MARKETING DECISIONS UNDER UNCERTAINTY

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MARKETING executives are constantly required to make right decisions at the right time, which are not only important to their organisations but also contribute to their personal success. In marketing, the costs of wrong decisions as well as the costs of delaying right decisions are indeed enormous. Hence, whatever a marketing executive does—whether launching a new product or opening a branch abroad or starting an advertising campaign—he does it by making decisions. He may or may not even sometimes realise that he is making those decisions, yet the entire process is always a decision-making one.

Quantitative Approach

Quantitative techniques of decision-making, based on mathematics and statistics, replace the traditional hunches in all aspects of decision-making, namely, forecasting, planning and control. Statistical techniques are designed to limit the area of "hit and miss" and improve the quality of marketing decisions by maintaining objectivity, clarity, consistency and accuracy of the decisions. These techniques enable the marketing executive to manage his organisation better by choosing the best of the most desirable course of action (or strategy) after evaluating the return (or payoff) of various possible alternative strategies in a given specific situation on a rational and logical basis. The basic philosophy of this approach is contained in the quotation: "If you can measure what you are speaking and express it in numbers, then you know something about it; but if you cannot measure it, if you cannot express it, in numbers, then your knowledge is of a meagre unsatisfactory kind." This quotation is particularly apt in a developing economy like ours, where the role of the modern marketing executive in the realm of managerial decision-making is crucial.

Marketing and Mathematics

Decisions are really choosing between alternative courses of action (or inaction) that have future outcomes to meet the objective of the organisation. In this aspect, marketing management has a vital interrelationship with other disciplines as Mathematics and Statistics. The alert marketing executive has to be aware of

the contribution of allied fields, which will strengthen his role as the major policy adviser to the top management. All the same, this awareness does not mean that he must be a master in such allied subjects. He must appreciate that other fields contain approaches and techniques which will be useful to him.

The Decision Process

The essential features of all marketing problems are: (a) recognition of the existence of several possible alternative strategies; (b) prediction of the payoff of each one of the strategies; and (c) assessment of order of preference of the strategies.

In order to make valid decisions, the marketing executive should have actionable facts at his disposal—facts that are reliable, adequate, effective, precise and dependable. Such facts are digested and refined to obtain "key data" that are pertinent to decision-making. The key data are then analysed (by means of mathematical models) to determine the alternatives. These alternatives, with their advantages and disadvantages, are studied carefully after considering the interrelated and interlocking effects before an intelligent decision is made. Such decisions are reviewed periodically in order to ensure that they are in accordance with the stipulated goal of the organisation.

Classification of Marketing Problems

All decision-making problems in marketing can be classified, viz., certainty, risk and uncertainty, depending upon the nature and extent of information available to the marketing executive in a particular situation. The principles for solving uncertainty situation are explained at great length while the other two are mentioned briefly in order to acquaint the reader with such situations.

Certainty Situation

Decision-making under conditions of certainty occurs when all the information for the different strategies to be adopted in a specific case is available clearly, but the problem for the executive is to choose the best strategy out of the various possible ones. For instance, in the case of physical distribution of a large organisation handling a variety of products, if there are ten warehouses (including some in foreign countries) for which the products are to be allotted from ten different manufacturing units, there are as many as 3.5 million ways of assigning the products. (It may be noted that the first warehouse can receive from any of the ten

factories, the second from any of the remaining nine, etc., yielding $10\times9\times8\times7\times6\times5\times4\times3\times2\times1$ or 3.5 million ways.) The problem for the marketing executive is to deploy his resources in a way that optimum results or maximum profits are obtained in the performance of overall sales after duly considering capacities of warehouses, demand from warehouses, production capacities of plant, transportation costs, etc. Since these factors can be obtained in a definite manner, such problems are classified as "certainty situations" and techniques like linear programming are available to the marketing executive in such situations to locate the best alternative.

Risk Situation

The term "risk" is familiar to all marketing executives and forms the second category of decision-making situation. The problems in the field of forecasting, brand loyalty, insurance, market research surveys, extension of test marketing results, bidding, inventory, etc., belong to this category. In this situation, the marketing executive has to determine the best manner when the strategies are not clearly defined, but only sufficient past data are available or can be obtained by special sample surveys in order to establish the "probability" of occurrence of each of the strategies. The term, "probability", is defined as the proportion with which an event occurs in a large series of repetitive situations and is very useful to measure the risk. Thus compared with the certainty situation discussed earlier, it is noted that the occurrence of various strategies is expressed in terms of probability or ignorance of future is expressed in terms of probability. For example, let us consider that 1,000 people have been interviewed as to whether they purchase a product and whether they have seen the advertisement of the product. The results are given below in Table I.

TABLE I

	Viewed the advertisement	*Did not view the advertisement*	*Total*
Purchased product A	400 (.40)	200 (.20)	600 (.60)
Did not purchase product A	150 (.15)	250 (.25)	400 (.40)
TOTAL	550 (.55)	450 (.45)	1,000 (1.0)

Dividing each figure by 1,000, the probabilities are obtained and have been indicated within brackets. With the help of the

laws of probability, it is possible to answer several questions such as (a) effect of advertising on sales of the product in future, (b) proportion of people purchasing product A, (c) proportion of people viewing advertisement on product A, and (d) fixing limits in extending the proportion from sample to the entire consumer population.

Uncertainty Situation

In actual practice, with the limited knowledge available to him, the marketing executive is often forced to make decisions, as decisions had to be taken at the right time, however insufficient the information might be, and hence is the importance of uncertainty in real life. If the information on various strategies to be adopted in a situation is neither logically available nor is it possible to estimate the probability of each of the strategies (which were covered in the previous two cases), then such a situation is called decision-making under uncertainty. This situation should not be confused with total ignorance. The marketing executive will surely have some knowledge of the strategies, though this knowledge is not sufficient to obtain explicit data on which the calculation of probabilities of different strategies could be based. Such problems are often encountered in the fields of decisions relating to diversification, launching new products, pricing new products, etc., where the opportunity to get field information is unavoidably inadequate. Several decision criteria are available to the marketing executive in order to minimise the ignorance created by the above situation. The application of these criteria depends upon the "attitude" of the decision-maker in a problem situation. Thus the decisions will be subjective or personal in an uncertainty situation, whereas in the previous two cases the decisions could be objective or impersonal. A simple example discussed below illustrates the application of these criteria.

> A marketing executive of a growing organisation is concerned with whether he should open a new sales territory (in the country or abroad) for a product now being sold regionally. It is well-known that the starting of business in a new territory will involve the establishment of a new regional office, a warehouse, employment of new salesmen, etc. If the expected sales in the new territory are likely to be "low", it is assumed that a financial loss would be incurred. If the sales turn out to be "average", it is assumed that some profit would be made. On the contrary, if the expected sales are "high", then the profit will be great. While it may be possible to evaluate the net profits corresponding to "low", "average"

and "high" sales, it is not always possible to know which one of these will occur in a situation and hence the uncertainty situation occurs.

Let the estimates of increase in profits be Rs 8 lakhs and Rs 1 lakh corresponding to high and average sales; and let the decrease in profits or loss be Rs 2 lakhs for low sales per year, when the territory is opened. (These estimates may be averaged out over a period of 10 years or so, taking into consideration the future potential as well.) If the decision is taken not to open the territory, then in all cases the increase in profits will be zero. The data may be seen in Table II below:

TABLE II

Strategy	*Various states of nature*		
	Low sales	*Average sales*	*High sales*
A. Open new territory	—3 lakhs	1 lakh	8 lakhs
B. Do not open new territory	0	0	0

Principles of Decision-Making

Having obtained the given information, the following principles help the executive to open or not to open the territory. (It may be remarked in this context, that if probabilities can be assigned for each one of states of nature, viz., low sales, average sales and high sales, then this reduces to a risk situation.)

Laplace Principle of Rationality

This criterion, which is usually followed by many, is useful to an executive, when he does not have any preferences in choosing the alternatives (viz., open or not to open the new territory) in a specific problem. This assumes that all possible states of nature are likely to occur with the same chance in the absence of adequate information about them. The decision rule in such a situation is to choose that strategy, which maximises the expected gain. In the given example, the expected profit is Rs 2 lakhs$=\frac{(8+1-3)}{3}$ if the territory is to be opened and nil if it is not opened. Hence in this situation, the decision to be taken by an executive without any preferences is to open the territory.

Principle of Minimax

This criterion is suited to a problem situation, which forces the attitude of the executive to be very conservative, pessimistic and unadventurous, and compels him to play too safe in order to protect himself from the falling of the Democles' sword on him or from the worst consequences that could happen when the environment is assumed to be malevolent to him in that situation. In such a case, the decision rule is to examine the minimum profit (or maximum cost), associated with each strategy, and choose that strategy which maximises the minimum profit (or minimises the maximum cost) so that the worst strategy is made as desirable as possible. It is noted that the worst for opening territory (A) involves a loss of Rs 3 lakhs, whereas the worst for not opening territory (B) is zero. Hence in this particular situation, the strategy to be adopted by the marketing executive is "not to open the territory".

Principle of Maximax

It may be noted that on the other extreme end of the minimax rule is the maximax criterion. This deals with a problem situation which forces the attitude of the marketing executive in that situation to be rash, adventurous and optimistic, thinking that the circumstances are going to be benevolent always. In such a case, the marketing executive chooses that strategy which maximises the maximum profit. In Table II, the best A is Rs 8 lakhs whereas the best B is zero and hence, in this particular situation, the executive has to open the new territory.

Principle of Optimism

Hurwicz's criterion of optimism avoids extreme conservatism of the minimax principle or extreme radicalism of the maximax principle. The criterion allows for the varying degrees of moderation according to the variation in optimism or pessimism of the attitude of the marketing executive in a specific problem situation. For this purpose, an index of optimism is obtained from the marketing executive in a specific situation. It may be observed that if the index of optimism $L=1$, the criterion reduces to the maximax principle, and if $L=0$, it reduces to minimax principle. A knowledge of L, which has to be obtained from the decision-maker, will enable the marketing executive to choose the best strategy in such a specific problem situation. If there is no preference between the two alternatives of opening and not opening the new territory, the following two equations can be obtained from Table II.

$$8\ L + (-3)(1-L) = 0L + 0(1-L)$$
$$\text{or } 11\ L = 3;\ \text{or } L = .27$$

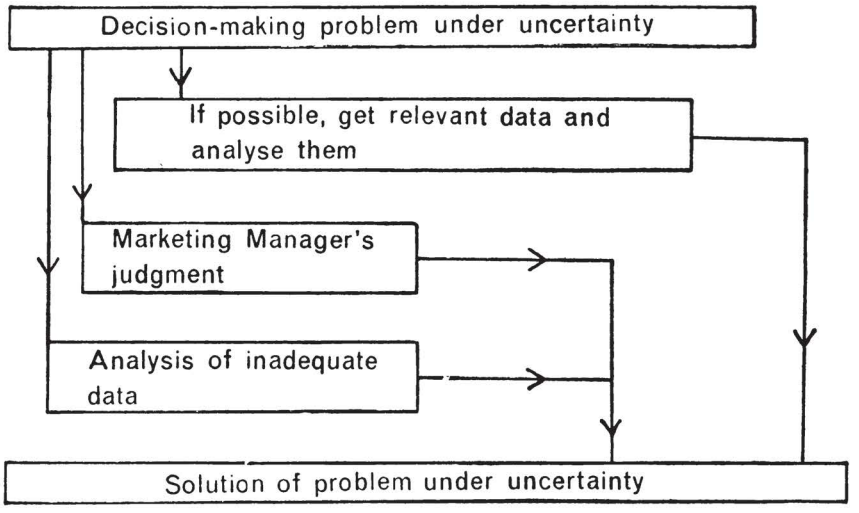
When the index of optimism of the executive L is equal to 0.27 in a problem situation, there is no preference between the two alternatives.

When L is less than 0.27, then the decision will be "not to open the territory" (to coincide with minimax principle). When L is greater than 0.27, then the decision rule will be "to open new territory" (to coincide with maximax principle).

Extension

These principles could also be appropriately extended if there are more than two strategies (in the example, "open territory" and "not to open territory") and a larger number of states of nature (in the example, "low sales", "average sales" and "high sales"). The same principles could be applied to other uncertainty situations like pricing a new product, developing marketing strategy for new products and recruitment of new persons.

The process of decision-making under conditions of uncertainty is diagrammatically represented below:



CONCLUSION

It may be emphasised that the above criteria serve as useful guidelines to the marketing executive in his decision-making problems under uncertainty. However, it should be kept in mind that whatever methods are adopted in the process of

decision-making, the marketing executive must see that his decisions are consistent with the following three broad principles:

(a) furtherance or continuation of the objectives and the activities of the organisation;

(b) maximum satisfaction to the largest number of persons involved in the organisation; and

(c) demands of the environment or the region in which the organisation operates.

Above all, marketing should be combined with such other techniques to build a more efficient and a more clearly integrated approach to the collection and processing of quantitative information. The combination of techniques and viewpoints can do much to assist the top management in conquering the ever-mounting difficulties of the business world.