3.1 Introduction

Right decision at the right time is the key for the success of any organisation.

Decision-making is the process of selecting the most desirable or optimum alternative to resolve a problem or to attain a goal. Managers must often make decision to resolve problem confrontations or conflict situations.

The above definition indicates that first some one or some group must be faced with the problem. Then the decision making process comes into picture to solve that problem.

Decision making is a complex process. It consists of various steps. In general, the decision-making process starts with the collection and analysis of input data as shown in Figure 5. After collecting the basic data and analysing it, the decision maker predicts the outcome according to the various alternatives available to him. He then evaluates the outcome in terms of their value and compares the alternative on the basis of the outcomes to which it may lead. The best alternative is selected and an action is taken which impacts on the uncontrollable factors (world). This affects the actual outcome of the decision. When the result of the action is known, the decision maker measures the results and compares them with the predicted outcome. The process then begins with
a new prediction which incorporate the lessons learnt in comparing the previous prediction with the actual outcome.

Figure 5: Decision making process

Thus a decision-making process involves process of gathering data, establishing goals and alternative, evaluating options and selecting the best alternative.\(^{(20,56)}\)

Some decision problems and conflicts are simple and deterministic and have only minor ramifications. They are mostly repetitive in character and of routine type. Group technology, operations research can be examples of this category. With the potential for well defined parameters, programmed decision-making process can be applied. An algorithm can be developed describing how the decision is to be made. Thus the execution of this process can be computerised. In designing a computerised system one has to identify program decision opportunities and then develop computer programs to execute them. The process
Selection of a product from a set of products according to the customer requirements is an example for programmed decision-making.

Unstructured decisions are more complex and probabilistic. In such cases, only a portion of the set of total parameters may be known. Non-programmed decision-making or heuristic decision-making process is involved in dealing with ill-defined problems. Quoting for a new product in a new market is an example of non-programmed decision-making.

Most management problem solutions are not repetitive and typical but applicable to other decisions. They are semi-structured problems usually have only one application. To bid or not to bid against a tender is an example of this category. (13, 61)

There are four basic elements which help in arriving at a decision are

(a) Model: represents a quantitative description of the problem

(b) Criteria: Facets that are responsible for fixing the goal or objective of the decision problem
(c) Constraints: Limiting factors considered in the solution of the decision problem

(d) Optimisation: Determination of what is needed and what is permissible. (13,56)

3.2 Decision Making and Information Requirement

Information requirement vary from one decision problem solution to another. It also differ from one decision maker to another. Decision makers have individual information accumulation rates that determine their information processing efficiency. Past knowledge coupled with present information processing efficiency, determines the individual's decision-making capacity. If an individual is unable to envisage each alternative at the present level of knowledge, then additional information is sought. Inability of information system to provide information or inability of decision makers to describe accurately their information requirement results in insufficient or ineffective information for decision-making. The use of information for decision-making process is depicted in the flowchart given in Figure 7. (13)

The three levels of decision making, viz. strategic, tactical and operational, have different information requirements. The matrix (Table 1) relates nature of information requirements to the three levels of decision making. (13,56)

In decision-making process both transaction information and status information has a great role. The transaction relates to the occurrence of an event that causes a specific
Figure 7: Flowchart for Information Requirement in Decision-Making

Problem & Conflict
Confrontation

Problem & Conflict
definition

Relate present knowledge
and problem scope

Is Present Knowledge
Sufficient for Solution

Seek additional
Information

Receipt of Information
(from formal & informal sources)

Relate relevant information
to problem (reject irrelevant information)

Integrate Information into
Decision-Making Process

Is Present Information
Sufficient to Solve Problem

Yes

DECISION

No

No

Yes
<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Classification of Information</th>
<th>Category of Decision Making</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Strategic</td>
</tr>
<tr>
<td>1</td>
<td>Dependence on external information</td>
<td>Very high</td>
</tr>
<tr>
<td>2</td>
<td>Dependence on internal information</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>Dependence on on-line information</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>Information in real time</td>
<td>Very high</td>
</tr>
<tr>
<td>5</td>
<td>Information reported periodically</td>
<td>Very high</td>
</tr>
<tr>
<td>6</td>
<td>Information that is descriptive-historical in nature</td>
<td>Low</td>
</tr>
<tr>
<td>7</td>
<td>Information that is performed - current in nature</td>
<td>Very high</td>
</tr>
<tr>
<td>8</td>
<td>Information that is simulated - if in nature</td>
<td>Very high</td>
</tr>
</tbody>
</table>

Table 1: Matrix of information requirement to decision makers
action and specific work to be performed. The processing of transactional information is usually characterised by information attributes of rigid timing, simple but precise content, and a highly structured format. Transactional information usually flows from one unit of an organisation to another unit with each making important additions or modifications to its content. The information content is normally a combination of descriptive and variable data elements. However, the existence of transactions and to some extent the efficiency with which they are processed, are closely related to the availability of status information. Status information either represent the status of the transaction or reflect the status of the resources affected by the transaction. (13)

3.3 Designing of Information System for Decision Making

It should be kept in mind while designing information system that the management information system is only a support system contributing to the effectiveness of the organisational structure. The successful operation of many organisations is based on their ability to process simple, routine day-to-day information effectively. In small organisations this information is often communicated informally - mainly verbally. However as organisations grow the simple and repetitive communications become quite structured and formal. The informal communication were often documented later by preparation of paper work for accounting or other processes.

Modern data processing viz:-computerisation has helped to reduce this after the fact paper processing. Computeris-
ation started with batch processing where the transactions were recorded in computer system. This batch processing of routine information was effective for accounting purposes, but it did not improve the basic operation mode of the organisation. Thus integrated on-line real time information system came to existence which helped in overall efficiency of the organisation. (35,42,60,71)

While Management Information System (MIS) can be defined as computer-aided decision making based on information of a routine nature generated from a large pool of data through sophisticated processing, Decision Support System (DSS) can be defined as computer-aided selection of information in combination with the knowledge of the persons using it to arrive at decisions. While MIS are hardware, data and accounting oriented, DSS is more opportunity, decision and function oriented. DSS emphasises on utilisation of information to improve human effectiveness. Therefore, the objective of DSS is not to replace judgement but to support it in such a manner that the strengths of both man and machine are utilised to the fullest extent. DSS is usually composed of five major components.

(a) database,
(b) model base,
(c) computer (hardware and software),
(d) user, and
(e) communication

These components are shown in Figure 8. (74)
It is not enough to have a computerised information system where a variety of data are collected, processed and reported. The information system must be able to reduce or filter the amount of detailed information according to each level of decision making. Data should be filtered through summarising and classifying operations that could screen out unnecessary
detail for a given level of decision making. The nature of this filtering process can be either logical or mathematical. Thus the quality of management reports very much depend on the efficiency in filtering method.

Another way to control the quantity and quality of information flow to the decision maker is by information monitoring method. There are three basic ways to implement the monitoring method. (4, 13, 39, 72)

(a) Variance reporting
(b) Programmed decision making &
(c) Automatic notification

(a) Variance Reporting: In this form of monitoring method, the data representing actual events is compared against data representing expectations in order to establish a variance. The variance is then compared to control value to determine whether or not the event is to be reported. Only those events or activities which are significantly deviated from the expectations are reported to the decision maker for action. Therefore, the information system must be able to execute the following procedures.

(i) establish the norm at which performance is anticipated (e.g. budget plan, quota, schedule, standard, etc.)

(ii) establish the amount of deviation from the norm which is considered acceptable
(iii) establish a procedure for collecting actual performance data and comparing it to the norm
(iv) extrapolate past knowledge to identify if trends can be highlighted (optional)
(v) disseminate the variance reports as they occur to the decision maker responsible for the performance.

(b) **Programmed Decision-Making:** The principle of programmed decision-making is that the information system monitors the flow of data as and when an activity occurs or reflects a condition inside the programmed decision-making range, a decision is automatically made by the system based on predetermined conditions. Thus by this method, the decision makers at tactical and operational levels can get more time to spend on less structural decision work.

(c) **Automatic Notification:** In this method the information system does not make any decision, but it can release information at predetermined time when needed. Thus advantages of computer memories are used to keep track of large amount of detailed information. In an industry, job allocation, resource allocation can be done by following this method.

The use of logico-mathematical models to transform data into information is becoming increasingly important as a means of providing information to the tactical level of decision makers. Conceptual modelling is an abstract process. The purpose of this model building is to develop an alternative
view of the problem situation. When this alternative view has been developed, then it has to be tested/compared with reality before accepting. The following figure (Figure 9) illustrates the modelling process. (13, 83)

![Diagram of modelling process]

Figure 9: Modelling process

There are seven factors with the strongest impact on the development of the responding companies information system. They are:

(a) Manager/user attitude towards systems development
(b) Information personnel training in the system approach
(c) Operating and middle management involvement in the planning phase

(d) Technical expertise of information professionals

(e) Operating and middle management involvement in the analysis, design and implementation phase of information system

(f) User/manager expertise in making their information and other needs explicit and known

(g) Use of database management systems appropriate to their modelling capabilities. (18)

3.4 Further Specifications

Information Requirements of Decision-making (IRDM) and the modalities of its transfer dynamics has been presented in this chapter. The prediction of this analysis is to be investigated in an application area. It has been chosen to study the basis of international marketing and the channelling of information in international tendering. A model of IRDM is specified in a modulated fashion into Information System for Decision-Making in International Tendering (ISDM>IT).