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ANALYSIS OF DECISION THEORY ANALYSIS

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Abstract

The requirement of operations research techniques inday to day life is very important in all the fields. To become a successful entrepreneur decision making is too important. Decision making is the process where an individual, group or organization gets a conclusion about future actions to pursue set of objectives

Decision theory is mainly related to decision making in conditions of risk and uncertainty. It is often possible to assign probabilities to different states of nature that assist the decision maker in choosing the decision that yields the best outcome. However, in some cases the decision maker is not able to determine the probabilities. Through this paper, we intend to describe the basic elements in the analysis of decision alternatives and choices. Several criteria can used in each case in order to take the best decision.

Keywords Decision, Optimal, Certainty, Alternatives, Risk

Introduction

Decision theory deals with the Process of making decisions, especially in conditions of uncertainty, when a number of alternatives courses of action may have to be evaluated before the final decision is made. It also analyses types of decisions, sets out ground rules for making decisions and develops decisions making methods using various kinds of models or procedures. Decision making is identifying and choosing alternatives based on the values and preferences of the decision maker. The decision maker is unsure of what situation will occur in the future and moreover he has no control over what will happen at the time the decision is made.

Due to the increasing complexity in the real world, time and marginal constraints have been created in the decision-making problems that organizations face. The main aim of operations research is to apply developed analytical methods to help make better decisions. A significant feature of operations research is its overall look at the system and trying to improve it as a whole instead of focusing on one or more system components.

As a result in finding the optimal solution based on the type of problem under study through the use of operations research plays a major role in the decision-making process. In this regard, most planners and decision-makers have turned their attention to employ operations research and its tools, including mathematical modelling, decision analysis, and simulation, with the aim of rational dealing with complex real-world problems.

Decision theory refers to a range of econometric and statistical tools for analyzing an individual's choices. In other words, it lets the entity make the best logical decision possible when dealing with uncertain and unknown circumstances.

Companies worldwide use decision theory to understand better how people make decisions and the market trend to make better commercial judgments. The theory has two types: normative and descriptive, commonly used by mathematicians, economists, marketers, data and social scientists, biologists, psychologists, philosophers, and politicians.

Types of Decision Theory

Decision theory helps entities determine how a professional or consumer makes rational choices while making a decision. When a person makes a decision, their belief system, morals, values,

social background, and even fears and uncertainty play a crucial role. Uncertainties such as states, repercussions, and behaviors cause people to choose one option.

The theory allows businesses to identify and solve problems with existing products or services and understand their target users when launching new ones. It is, thus, the basis of understanding a successful business, marketing strategy, and behavioral changes.

The method is an important aspect of everyday living since it aids in identifying a pattern or trend in a person's life. It always answers the questions and the logic that underpins them. Even the smallest life decisions reveal a lot about a person. For example, why do people like a particular political party, their views on marriage, their favorite color, or why they wish to visit a location with mountains or beaches, whether they drive to work or take the bus. The individual choices are heavily influenced by circumstances, repercussions, and behaviors that can be understood in two types:

Normative Decision Theory

This decision analysis theory analyzes the repercussions of ideal logical decisions based on a set of values. It also decides the optimum course of action based on limits and assumptions. However, it does not consider other factors interfering with it. Instead, it deals with expected behaviour, decisionmaking processes, and the best potential outcome. This theory employs tools, procedures, and computer applications to arrive at an optimal decision.

Optimal Decision Theory

This quantitative and qualitative method, often known as descriptive decision theory, examines the decisions made by irrational people. Furthermore, this theory employs various frameworks, hypotheses, and functions to comprehend practical actions that follow a set of norms.

Companies use the **decision theory in operation research** because it considers several outcomes, rational reasoning, and influencing factors to understand how a person thinks logically rather than idealistically. The theory analyses how and why a person made a decision, the reasons for that decision, and when and where that decision was made because location and time are crucial in decision making.

Decision Making Environments

Decision making is identifying and choosing alternatives based on the values and preferences of the decision maker. Making a decision implies that there are alternative choices to be considered, and in such a case we want not only to identify as many of these alternatives as possible but to choose the one that best fits with our goals, objectives, desires, values, and so on

The decision maker is unsure of what situation will occur in the future and moreover, he has no control over what will happen at the time the decision is made. The decision-making environment is often characterized by three states: certainty, uncertainty, risk, conflict.

Certainty

A decision made in safe conditions, certainty, is a condition for which you know which state of nature will occur in the future. We can think of security as a single case or an alternative. In conditions of complete security, only one condition or a variation of conditions is possible which have no effect on the consequences of a certain alternative. So, the decision is not influenced by uncontrolled factors. The assumption that complete certainty exists, when the information is not known with complete certainty, makes finding an optimal and approximate solution quite reasonable. Certainty is a theoretical and rarely a practical possibility. Very few well-structured and well-programmed decisions and very few decision-makers can be totally sure of the consequences that will really happen. However, a decision maker can choose a model as if it occurred in safe conditions only if he believes that his modeling with probabilities would not add anything new to the problem analysis. When it is known for certain which of the possible future conditions will actually happen, the decision is usually relatively straight forward.

Uncertainty

In very few decision-making situations is perfect information - all the needed facts - available. Most decisions are made in the face of uncertainty. In decision making under pure uncertainty, the decision maker has absolutely no knowledge, not even about the likelihood of occurrence for any state

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of nature. In such situations, the decision maker's behavior is purely based on his/her attitude toward the unknown. Some of these behaviors are optimistic and some pessimistic ore something between.

Uncertainty means that it is impossible to assess the likelihood of various possible future events. A decision made in conditions of uncertainty has more than one state of nature but the decision maker cannot determine the probabilities of the occurrence of each state. In conditions of complete uncertainty not only the consequences of the decision can be predicted but we will have very little confidence in any possible situation or in the possibility of their occurrence. Also, the decision structure will be poor and the information will be limited or doubtful. Conditions of complete uncertainty are also very rare. In practice, complete security/uncertainty extremes are unlikely to occur. Risk

Whenever the decision maker has some knowledge regarding the states of nature, he/she may be able to assign subjective probability estimates for the occurrence of each state. In such cases, the problem is classified as decision making under risk. Probability enters into the process by playing the role of a substitute for certainty - a substitute for complete knowledge. Risk means that certain parameters have probabilistic outcomes. A decision made under risky conditions has more than one state of nature. We can make assumptions that the decision maker can arrive at a probability estimate for the occurrence of each of these states of nature. Managers usually make some kind of assessment regarding the possible consequences even when the decision situations are very unclear. When security conditions are not present but we are able to make reliable predictions using certain probabilities, we can say that decision-making is done under risk conditions and probability theory takes special importance. Conflict

A decision taken in a conflict situation exists when the interests of two or more decision makers are in conflict and they are in competition with each other. In other words, if decision maker A benefits from following a certain course of action, this happens if decision maker B has taken a fully defined course of action. So, decision makers are interested not only in their own actions but also in the actions of others when making decisions in conflict situations. These situations are part of the game theory. We can use several criteria in each case:

Certainty - a single case or alternative, need an no to

- a use criterion. • Uncertainty - Several criteria such as: Maximax, Maximin, Minmax regret, Laplace, Hurwicz.
- Risk Several criteria such as: Expected Values, Expected Opportunity Loss.

Conclusion

Decisions may rely on personal experience, may be made under social pressure, time constraints may be influenced by one's emotional state, etc., everything could interfere with careful consideration of all the options and consequences. We described the basic elements in the analysis of decision alternatives and choices. The concept of uncertainty is so common in our everyday life and we face it constantly and we are aware that most of the time people are more likely to rely on personal experience than on information about probabilities. This paper, is just a first step toward the decision theory and strongly believe that it will serve as a basis for future studies in this interesting field.

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