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## DECISION MAKING INVESTMENT ON THE STEEL INDUSTRY BY RISK AND UNCERTAINTY CONDITION

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### ABSTRACT

This research presented is engrained within the existing decision theory and steel industry literatures. It contributes to one of the current arguments in papers by providing evidence that in the operators in the *Anjani Steel Raigarh* industry there is a link between the use of decision analysis in investment appraisal decision-making by organizations and good business performance. One reason for this is that no study to date has shown that use of decision analysis methods and concepts can actually help individuals or organizations to fulfill their objectives. Despite over epochs of research undertaken developing decision analysis tools, understanding the behavioral and psychological features of decision-making, and applying decision analysis in practice no research has been able to show conclusively. Such investigation not only contributes to the current theoretical debate in the steel industry and decision theory literatures but also provides valuable insights to practitioners.

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### 1. INTRODUCTION

Decision-making studies are useful for providing broad visions into the field of decision-making, very few have investigated investment decision-making in complex business situations where there is substantial risk and uncertainty and each investment decision requires significant capital expenditure without the prospect of revenues for many years. Decision analysis is a label given to a normative, axiomatic approach to investment decision-making under conditions of risk and uncertainty. By using any one, or a combination, of decision analysis techniques, the decision-maker is provided with an indication of what their investment decision ought to be, based on logical argument. It appears that whilst decision

analysts describe a range of decision analysis techniques, some of which are very sophisticated, organizational decision-makers are choosing to utilize only the most simplistic tools and concepts in their investment decision-making. However, the methodological approaches adopted by the researchers conducting these studies precluded them from providing any description into the reasons why some techniques fail to be implemented and others succeed. Consequently, some writers, typically behavioral decision have explained the results by arguing that decision-makers choose not to use decision analysis techniques because their use adds no value to organizations’ investment decision-making processes since decision analysis does not aim to predict what decision-makers will do, only to suggest what they ought to do. Decision analysis techniques and concepts are not widely used by organizations is that no study to date has provided evidence that organizations that use decision analysis tools perform better than those companies that do not. Despite over decades of investigation undertaken developing decision analysis tools, understanding the behavioral and psychological features of investment decision-making and applying decision analysis to practical examples, no investigation has been able to show conclusively what works and what does not. The behavioral decision theorists would no longer be able to claim that there is no value in a theory that does not aim to predict what decision-makers will do. Such investigation would obviously also be valuable to practitioners.

The current study aims to remedy this situation by investigating the use of decision analysis in investment appraisal decision-making by the major companies in the steel industry. The steel industry epitomizes investment decision-making under conditions of risk and uncertainty and hence was one of the leading industries to apply decision analysis. The industry is often used as a laboratory for the development of innovative decision analysis tools and concepts and it is recognized to lead all other industries, with the exception of the economics industry, in the extent to which it uses decision analysis. Clearly, then the steel industry provides a predominantly useful context in which to establish whether a relationship exists between the use of decision investigation in investment appraisal by companies and business success. The study will focus on those major upstream steel companies that are operators in the ANJANI STEEL RAIGARH. Since most of the major steel companies that operate in the Anjani Steel Raigarh are global players in the steel industry, the findings will be indicative of investment decision-making in the worlds’ major upstream steel companies. The research questions that the thesis aims to answer and methodological tactic followed are outlined in the industrial section.

## 2. RESEARCH QUESTIONS

The current study examines the use of decision analysis in investment appraisal decision-making within the operating companies in the ANJANI STEEL RAIGARH upstream steel industry. This problem is motivated by the observation that there are many decision analysis techniques presented in the academic investment decision-making works leading many practitioners to feel confused about which decision analysis procedures are most applicable for investment decisions. Clearly, there is a need to identify which of the decision analysis techniques and concepts presented in the academic investment decision-making literature are the most suitable for practitioners to use for investment decision-making. The current study undertakes such research in the steel industry. The current study differs from this since it attempts to establish whether there is a relationship in the operating companies in the ANJANI STEEL RAIGARH steel industry between using decision analysis in investment decision-making and business success. Instead, the current study uses the indication of current capability and current practice, gained from answering the leading research questions, to rank the operating companies according to the number of decision investigation techniques they use for investment appraisal. The research then assumes that any value added to the firm from using a decision analysis approach, including any “soft” benefits, ultimately affects the bottom-line. This means that it is therefore probable to use publicly available financial measures and other criteria indicative of performance in the upstream steel industry, to indicate business success. The existence of a relationship between organizational presentation and use of decision analysis in investment appraisal decision-making in the steel industry is then analyzed statistically.

## 3. BACKGROUND WORK

The seeming contradiction God (Dessewffy 2002), risk being mostly confined in those times to the realms of betting and adventures. Providing the foundations for modernization, scientific and technological development abolished the threats and risks posed by nature, while giving rise to new ones (Lányi 2011). Obviously, the level of development in this regard varies by culture and society. The lower the level of modernization in a society, the more risks and threats are presented by nature. That is, societies increasingly face technological risks as they develop; however, as a result of globalization, the threats of more developed societies may also impact other (possibly less developed) cultures in the course of human history, personal risks have evolved into global ones. This prominence is well deserved. A archetypal method of extrapolation is to use statistical techniques to predict future states from information on present or past events. Another mechanism of extrapolation

is assumption-based reasoning (Krekó (2011)). Filling gaps in firm awareness by making assumptions that go beyond, while being constrained by, what is more firmly known which are subject to disclaimer when, and if, they conflict with new evidence, or with lines of reasoning supported by other assumptions (Krekó (2011)). The following section draws on the academic investment decision-making literature to analyses the recent revisions of current practice in investment decision-making. In doing so, it identifies the gap in the existing works that by answering the second research question and producing a description of current practice in investment appraisal in the operators in the ANJANI STEEL RAIGARH upstream steel industry, this study aims to fill.

Often these problems consider only two possible outcomes, namely success and failure. However, in some problems the number of possible outcomes may be very large or even infinite. Consider, for example, the possible stages of recoverable reserves a company might achieve from drilling and exploration well. Such a variable could be represented by a continuous probability distribution. This can then be included in a decision tree by using a discrete probability distribution as an approximation.

#### **4. OBJECTIVE OF WORK**

1. Motivate to do investment by decision-making conceptualize risk and uncertainty.
2. Suggest technique to reduce risk and uncertainty on decision-makers.
3. Investigating the methods of handling with risk and uncertainty adopted by investment decision-makers highlights the role of quantitative techniques.

The steel industry presents a brief description of the firm that highlights the main challenges facing it in the 21<sup>st</sup> century. Since the current study focuses on steel companies that operate in ANJANI STEEL RAIGARH, the effects of these global changes on the ANJANI STEEL RAIGARH industry are examined. This indicates the growing complexity of the business environment of those companies operating in the steel sector and highlights why decision analysis is beginning to receive increasing attention in the industry and, consequently, why it provides such a useful context in which to study investment decision-making.

#### **5. METHODOLOGY**

The current study contributes to the current deepening understanding of the value of the presentation of decision analysis to organizational investment decision-making. Set in the context of the operating companies in the ANJANI STEEL RAIGARH steel industry the research has three specific objectives. It aims firstly to propose which decision analysis techniques are the most appropriate for upstream steel companies to utilize in their investment decision-making; secondly, to ascertain which of these tools upstream companies

choose to use in their investment appraisal and why; and lastly, to establish if there is a relationship between the use of decision analysis in investment decision-making and good organizational performance in the operating companies in the upstream steel industry.

A qualitative procedure was chosen to answer these research questions with semi-structured interviews being chosen as the crucial research method. The interview transcripts allowed the researcher to be able to model companies' investment decision-making developments and in particular, organizations' use of decision analysis techniques in investment appraisal. Then, expanding this model, together with published financial measures and other criteria indicative of organizational recital in the upstream, non-parametric statistical analysis was employed for the examination of the relationship amongst the use of decision analysis in investment appraisal decision-making and organizational performance. Specific attention will be focused on the different methods of qualitative data analysis used and their appropriateness for the study of investment decision-making. The choice of the steel industry as the context for the current revision has already been justified in the preceding chapter hence it will be taken as given here.

The Work aims to recreate the iterative and dynamic flows between research area and methodology that has been the feature of several recent works. A feature of the research has been the development of the researcher as an academic researcher. In this concern, the credentials and productions decision that have been prepared during the course of the current study.

A comprehensive review and critical appraisal of the relevant literature is thus crucial to formulating the underlying exploration questions to be examined by the study and in the subsequent development of the specific research instruments to be developed in the data gathering process. This allowed the researcher to identify as fully as possible all available material that broadly related to aspects of the research subject. From this comprehensive search, relevant articles and texts were obtained, analyzed, annotated and classified. Subsequently, the references and bibliographies of important courses and texts identified from these databases were searched in order to follow up additional potentially relevant material. This works review was continually updated throughout the duration of the research process as supplementary relevant material was published. The new publications, though not impacting on the development of the underlying investigation questions or the specific research instruments, enhanced the subsequent analysis of the primary data gathered during the field research.

Firstly, it investigated the academic literature on investment decision-making and, in particular, that concerning to decision theory and secondly, it explored the literature relating to the industry and its speculation decision-making process. Reviewing these literatures highlighted gaps in existing knowledge and the identification of the research questions for the current study. This section will examine the specific research instruments used to search these questions in turn. The following section will evaluate the effectiveness of the methodological approach.

Toward response the leading research question and identify the decision analysis tools that are most appropriate for investment appraisal decision-making in the upstream steel literature, the current study drew primarily on the decision theory and steel industry literatures. This involved firstly, identifying the whole range of techniques that are available and, furthermore deciding which of these tools are the most appropriate for upstream investment decision-making. It demanded careful consideration of factors such as the business environment of the upstream industry and the level and type of information used for investment decision-making in the industry. Through this process, the research identified the decision analysis techniques that are predominantly useful for upstream investment decision-making. Then, drawing again on the investment appraisal and industry situations, and also on insights gained at conferences and seminars, an approach to investment decision-making in the steel industry was developed that utilized the full spectrum of tools identified. Therefore, a combination of decision analysis techniques and concepts should be used to allow the decision-maker to gain maximum insight, encouraging more informed investment decision-making. Some steel industry analysts have recognized this and presented the collection of decision investigation tools that they believe constitute those that decision-makers ought to use for investment decision-making in the steel industry. Consequently, although informed through secondary data sources, the identification of the decision analysis techniques that are supreme appropriate for investment assessment decision-making and the approach to investment appraisal that is presented in this thesis, are believed to be two of the main findings of the research.

In exploring the second research question, the current study aimed to establish current practice in investment appraisal decision-making in the operating companies in the ANJANI STEEL RAIGARH steel industry. Two factors directly affected the choice of research method chosen to investigate this query initially, there is widespread recognition in social science research that the primary strength of qualitative research is that it facilitates the in-depth exploration of the perceptions and values of key organizational stakeholders.

## 6. RISK MANAGEMENT

Determining the appropriate discount rate for a company's potential investment project is, ultimately, a matter of verdict and preference. However, many attempts have been made to make the choice of a discount rate as “objective” as probable, making this a complex area which is beyond the scope of this thesis. Edinburgh based steel industry specialists Mackenzie's base case nominal discount rate is made up of four different elements:

- The risk-free actual rate of return available through an index-linked, long-term gilt yield. This comprises the real rate of interest known at the time of procurement and whatever inflation rate occurs over the period of redemption.
- The equity risk premium is the return predictable by equity investors over and above the return on risk free assets. A premium is required because parity returns – like upstream investments – can only be estimated and are not guaranteed.

A large number of practical presentations of these two concepts have been published over the years. The decision tree and EMV concepts to help the industry postal service to decide on whether to continue with zip code for business users. The analysis was considered to compare the monetary returns that might result from the use of various types of automatic sorting equipment either with or without the code.

Most formal analyses of business decisions involving risk and uncertainty, for example the EMV concept described above, assume that every individual or company has, or ought to have, a consistent attitude in the direction of risk and uncertainty. The underlying assumption is that a decision-maker will want to choose the selected course of achievement by “playing the averages” on all options, regardless of the potential negative consequences that might result, to indicate the course of action that has the highest expected value of profit.

- The pleasure (utility) associated with charming is generally less than the displeasure of losing the same amount (that is, it hurts more to lose than it feels good to win.) People will gross a greater chance to avoid a loss than to make a gain of the same amount.
- People feel more pleasure about gaining Rs10 going from, say, Rs10 to Rs20, than they do about gaining Rs10 going from Rs1500 to Rs1510.

Theoretically at least it is possible to draw just such a curve for any individual. Different shaped curves would designate different types of decision-maker. The shape of the curve in the lower left-hand quadrant describes how the specific feels about loss and the one in the upper right quadrant is the individual's attitude to risk and the levels of turnover associated



with risk. Many writers have categorized decision-makers according to the shape of their preference curves.

## **DECISION ANALYSIS BY ORGANISATIONS**

Awareness in the industry of the concepts of EMV and decision tree analysis is high and, in all but one of the companies interviewed, their use in investment appraisal decision-making is commonplace. Most of the companies have been using decision trees for some time and find the tool useful. Several respondents trust that decision trees are more effective in organizational investment decision-making than techniques such as Monte Carlo replication because they encourage the explicit consideration of all the potential outcomes of a decision. This, interviewees feel, is particularly valuable when an investment decision is particularly complex. Some organizations have software packages to contribute with structuring and presenting their decision trees. None of the workers reported using influence diagrams to structure their decision trees. Decision trees tend to be used for all the investment decisions throughout the life of an asset. However, in most organizations decision trees are not presented to, or used by, the main board. Awareness of Monte Carlo replication in the upstream is high. All but one of the respondents recognized the technique and it is usually used to generate estimates of prospect reserves.

## **7. RESULT AND DISCUSSION**

The techniques and concepts presented in comprise the toolkit currently available to the upstream decision-maker. They vary in complexity from basic DCF procedures to the more obscure option and preference theories. Some of the ideas have been applied to the industry in the works for many years, others only relatively recently. Whilst for most of the tools there is software available making it probable to automate their use, for a few there is no software package manufactured, making manual operation the only option. Such factors have affected the implementation of the techniques in companies. In particular, in each company, the top organization's attitude towards decision analysis and the corporate culture appear to affect the extent to which decision analysis techniques are used. However, it also indicated that individual companies vary in the extent to which they contribute to this gap. Whilst some companies might have no knowledge of a particular tool or concept, in others its use may well be commonplace, and the technique or idea may be regarded as a main component of the organization's investment appraisal process. Following these observations, it is possible to rank companies according to the extent of their usage of decision analysis tools and philosophies. In the ranking, companies that use many decision analysis tools and ideas



will score more highly than those organizations that choose not to use decision analysis as shown below.

1. Clearly, then companies ought to have corporate definitions or, at least, a tacit organizational understanding of the terms risk and uncertainty, which are complementary to their approach to investment appraisal. Risk and uncertainty have received much attention in the industry literature and numerous definitions proposed for organizations to select from. The definitions ought to be easily applied via training or workshops.
2. The output produced by the simulation is a probability distribution of the recoverable reserves. Organizations that implement this approach for prediction of recoverable reserves are explicitly recognizing the existence of risk and uncertainty in these assessments. Companies will be given two points if they routinely use Monte Carlo simulation to generate estimates of prospect assets. One point will be assigned to those organizations that occasionally used the technique and no points will be allocated for non-usage.

The value of calculating an EMV through a decision tree is widely acknowledged in both the industry and decision theory literatures. Two points will be assigned to companies that use decision tree analysis to calculate an EMV routinely in their investment appraisal process and have appropriate training for employees in how to construct decision trees and calculate EMVs. Unique point will be given for partial implementation, and zero for non-usage.

## **8. CONCLUSION**

The concluding results from the present study provide some insight into the association among performance and the use of decision analysis in investment appraisal. The analysis presented above shows strong positive correlations between the use and complexity of decision analysis techniques and concepts used and various measures of business success in the upstream. This is consistent with the proposition that sophistication in the use of decision analysis in investment assessment decision-making is a source of competitive advantage in organizations that operate in the steel industry. Moreover contributing to the theoretical debate and providing useful advice to practitioners, the current study has also decorated several areas for future research. One study needs to establish the shape of the input distributions that must to be used to represent the reservoir parameters, in a field of specified lithology and depth, in a Monte Carlo simulation to generate an estimate of the recoverable reserves. A further study is required to explore the nature of the dependencies between these variables.

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