipowner
Financial power of the shipowner
<b>Reliability of the charterer</b>
Reliability of the charterer
Raising market conditions
<b>Technical sufficiency of the ships</b>
Availability of cargo handling equipment in the ships
Age of the operated ships
Condition of the operated ships
Profitability of the trade
Suitability of the cargo in term of size and type
<b>Daily market changes</b>
Daily market conditions
Commodity pricing

## 6.5 Reflection on the Top-Down Control

The top-down control represents the second stage of this research's decision-making model. It is the process that monitors any potential conflict between the 'constructed most plausible model' (stage 1) and the logic of the dry bulk ship chartering.

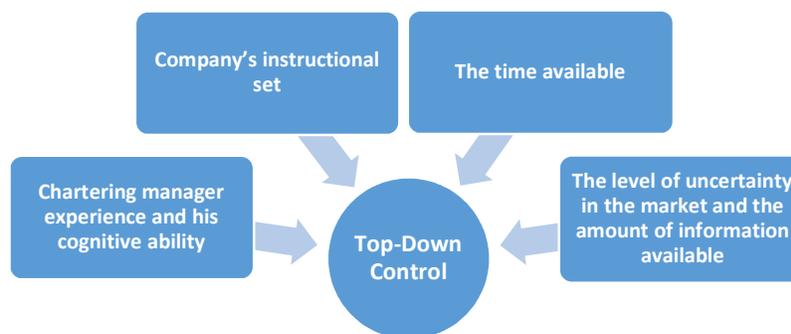
In Pennycook et al.'s (2015) model, this stage is called 'conflict monitoring' and described as the top-down control, while in Evans's (2006) model the name is 'analytic intervention', and it was left as a part of the 'heuristic process'.

For this research's model, this 'second stage' will maintain Evans's (2006) heading, but will be described as the 'top-down control' and will be positioned as the second stage in the three-stage dual-process model.

This stage will be located under the 'analytic process' and not the 'heuristic process', as Evans (2006) debatably done. This argument will be demonstrated and further justified in section 6.7.

Pennycook et al. (2015) stressed on the fact that investigations of the factors that undermine intuitive decision making may lead to effective analytic intervention, which could avoid decision errors. In this research, Evans's (2006) list of factors affecting the likelihood of the analytic system intervention was further investigated, verified, and improved.

In subsection 5.5.1 of this document, the synthesized qualitative and quantitative findings under the subtheme 'factors affecting the top-down control' have highlighted the factors affecting and shaping the level of the 'top-down control' over the heuristic process, and are responsible for influencing the likelihood of the analytic intervention. Those factors are illustrated in Fig.12 below.



**Figure 12: The factors affecting the top-down control over heuristics in ship chartering decisions in MEG dry bulk shipping companies**

The findings under the subsection 5.5.1 as summarized in Fig.12 above are explicitly answering this research's question No.6.

## 6.6 Reflection on the Bottom-Up Control

The bottom-up control represents the third stage of this research's decision-making model. This stage denotes the additional analytic processing necessary to inhibit and override an intuitive response.

In Pennycook et al.'s (2015) model, this stage is called 'cognitive decoupling' and described as the 'bottom-up' control, while in Evans's (2006) model the name is 'explicit reasoning and evaluation'.

As explained earlier, Evans's (2006) heading will be maintained, but Pennycook et al.'s (2015) terms will be also incorporated to offer better explanations to the model's users.

Pennycook et al. (2015) argue that the lower-level cognitive processes (the bottom-up) have been isolated in previous studies. In their opinion, these processes are more important in the understanding of the dynamic relationship between system 1 and system 2 processes, as they can determine which system's processes will dominate.

However, Evans (2006) and Pennycook et al. (2015) did not study the bottom-up sources of control that generate stage 3 and settled for highlighting few titles. Conversely, this research has thoroughly examined the ideas that are considered as the sources of the bottom-up control, which can enhance the explicit reasoning and evaluation process among chartering managers in the Middle East Gulf dry bulk shipping companies while making their ship chartering judgments/decisions.

Having said that, it is fair to highlight that Pennycook et al. (2015) admit that they have left the bottom-up control without further study to inspire further research, "Obtaining a stronger understanding of the bottom-up factors that lead to analytic thought could lead to more efficient debiasing interventions and, as a consequence, better decision-making. Our principle goal in the current work was to inspire and guide such research" (Pennycook et al. 2015, p.68).

In subsection 5.6.1 of this document, the synthesized qualitative and quantitative findings under the subtheme 'ideas for the bottom-up control' have revealed the ideas that can be applied at the level of the chartering managers -being middle managements- for a 'better control' over heuristics.

These ideas can be applied in MEG shipping companies at the middle management level to make the interaction between the analytical and heuristics processes more effective, with an aim to control the heuristic system, eliminate the biases, and produce a rational outcome from a descriptive process.

Those verified ideas, as grouped in Fig.13, Fig.14, and Fig.15 are considered as the desired sources of the bottom-up control in this research's ship chartering decision-making model.

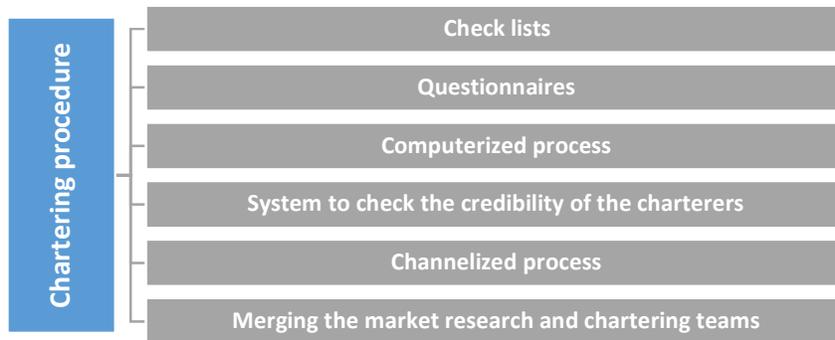


Figure 13: The ideas categorized under the 'chartering procedure' that considered as sources of the bottom-up control

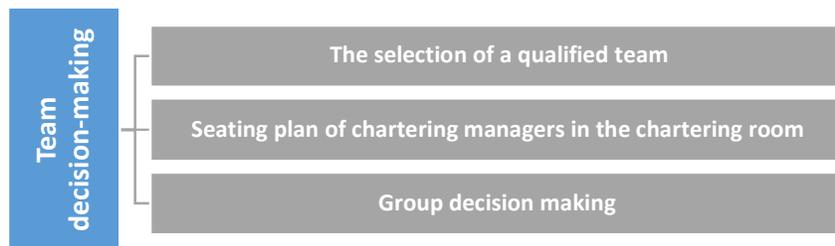


Figure 14: The ideas categorized under the 'team decision-making' that considered as sources of the bottom-up control



Figure 15: The ideas categorized under the 'preparing the decision maker' that considered as sources of the bottom-up control

The findings under the subsection 5.6.1 as summarized in Fig.13, Fig.14, and Fig.15 above are sufficiently answering this research's question No.7

## 6.7 The Revised Decision-Making Model

A lot of work has been done throughout this research’s phases, including this document, for the researcher to be able to write this section.

This section presents the desired outcome that fulfills the research aim in designing a ship-chartering decision-making model that can streamline chartering managers’ decision-making process in MEG dry bulk ship-owning and ship-operating companies, under uncertainty. The work during this document was inspired by Pingle’s (2016) words that “there is still room for improvement, particularly with regards to understanding how boundedly rational decision-makers cope with uncertainty” (p.106).

Evans’s (2006) heuristic-analytic model, as shown in Fig.1, was the starting point of this research’s investigations into the development of a ship-chartering decision-making model. During this research’s journey, this model was under continuous developments and improvements to ensure its compatibility and suitability to chartering managers in MEG dry bulk ship-owning and ship-operating companies.

The discovered gaps -throughout this research investigations- in Evans’s (2006) model can be briefly summarized in Table 16 below.

**Table 16: The discovered gaps in Evans’s (2006) decision-making model**

No.	Discovered Gaps	Explanations
1	Types of decisions	The types of decisions that this model is designed to support are not specified.
2	Types of heuristics	The types of heuristics which represent the ‘the most plausible model’ are not specified, despite being the source of system 1.
3	Types of biases	The types of biases that this model is designed to deal with are not specified.
4	Task-related factors	The factors affecting the initial stage of the decision-making model are not comprehensively studied, Evans have settled with few defined titles only.
5	The analytic intervention	Verifications and amendments were required for the factors affecting the analytic intervention. Also, positioning the analytic intervention under the heuristic process found to be unconvincing.
6	The explicit control	Despite being the only source of control in Evans’s model, this vital stage has been dealt with as a trivial component, with least considerations.
7	Who can use the model?	Evans’s model was designed as a general theory and can be criticized for the nonexistence of a practical business validity.
8	How to use the model?	There is a lack of coherence between the model’s components and on the clarity of how the decision-making processes are actually flowing.
9	Bias threats	According to Evans, bias results only from a failure to sufficiently engaging analytic intervention stage.

The previous chapters of this document together with the previous sections of this chapter have sufficiently and appropriately overcome most of these gaps, specifically the gaps stipulated under the numbers from 1 to 7, in the above table.

While facing the gaps 8 and 9 as stated in the above table, the researcher recalls Creswell’s (2008) argument that any exploratory research should not be restricted or directed by the literature. Instead, the literature should be used as an aid once patterns or themes have emerged from the data.

As discussed in section 2.6, some of Pennycook et al. (2015) explanations as to ‘how the dual process models actually work’ found to be compatible with this research’s model. Having said that, and as reflected in section 2.6, Pennycook et al.’s (2015) model can also be criticized for a few gaps and missing components.

By benefiting from this document’s findings and from Pennycook et al.’s (2015) work, a revised dual-process model -as shown in Fig.16 below- is produced to offer a better understanding of the decision-making processes of chartering managers in MEG dry bulk ship-owning and ship-operating companies. Through its three-stage dual process structure, the model offers a better understanding of the ‘bias threat’ throughout the decision-making processes. Moreover, conflict monitoring, rationalization, and the decoupling processes are harmonized with the enhanced model components, as it is believed that they can offer better explanations for the decision maker on the model’s workability.

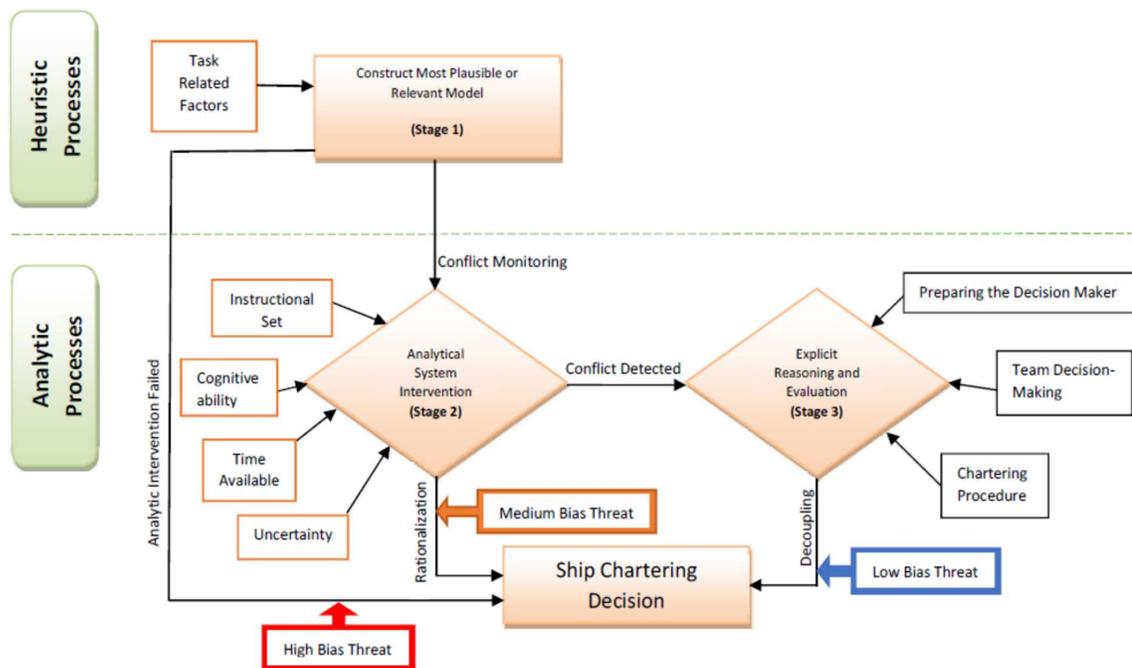


Figure 16: The revised decision-making model

This research does not aim for a theoretical model only, but to a technically practical business model that has a solid theoretical stand.

According to the revised decision-making model as shown in Fig.16, the chartering manager starts the interaction with a new task, being one of the decisions shown in Fig.9, by ‘constructing the most plausible or relevant model’ (stage 1), which is characterized by the heuristics frequently used by chartering managers in MEG dry bulk shipping companies, as shown in Fig.10. This stage is directly affected by the ‘task-related factors’ as specified in Table 15.

Once this subconscious stage 1 is completed, the duty will be on the factors affecting the top-down control over heuristics in ship chartering decisions in MEG dry bulk shipping companies, as shown in Fig.12. Those factors are responsible for influencing the likelihood of the analytic intervention (stage 2), that monitors any potential conflict between the ‘constructed most plausible model’ (stage 1) and the logic of the dry bulk ship chartering.

If the analytic intervention (stage 2) fails, the chartering manager will be considering the outcome of stage 1 as a final decision. At this point, the threat of the bias will be ‘high’ as no type of control has been employed, and the decision has been taken intuitively.

However, if the analytic intervention was successful, the next step will be either ‘rationalization’ or ‘explicit reasoning and evaluation’ (stage 3).

Rationalization is a form of system 2 processing where, despite successful analytic intervention, the chartering manager focuses on justifying or elaborating the first initial response. This means that the chartering manager does not view the outcome of the initial response as an error (i.e. no conflict detected). This could be true, and the use of the related heuristic was successful. Or, it could be wrong, and a biased decision might take place. Therefore, rationalization is a step that might carry a ‘medium’ threat of bias from the failures of response inhibition.

If conflict detection was successful at stage 2, the next step would be ‘explicit reasoning and evaluation’ (stage 3).

Stage 3 represents the bottom-up control in the revised model, and it consists of the sources of the bottom-up control as grouped in Fig.13, Fig.14, and Fig.15. This stage is responsible for the ‘decoupling’ of the detected conflict. As explained earlier, decoupling refers to the additional processing required to prevent and prevail an intuitive response.

The outcome of stage 3 is expected to be ‘rational’, however, in the unlikely event that the decoupling process fails, a bias might arise. For that reason, the threat of the bias from stage 3 is described as ‘low’ threat.

It might be noticed that the revised decision model differs from Evans’s (2006) model that consider bias as a result of a failure to sufficiently engaging analytic intervention stage, only. Also, the revised decision model differs from Pennycook et al.’s (2015) model that relate the bias threats to the two possible failures at the ‘analytic engagement’ and the ‘response inhibition’ stages only, as this research’s model consider a third source of bias threat which is the ‘unsuccessful decoupling’.

Also, after viewing stage 2 above, the reader may acknowledge that positioning the ‘analytic intervention’ under the heuristic process by Evans (2006) is unconvincing. Thus, it is positioned as a separate stage and under the analytic process in the revised decision model.

Despite sharing some of the titles and parts of the structure with Evans (2006) and Pennycook et al. (2015), the flow of the decision-making processes through the three stages in the revised model follows the researcher’s explanations as discussed above, which might differ from the original models.

## 7. Conclusion

This research's discussion has managed to answer all of the seven questions stipulated in section 1.4.

Likewise, this research's objectives as stated in section 1.3 have been satisfactorily achieved.

Consequently, the aim of this research has been reached in designing a ship-chartering decision-making model that can streamline chartering managers' decision-making process under uncertainty.

The selected research design and the applied research processes have approved their appropriateness for this study by enabling the researchers to achieve the desired outcome.

The purpose of this chapter is to bring the research to a close by reviewing the prospect of utilizing the produced model, the managerial implications, and the research's contribution to knowledge. This chapter also identifies the research's limitations and considerations for further research.

### 7.1 Will the Model be Used?

The researcher has endeavoured during the interviews and the focus groups to investigate the participants' perceptions and trust in the idea of a decision-making model that might be used to support the ship chartering decision-making process, in addition to the expected impact of that model on chartering decision-making in MEG shipping companies in the dry bulk shipping market.

As shown in section 5.7, different opinions and views were observed regarding the reliability, effectiveness, and workability of a decision-making model. Some are optimistic views, and others are pessimistic. But, the good part is that all of the participants were appeared to be ready to test such model, despite being uncertain on how it can be applied and the expected outcome.

Moreover, during the quantitative part of this research, the questionnaire's respondents were asked at the end of the survey the following two questions and have been requested to answer with 'yes' or 'no':

A) Have you thought about the subject of 'intuitive' and 'analytical' decision making before today?

Only 38.1% answered with 'yes', while 61.9% replied with 'no'.

B) Do you think that this survey has attracted you to learn more about our research, and how it can improve your ship chartering decision making?

89.3% pleasantly answered with ‘yes’ and only 10.7% said ‘no’.

The researcher views above responses as an encouraging result, and despite some conservative opinions, it appears that a ‘promising way’ is ahead of this research’s applications.

The researcher is hopeful that this work can assist chartering managers in MEG ship-owning and ship-operating companies in achieving efficient decisions.

## **7.2 Managerial Implications**

The researcher views the designed model as a reliable and effective tool that can produce rational decisions and assist MEG ship owners and operators in improving the value proposition for their ships while underway by contributing to the enhancement of their efficiency.

As part of a DBA study, this document is required to present a solution that is appropriate to the research’s problem and can be applied by MEG chartering managers in real life.

The produced three-stage dual-process decision-making model is ready to be applied by Middle East Gulf dry bulk ship-owning and ship-operating companies, for their chartering managers (being middle managements), to assist in streamlining their daily tactical decisions.

Having said that, the researcher believes that this model should be able to be applied to other shipping trades/markets (such as tankers, liquefied gas, containers) in MEG, as it has been designed to suit the most volatile shipping market (the dry bulk cargo), which is known for its highest uncertainty among other trades. All shipping markets/trades are sharing the same ship chartering structure and procedures.

Moreover, by applying suitable amendments, this model can be applied to chartering managers in the ship-owning and ship-operating companies of other regions, around the globe.

In addition to the traditional ship-owning and ship-operating companies, this model is a useful tool for managers of shipping funds and ship investments.

Despite being designed to deal with tactical decisions only, this model can have a considerable impact on the strategic level of the company. From the researcher’s personal experience, chartering decisions can make or break the shipping firms on the long-run. A lot of opportunities were lost because of wrong decisions and biased

judgments. Also, a lot of sad stories of companies' bankruptcies could have been avoided if the right chartering decisions have been made on time.

### 7.3 Contribution to Knowledge

The researcher admits that 'contribution to knowledge' bears significant value in a doctoral research. Nevertheless, it is believed that this humble work has managed to shed some light on a region (the Middle East Gulf countries) that has not been studied before in the area of intuitive decision-making, and on an industry (the shipping industry) that lacks the attention of the intuitive decision-making researchers.

Moreover, by overcoming the gaps and weaknesses of the models proposed by Evans (2006) and Pennycook et al. (2015), it is believed that the produced decision-making model is a step forward in the dual-process decision-making academic investigations.

In addition, this research focuses also on the contribution to the knowledge of practice. This research's model was created - after synthesising the existing research and models- as a practical model to support decision making in the shipping industry.

As part of this work, this research has critically reviewed the published work on heuristics, and has discovered the heuristics which are subconsciously and frequently used by chartering managers in Middle East Gulf dry bulk shipping companies while making their chartering decisions. Those heuristics are an important feed for the first stage of the developed three-stage dual-process model, which covers one of the previously discovered and deliberated gaps in Evans's (2006) and Pennycook et al.'s (2015) models.

Also, this research has discovered the predominant chartering managers' decisions in MEG dry bulk shipping companies. This 'important step' in recognizing the type/nature of the decisions that the model is designed for was not covered in Evans's (2006) and Pennycook et al.'s (2015) works.

Similarly, this research has revealed the task-related factors that are affecting the chartering managers in Middle East Gulf dry bulk shipping companies at the initial stage of constructing the most plausible or relevant model. This list of factors was not covered in the work done by Pennycook et al. (2015), while Evans (2006) has highlighted only three 'general' factors in his work.

Also, this research has listed four new biases that are emanating in ship chartering decisions in MEG dry bulk shipping companies. Those four biases were not included in the list of biases shown in document 2, which contains all biases gathered by the researcher from all investigated reliable sources.

This research has adopted Pennycook et al.'s (2015) three-stage structure and associated it with Evans's (2006) model to cover some of the latter model's gaps. Additionally, this research has thoroughly examined the ideas that are considered as the sources of the bottom-up control, which can enhance the explicit reasoning and

evaluation process among chartering managers in the Middle East Gulf dry bulk shipping companies while making their ship chartering judgments/decisions. Pennycook et al. (2015) did not study these bottom-up sources of control that generate stage 3 and settled for highlighting few titles.

This research has provided the required verifications and amendments for the factors affecting the analytic intervention. Also, positioning the analytic intervention under the heuristic process was challenged and modified.

The developed model in this research is considered to be ‘unique’ amongst the established dual process models, as it justifiably relating the bias threats to three possible failures: at the ‘analytic engagement’, the ‘response inhibition’, and the ‘unsuccessful decoupling’ stages.

Considering the above additions, alterations, and adjustments, the developed model in this research is considered more complete and usable for decision making.

It can be said that from the previously discussed participants’ feedback, people find the model feasible, useful and valuable in their decision making (Platts, 1996).

#### **7.4 Research’s Limitations and Considerations for Further Research**

As discussed in chapter 3, this research’s methodological approach for data gathering is based on a mix-method strategy with a ‘sequential exploratory’ design. The data then were assimilated through an integrated design. This type of data aggregation allowed the researcher to investigate the differences and similarities between the qualitative and quantitative findings.

Having said that, and despite the consistency between the qualitative and quantitative findings on the heuristics frequently used by chartering managers, the researcher believes that there was a possibility in improving the reliability of the interviews’ results.

During the semi-structured interviews, chartering managers have endeavoured to relate their past decisions to the heuristics’ list and its detailed explanations as presented by the researcher to them. However, decision makers are not always able/capable to judge themselves when it comes to the usage of heuristics as this process is highly dependent on the level of consciousness, even if they are sincerely trying to recall their real-life decisions and share their experiences.

In their researches on heuristics, Busenitz (1999), Fong and Nisbett (1991), and Fong et al. (1986) applied a different/more structured approach to the interviews to measure the use of heuristics. In their studies, the participants were given scenarios representing several types of real-life decisions. For each problem, the participant was requested to choose from two alternatives, one based on statistical information, whereas the other

alternative was based on heuristic reasoning. After making the choice, participants were asked to describe their reasoning for the designated decision.

This approach could have improved the reliability of this study's interviews' results on heuristics, as it allows the researcher to observe a relatively more natural reaction by the decision maker on a real-life problem. However, this approach should be mixed with some indirect questions to allow the participants to share their real-life stories.

Maitland and Sammartino (2015) applied a different approach to observe heuristics in decision making under uncertainty, "as data depth and richness are critical to heuristics studies, we chose a case study method" (Maitland and Sammartino 2015, p. 1561).

In this research, fortunately, the researcher has conducted two additional focus groups with experienced consultants and ship-brokers who are interacting continuously with the decision makers and are observing their actual daily decisions in real-life business dealings. The findings of those two focus groups were confirming the semi-structured interviews' findings, which assisted in reinstating the confidence in the semi-structured interviews' findings to a certain extent.

In addition, the questionnaire's findings were confirming the qualitative findings as presented during the data assimilation discussion.

The questionnaire is a widely used method in the field of business psychology research. Amongst many others, Zhang et. al (2014) have applied the survey questionnaire method to validate their previously collected data on heuristics from online sources.

Having said that, using the survey questionnaire as a sole data gathering method in a research that shares the aim/structure of this study is an act that needs to be cautiously considered.

Future researchers on 'heuristics and decision making' are advised to prudently select their data gathering approaches that can enable them to observe the natural reaction of a decision maker to a real-life problem that requires a choice/judgment under uncertainty and a time constraint.

Apart from heuristics, the assimilation of the findings on the 'factors affecting the analytic intervention' reveals that the quantitative findings are confirming the qualitative findings. Having said that, it is worth highlighting that the way the 'factors affecting the analytic intervention' were presented and explained to the survey's respondents might have conveyed some positive connotations which might have produced distorted results by social desirability bias. According to Krumpal (2013, p.2015) "due to self-presentation concerns, survey respondents underreport socially undesirable activities and overreport socially desirable ones".

Also, the applied approach to investigate the biases emanating in ship chartering decision-making in MEG shipping companies found to be less effective. It has been noticed that discovering all of these biases probably cannot be perfectly achieved by direct questions to participants.

Likewise, measuring the expected willingness or resistance from chartering managers toward utilizing the produced model in their daily decision-making could not be best achieved by direct questions in the interviews or the survey.

To investigate the above two subjects adequately, it is recommended to conduct the future research through an alternative approach that might reveal more accurate results.

Moreover, the researcher encourages further research on the three-stage dual-process decision-making modeling by investigating different sources of the intuitive process (system 1).

For researchers interested in testing other shipping regions with the same produced model, it is recommended to adjust/validate the TRF list, the type of heuristics, and possibly the sources of the bottom-up control before testing the model in another region.

The produced model can also be adjusted and applied on decision makers working in other industries that are sharing similar business atmosphere/nature with the shipping industry (in term of the time pressure and the high uncertainty), such as traders working in dealing rooms of banks and investment companies, stocks and futures traders.

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