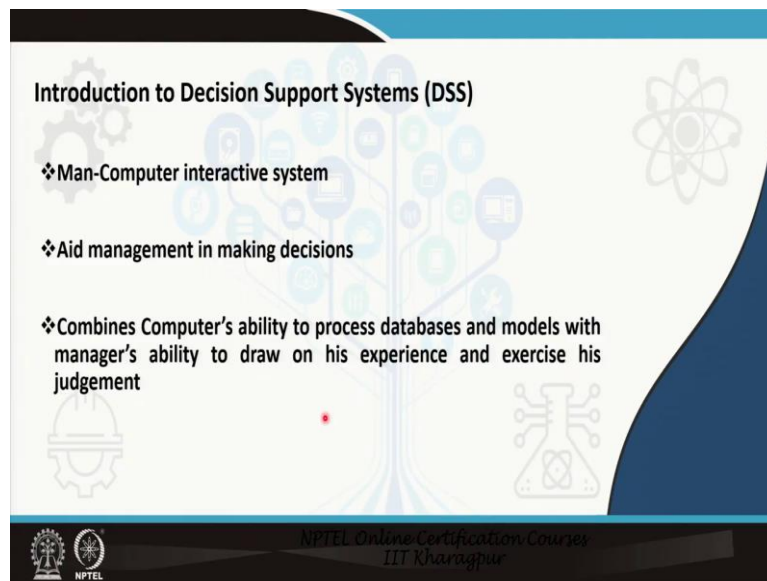


Management Information System
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Vinod Gupta School of Management
Indian Institute of Technology, Kharagpur

Week – 10
Module – 02
Lecture - 47
Decision Support Systems

Hi, welcome back to our 2nd module of the 10th week related to our course on Management Information Systems! In this module, we are going to discuss about ‘Decision Support Systems’. We will be basically covering certain introductory concepts related to ‘decision support systems (DSS)’. And, we will also mention the essential differences between MIS and decision support system (DSS).

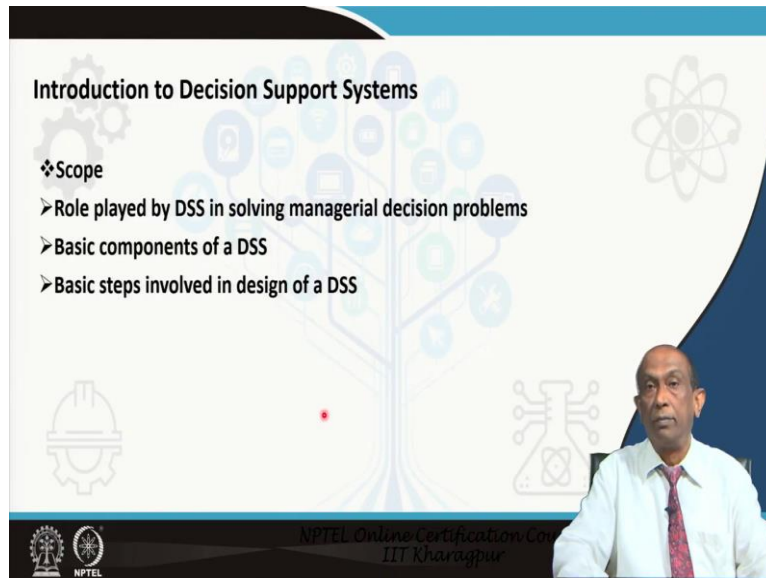
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So, what is decision support system? Decision support systems are primarily man computer interactive systems, which aid management in making decisions. So, there is an interaction between man and computer. So, in decision support systems we combine computers ability to process databases and models with manager's ability to draw on his experience and exercise his judgment.

So, manager's ability to draw on experience and judgment is combined with the computer's ability to process database and models in any decision support system.

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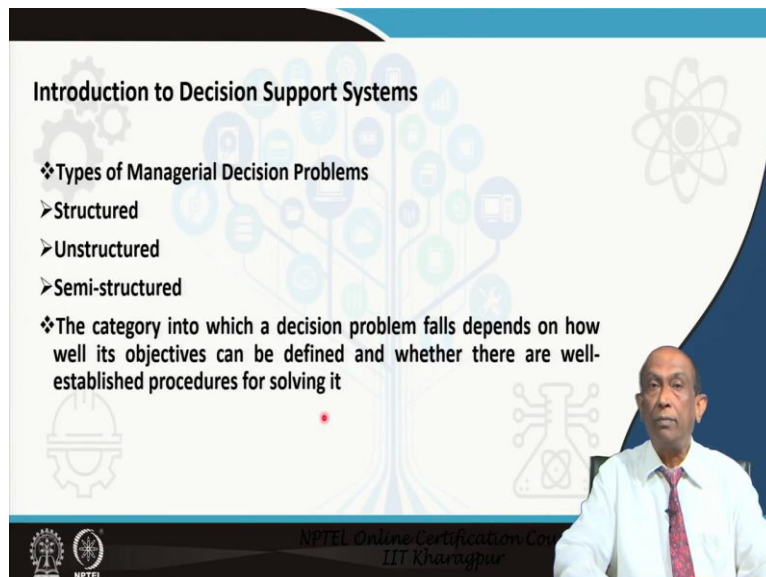
Introduction to Decision Support Systems

- ❖ Scope
 - Role played by DSS in solving managerial decision problems
 - Basic components of a DSS
 - Basic steps involved in design of a DSS

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So, basically the scope of this discussion in this module is limited to the role played by decision support systems in solving managerial decision problems, we will talk something about the basic components of a DSS. And, we will talk about the basic steps involved in design of a DSS.

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Introduction to Decision Support Systems

- ❖ Types of Managerial Decision Problems
 - Structured
 - Unstructured
 - Semi-structured
- ❖ The category into which a decision problem falls depends on how well its objectives can be defined and whether there are well-established procedures for solving it

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Now, before we go into the details of decision support systems. We need to know, what are the different types of managerial decision problems? And, first of all what is decision making? So, decision making basically refers to choosing one among the several alternatives

that exist to solve a particular problem that the managers are facing. The managers they try to find out the best alternative among the possible alternatives, but sometimes and in most cases, they are more bothered about finding an effective solution rather than finding an efficient solution.

We will talk about the difference between an effective solution and efficient solution slightly later. The managerial decision problems can be classified into structured, unstructured, and semi structured problems. And, the category into which a decision problem falls will depend on how well, its objectives can be defined and whether there exists well established procedures for solving such kind of problems.

Problems where there is well defined objective as well as well established procedures exist for solving those problems are known as structured decision problems. So, structured decision problems are those where we have a very well defined objective or well defined objectives. And, well established solution procedures for solving them; ok.

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The slide is titled "Introduction to Decision Support Systems" and lists three types of managerial decision problems:

- ❖ Types of Managerial Decision Problems
 - Problems with well defined objectives and well established solution procedures are said to be Structured (e.g., Inventory Replenishment)
 - Problems with vague objectives and with no well established solution techniques are Unstructured (e.g., New products to be manufactured)
 - Semi-Structured problems combine the features of both

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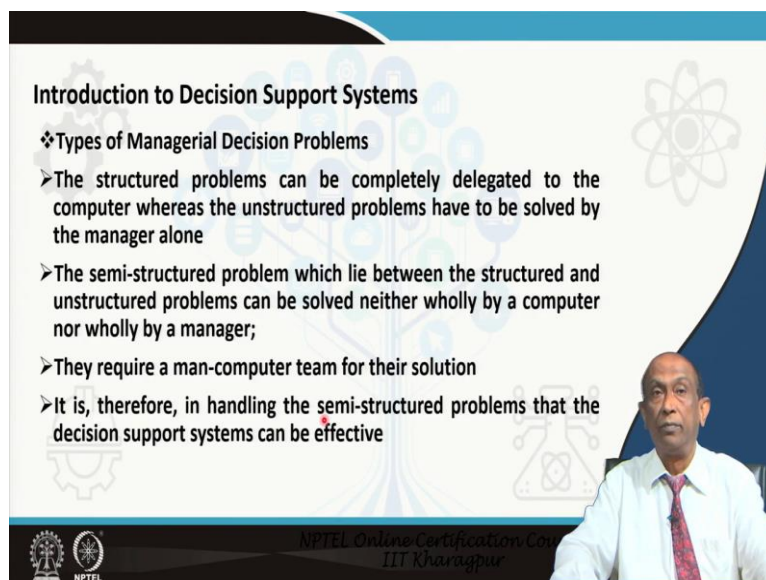
And unstructured problems, unstructured decision problems are those where the objectives are vague and there exists no well-established solutions' techniques; they are unstructured decision problems; so, problems with vague objectives and with no well-established solution techniques, for example, new products development.

New products to be manufactured in a portfolio of new product completely unstructured one, but look at the inventory replenishment problem in an organization, here the objective is very well defined and the procedure is well set. Whenever the stock level of any product falls below a pre specified quantity, which is known as the reorder level a new order has to be generated and placed onto the suppliers, in terms of purchase orders.

And, the quantity, which is specified as order quantity, there are various well, established procedures for computing that. Semi structured problems lie in between structured decision problems and unstructured ones. Sometimes semi structured problems combine the features of both, in semi structured problems, we may have a well-defined objective, but there exists no established solution procedures for solving them, or sometimes there exists several solution procedures.

But, the objective cannot be set rightly, very difficult to set specific objectives for the problem at hand. And, it is those class of problems that is the semi structured problems, which are candidates for getting solved through decision support systems. So, DSS is primarily meant for solving semi structured problems.

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The slide is titled "Introduction to Decision Support Systems" and lists "Types of Managerial Decision Problems". It contains four bullet points: 1. Structured problems can be completely delegated to the computer, while unstructured problems must be solved by the manager alone. 2. Semi-structured problems, which lie between structured and unstructured, cannot be solved wholly by either a computer or a manager. 3. They require a man-computer team for their solution. 4. It is, therefore, in handling semi-structured problems that decision support systems can be effective. The slide also features the NPTEL logo, the text "NPTEL Online Certification Course IIT Kharagpur", and a video inset of a man in a white shirt and tie.

You see the structured problems where the objective is very specific and established well solution procedures are there. May be completely delegated to the computer whereas, the unstructured problems. For example, generation of a strategy, there computer is of no help,

new products that need to be manufactured or developed, completely unstructured and this kind of problems need to be solved by the manager alone.

The semi structured problem that lie between the structured and unstructured ones cannot be solved wholly by a computer or by a manager alone. They require an interaction between the manager and the computer. And, hence there is a need for a man computer team to interact with each other to generate solution for this class of problems. And, it is therefore, in handling the semi structured problems, decision support systems are widely used, where the emphasis is on generating effective solutions rather than trying to find out efficient solutions.

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The slide is titled "Introduction to Decision Support Systems" and features a background with faint icons of a gear, a tree, a person, and a molecular structure. The main content is a list of three phases of a decision-making process, each preceded by a right-pointing arrow. The phases are: Intelligence (scanning environment and identifying problem areas), Design (formulating and analyzing alternatives), and Choice (selecting and implementing an alternative). A small red dot is visible on the slide. In the bottom right corner, there is a video inset of a man in a white shirt and tie. The bottom of the slide contains the NPTEL logo and the text "NPTEL Online Certification Course IIT Kharagpur".

Introduction to Decision Support Systems

❖ Different Phases of a Decision-Making Process

- Intelligence: Here the decision maker scans his environment, processes raw data and identifies the problem areas
- Design: For the problems identified in the above phase, various alternatives are formulated and analysed in this phase
- Choice: Here, a selection is made from the alternatives proposed in the above phase, and the chosen alternative is implemented

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Let us now talk about the different phases of a decision making process. Primarily there are 3 phases; the intelligence phase, the design phase, and the choice phase. In the intelligence phase the decision maker or the manager, scans the overall business environment, or the surrounding environment, which influences the business, processes raw data, and then identify a particular problem or identify the problem areas.

In the design phase what we see is that for the problems that have been identified in the intelligence phase. Managers try to find out or formulate various alternatives to solve that problem. So, these various alternatives that exist are analysed in detail during the design phase. And, in the choice phase a selection is made from the proposed alternatives and the chosen alternative is implemented. We need to know these phases because that will help us in the design of decision support systems.

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Introduction to Decision Support Systems

❖ **Problem Solving Process in a DSS:**

- Iterative and interactive
- The computer provides some output to the manager, the manager then interprets the output, gives new input, modifies the existing data or asks new questions
- The computer's major tools are models, both simple and sophisticated, whereas the manager uses mostly his experience and judgment

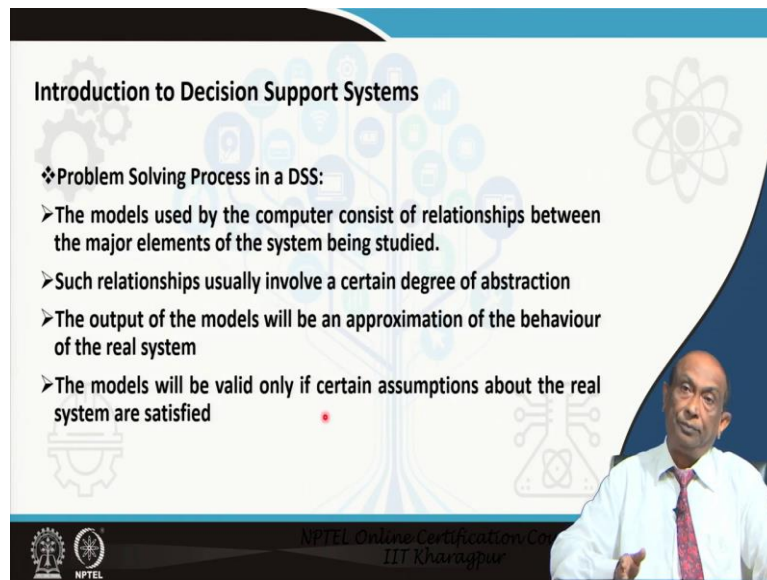
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If, we look at the problem solving process in a decision support systems, we find that mainly the process is iterative as well as interactive. What happens is that, the computer provides some output to the manager based on the different inputs that the manager has already provided.

The manager then interprets those output. After, his interpretation he may provide new input to the system, or he may modify the existing data, or the manager might ask new questions as part of the output that should be generated from the system. So, in here the computers major tools are the models. These models may be both simple and sophisticated whereas, the manager uses mostly his experience and judgment.

So, right in the beginning we said that it is an interaction between the manager and the computer. Is not only interactive, it is iterative, because the process may have to be repeated several times in order to get an effective solution which is satisfactory for the management group.

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Introduction to Decision Support Systems

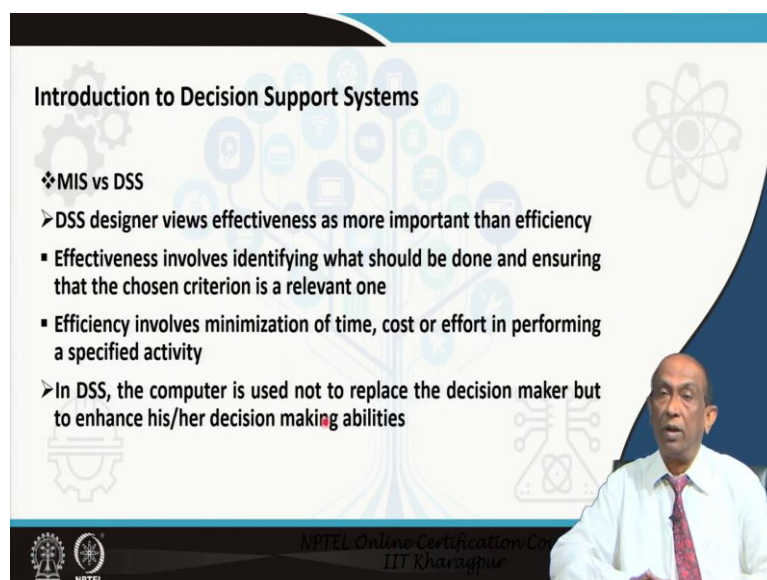
❖ **Problem Solving Process in a DSS:**

- The models used by the computer consist of relationships between the major elements of the system being studied.
- Such relationships usually involve a certain degree of abstraction
- The output of the models will be an approximation of the behaviour of the real system
- The models will be valid only if certain assumptions about the real system are satisfied

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The models that are used in decision support systems, consists of finding out relationships between major elements of the systems that we are going to study. And, such relationships that we are studying usually involve a certain degree of generalization. The output of the models will be an approximation of the behaviour of the real system. And, these models will be valid only if certain assumptions about the real system are satisfied.

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Introduction to Decision Support Systems

❖ **MIS vs DSS**

- DSS designer views effectiveness as more important than efficiency
 - Effectiveness involves identifying what should be done and ensuring that the chosen criterion is a relevant one
 - Efficiency involves minimization of time, cost or effort in performing a specified activity
- In DSS, the computer is used not to replace the decision maker but to enhance his/her decision making abilities

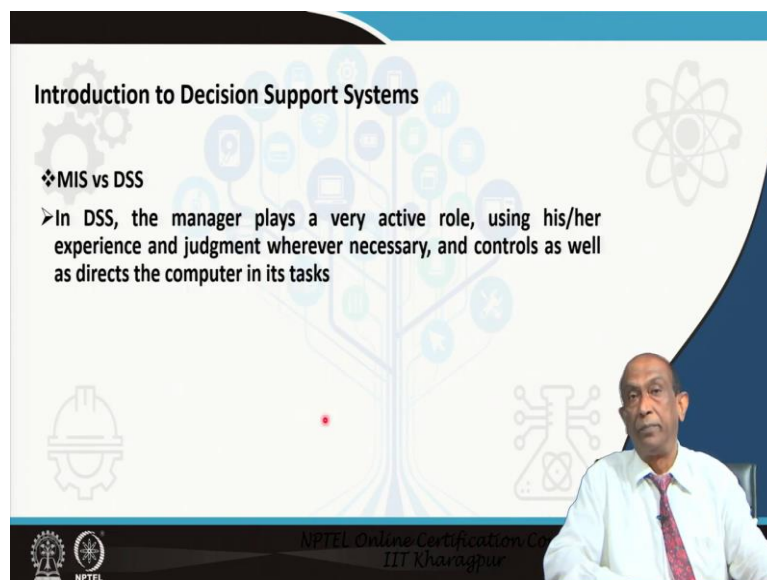
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Let us talk about the difference between management information system and decision support system. DSS designer views effectiveness as more important than efficiency.

Effectiveness involves identifying, what should be done and ensuring that the chosen criteria is a relevant one. That means, in an effective solution, we first question that whether the chosen objective is the right one or not, whether the manager is doing the right job that is the first thing.

Choosing the right objective is the most important thing in trying to find out an effective solution. Having chosen the right objective or a relevant objective, then we try to find out a satisfying solution for the same. Whereas, efficiency involves some kind of an optimization approach, finding the best solution approach, involving minimization of time, cost, or minimization of effort, in performing a specified activity. In DSS, the computer is used not to replace the decision maker, but to enhance the manager's decision making abilities.

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Introduction to Decision Support Systems

❖ MIS vs DSS

➤ In DSS, the manager plays a very active role, using his/her experience and judgment wherever necessary, and controls as well as directs the computer in its tasks

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In decision support system the manager plays a very active role, using his or her experience and judgment wherever necessary, and controls as well as directs the computer in its tasks. Because, in various iterations sometimes new inputs are being provided by the managers sometimes there are modification of data.

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Introduction to Decision Support Systems

❖ Range of Capabilities of a DSS

- Not all DSS need to include models in order to be effective
- A DSS can provide simple data retrieval facilities and yet be useful in aiding decision making .

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The slide features a background with a stylized tree of icons representing various data and technology concepts. A speaker is visible in the bottom right corner of the slide frame.

Not all DSS need to include models in order to be effective. Models are important components of DSS, but there are many simple decision support systems wherein the models are not necessary. Decision support systems can be simple data retrieval facilities and yet they may be highly useful in aiding decision making.

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Introduction to Decision Support Systems

❖ Range of Capabilities of a DSS

- The range of facilities offered by DSS can be listed as:
 - Retrieving information
 - Providing mechanism for adhoc data analysis
 - Providing pre-specified aggregation of data in the form of reports
 - Estimating the consequences of proposed decisions
 - Proposing decisions

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The slide features a background with a stylized tree of icons representing various data and technology concepts. A speaker is visible in the bottom right corner of the slide frame.

So, when we talk about the range of capabilities of a decision support system, we can list them as retrieving information from the database, providing mechanisms for ad HOC data analysis that can be also a DSS. DSS can provide pre specified aggregation of data and

generate various forms of reports. DSS can estimate the consequences of proposed decisions or it can propose various decisions new rules by analysing the data.

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Introduction to Decision Support Systems

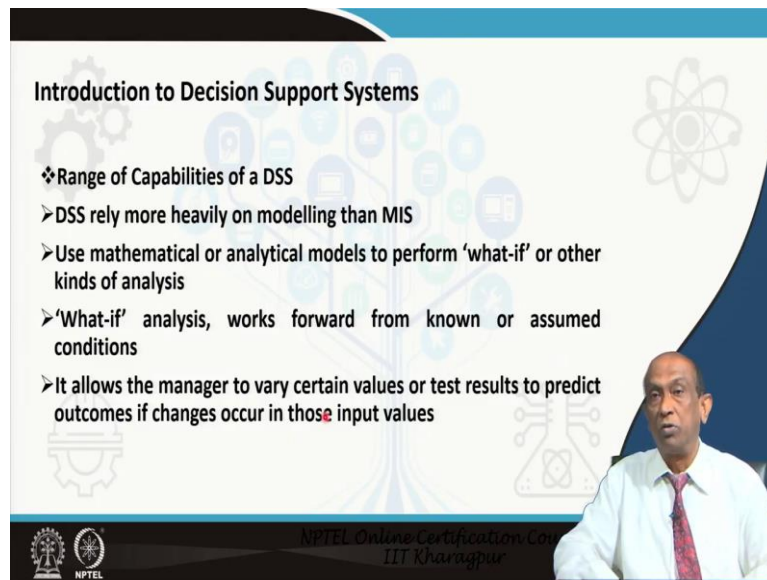
- ❖ Need for DSS Approach
 - Problem is semi-structured
 - All the parameters of the problem are not clearly defined
 - The parameters are firmed up as one proceeds through the solution process
 - Inputs are dynamic in nature
 - The input data for the problem are not fixed
 - These data change from time to time
 - For example, incorporation of new customer or change in demand from customer

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So, the need for decision support systems arises particularly in cases, where the problem is semi structured. Means the parameters of the problem may not be clearly defined and in semi structured problem another important thing happens is that the parameters governing the problems are firmed up as one proceeds, through the solution process.

DSS is also used widely in cases, where the inputs for a given problem are dynamic in nature. That means, the inputs that are required for solving the problem are not fixed, this data change from time over time this pattern of data changes, for example, incorporation of new customer or change in demand from the customer.

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Introduction to Decision Support Systems

- ❖ Range of Capabilities of a DSS
- DSS rely more heavily on modelling than MIS
- Use mathematical or analytical models to perform 'what-if' or other kinds of analysis
- 'What-if' analysis, works forward from known or assumed conditions
- It allows the manager to vary certain values or test results to predict outcomes if changes occur in those input values

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So, whenever the demand changes a fresh set of input comes in. Decision support systems rely more heavily on modelling than management information systems. Sometimes the models may be very simple, simple mathematical analytical models. We can use a spreadsheet to perform, what if or other kinds of such analysis through a spreadsheet. So, what are those 'what-if' type of analysis, that we perform every day on a daily basis through excel.

'What-if' analysis works in the forward direction from some given condition or assumed conditions. It allows the manager to vary or change certain input values or test results to determine or predict outcomes whenever some changes occur in the input values of those inputs.

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Introduction to Decision Support Systems

- ❖ Range of Capabilities of a DSS
 - What happens if we raise product prices by 10 percent or increase the advertising budget by Rs. 10 lakhs?
 - *Sensitivity analysis* models ask *what-if* questions repeatedly to predict a range of outcomes when one or more input variables are changed multiple times

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For example, here we have given 2 examples what happens? If we raise prices of a product by 10 percent or increase the advertising budget by rupees say 10 lakhs, what happens to the profit or what happens to the total revenue? If the price is increased by 10 percent or advertising budget is raised by 10 lakhs. So, sensitivity analysis models ask, what if questions repeatedly to predict a range of outcomes.

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Introduction to Decision Support Systems

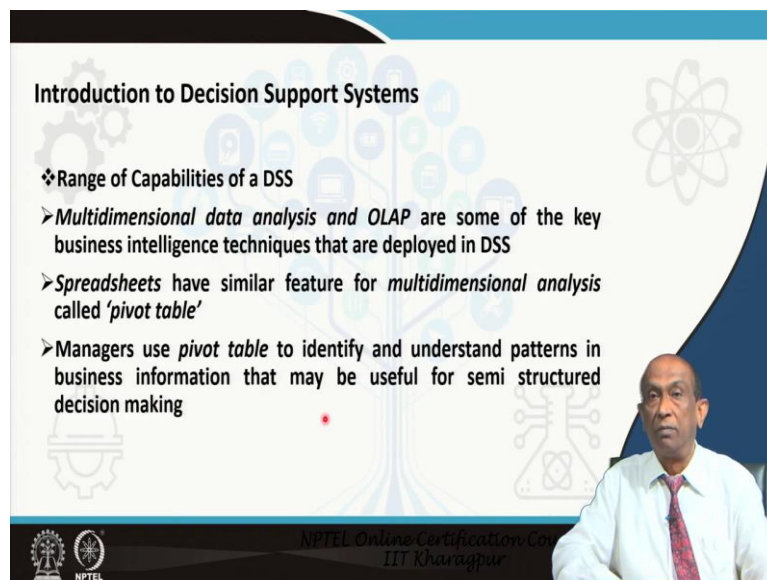
- ❖ Range of Capabilities of a DSS
 - *Backward Sensitivity analysis* helps decision makers with goal seeking.
 - For example, if the user wants to sell one million product units next year, how much must he or she should reduce the price of the product?

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When one or more input variables are changed multiple times? Backward sensitivity analysis helps decision makers with goal seeking. For example, if the user wants to sell one million

product units next year, how much he or she should reduce the price of the product? So, the goal is specified. Now, you try to see what should be the values for the input variables. This also can be accomplished through the use of simple spreadsheet models, using that goal seek function.

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The slide is titled "Introduction to Decision Support Systems". It features a background with various icons related to technology and business, such as gears, a tree, and a network diagram. The text on the slide is as follows:

- ❖ Range of Capabilities of a DSS
 - *Multidimensional data analysis and OLAP* are some of the key business intelligence techniques that are deployed in DSS
 - *Spreadsheets* have similar feature for *multidimensional analysis* called '*pivot table*'
 - Managers use *pivot table* to identify and understand patterns in business information that may be useful for semi structured decision making

At the bottom of the slide, there are logos for NPTEL and IIT Kharagpur. A small red dot is visible on the slide. A video overlay of a man in a white shirt and tie is positioned in the bottom right corner of the slide.

Multi-dimensional data analysis and OLAP tools are also some of the key business intelligence techniques that are of late deployed in decision support systems. And multi-dimensional analysis through excel spreadsheets take the help of this pivot table, pivot analysis. Managers they use this pivot table to identify and understand patterns in business information that may be useful for solving semi structured problems.

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Introduction to Decision Support Systems

- ❖ Range of Capabilities of a DSS
- In the past, much of this modelling was done with spreadsheets and small stand-alone databases.
- Today these capabilities are incorporated into large enterprise BI systems where they are able to analyse data from large corporate databases

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In the past, much of this modelling was done with spreadsheets and small standalone databases. But, today these capabilities are incorporated into large enterprise business intelligence systems, where they are able to analyse data from large corporate databases.

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Introduction to Decision Support Systems

- ❖ There are several other problems for which decision support systems have been reported to have been successfully employed
- Some of these problems are
 - ✓ Decisions on merger of companies
 - ✓ Budget planning
 - ✓ Portfolio management in banks
 - ✓ Corporate planning and
 - ✓ Capacity planning in production

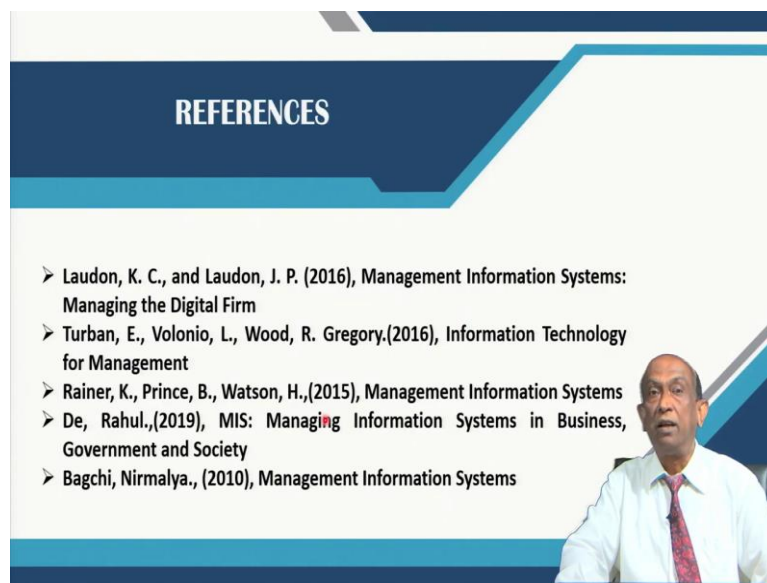
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There are many other problem areas for which decision support systems have been reported to have been successfully employed. For example, some of these problems are when the managers they have to take decisions related to merger of different companies. So, problems

related to acquisition and merger of companies are mostly semi structured and lot of decision support systems have been deployed for solving such kind of problems.

Budget planning, portfolio management in banks, corporate planning, as well as capacity planning in production are some of the examples, where decision support systems have been successfully deployed and have found lot of popularity.

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So, these are the references that I have used for preparing this module.

And, thank you all for your patience!