Advanced Business Decision Support Systems
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Lecture 05
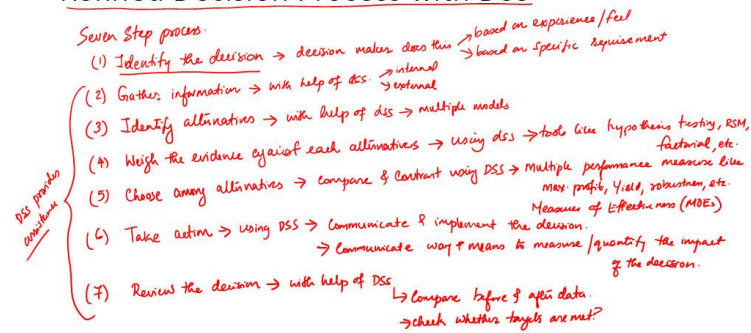**Refined Decision Process with DSS**

Good afternoon everyone. Welcome to the latest lecture in the NPTEL MOOCs from IIT Kanpur's Advanced Business Decision Support System course. I'm Dr. Deepu Philip, and Dr. Amandeep Singh Oberoi and Prabal Pratap Singh are also taking this course with me. We will all be teaching it together as we go over the Fundamentals of Decision Support Systems.

This course is an advanced version of the one that was previously planned for NPTEL MOOCs, as I already said. So, now that we've seen what makes up a web-based decision support system, as well as its key features and various building parts, etc.

We are now examining the Business Decision Taxonomy in greater detail. How are decisions in business made? In the last course, we mostly concentrated on what you might refer to as a general decision, however in this course, our attention is more heavily focused on business decisions.

We discussed a general decision-process model in the last class, in which the decision problem is defined, a decision-maker is chosen, information is gathered, alternatives are identified and evaluated repeatedly, a decision is made, followed by implementation, monitoring, and repetition of the process in a cycle.

Refined Decision Process with DSS (with respect to a business)

Seven Step process.

(1) Identify the decision → decision maker does this → based on experience/feel
→ based on specific requirement

(2) Gather information → with help of dss → internal / external

(3) Identify alternatives → with help of dss → multiple models

(4) Weigh the evidence cy a/of each alternatives → using dss → tools like hypothesis testing, RSM, factorial, etc.

(5) Choose among alternatives → compare & contrast using DSS → Multiple performance measure like max. profit, Yield, robustness, etc. Measures of Effectiveness (MOEs)

(6) Take action → using DSS → Communicate & implement the decision.
→ Communicate way & means to measure/quantify the impact of the decision.

(7) Review the decision → with help of DSS → Compare before & after data.
→ check whether targets are met?

DSS provides assistance

So, today's class we are going to do, the Refined Decision Process with the help of DSS. So, the General Decision Process Model is done without a Decision Support System.

What transpires when you put a Decision Support System to use to really implement it? Therefore, it may be broken down into seven steps. In reality, it's a seven-step process. Determine the decision is the first stage, after all. The manager, or the person who makes decisions, is responsible for this component. Either based on personal preference or a specific demand, depending on experience, feeling, etc. One of these possibilities is possible. As a result, the decision's identification becomes the initial step, and DSS is frequently used for this task.

Second is the gather information. We do not need to decide who is going to the decision maker because this is with help of DSS. You gathering the information and this can be based on internal, external, all those kind of things, what we seen, it can be internal, it can be external, it can be knowledge base, all those kind of things, it can be with the help of DSS.

And, once you gather information, the third step in this part is identify alternatives. Again with help of DSS and where you have multiple models and multiple options also. So, earlier where, when a group of people or individual sit and identify alternatives, the DSS helps here to identify the alternatives.

The fourth step becomes weigh the evidence against each alternatives. Again, using DSS like tools, like hypothesis testing, factorial, all these kind of things comes into picture. So, different tools you use, response, surface methodology, etcetera. You use multiple tools to identify which alternative performs better, you may have different measures also. But, anyway, the DSS helps you in identifying or weighing the evidence against each alternatives.

Then comes the fifth step. Choose among alternatives, you can say, compare and contrast using DSS. Again, here what you will end-up doing is, you can think about multiple

performance measure like maximum profit, yield, robustness, etcetera. Depending upon different objectives or different yardsticks or measuring or what you call as measures of effectiveness. Some people called as MOEs. Against different MOEs, you can decide which of the alternatives you are going to end-up choosing.

Then the sixth one is, you have to do is, take action. That means (here) again using DSS, communicate and implement the decision. So, you made your choice. Now, you have to communicate and implement the decision. This means also communicate ways and means to measure or quantify the impact of the decision.

So, it is not just you are implementing the design or the decision, you are not just taking action, you are also telling people, here is the action and there is how this action will be effectively we will measure, or quantify the impact of the action or the decision.

Then, review the decision, again with help of DSS. Here, what you do is, compare before and after data, check whether targets are met. So, those kind of things are part of this one. So, with the DSS what actually happens is, you can see that once the decision maker identifies the decision, in all the rest of the steps you have DSS provides assistance.

So, the previous case where a human being was seriously involved or a group of human beings were seriously involved, here you have a computer system, which actually eliminates lot of the mundane things like collecting the information, comparing and presenting the alternatives, assisting you to weigh the evidences, choosing among alternatives, ranking them according to the criteria that you specify.

And then, taking the action which means choosing the alternative which also involves automated communication of the decision to the stakeholders, and also telling them how will we measure the effectiveness of the current decision and reviewing your decision. So, this decision process is, you can say the DSS with respect to a business. So, we are discussing it with respect to a business in this regard.
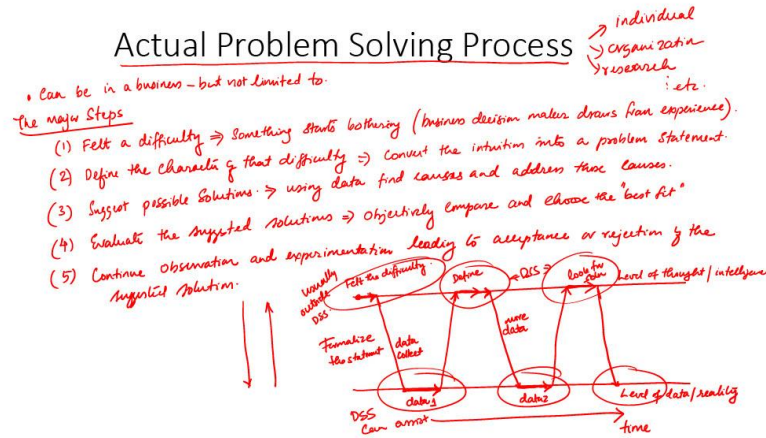
So, sometimes people talk about decision making and Problem Solving in the same breadth. And, Problem Solving, one thing you have to understand is that it can be in a business, but not limited to.

Problem Solving happens everywhere, you can solving a research problem or other kind of things. So, there are some sudden differences. The major steps of the actual Problem Solving are: the step 1 is felt a difficulty, something starts bothering. So, if you are a researcher, you feel like why is this happening, this does not seems right, there is something wrong going on here, I need to investigate this more.

And, similarly with the case of a business decision maker, the performance of this particular line is not up to the mark, there is something wrong with this, I need to investigate.

So, that is the one part. So, we can say it as business decision maker draws from experience. So, I usually tell people that, this felt a difficulty, I will explain it slightly below, but let me give you the major steps, the five steps, as part of this. Step 2 is what we call defining the character of that difficulty. So, you basically convert the intuition into a problem statement.

And, the third one is that we will talk about this in a particular fashion. The third one is to suggest possible solutions, where you are basically using data to find causes and address those causes. Fourth one is to evaluate the suggested solutions. You can basically say that you objectively compare and choose the best fit. Whatever you think is the best fit, you choose it.

And, then the last one is what you call continuing observation and experimentation. Leading to acceptance or rejection of the suggested solution. So, what you are doing is continuing the observation and experimentation. So, in a way, how this happens is that you can physically think about it as there are multiple models there are VW and nominee

models for this. But one way to think about it is that there is something called a level of thought, or what we call intelligence.

And, there is something called a level of data, or you can call it reality. And, you have time that is going on under the x axis and almost all felt the difficulty the feeling starts here. It starts somewhere here. You're feeling the difficulty right here.

This is the feeling or felt the difficulty. It always happens in the level of thought and as time progresses, this feeling bothers you and after some point of time, what you have to do is become so much that you have to deal with it. So, from there, you move to the plane of the data or reality. And, what you are actually trying to do here is formalize the statement.   So,   for   that,   what   you   are   doing   is   collecting   data.

Here is the data collect. It can be quantitative or qualitative, whatever it is. And, in this process, using that data, you will spend some time, and this is where you will collect the data. Let us call it as data 1. You collect the data and with the help of the data, you go back to the plane of thought and this is where you are for some time. You think about it, and   you   will   actually   have   to   define   the   character.
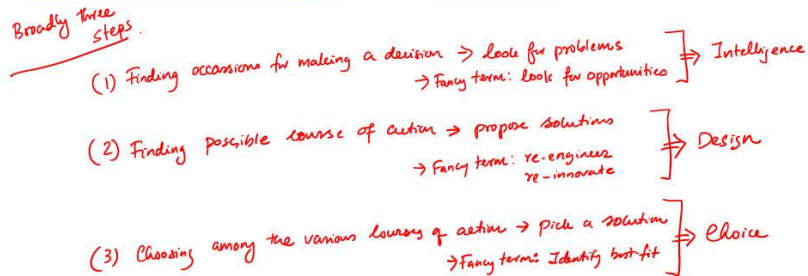
And, after defining the character or the problem, you will go back again. You will spend some more time here, and you will go back down to this one again, where you are actually trying to collect more data. And, this data is basically dependent on the definition you are trying to collect. You can call it as data 2 and the idea of this data 2 is that it is supposed to help you identify the solutions. So, with this data, you go back again, and then   you   start   looking   for   solution.

So, you always alternate to go back and forth between these. The thought and the intelligence and the reality field. So you come, collect data, go back, think, come, collect more data, go back, and think. And, then after some point of time, you will come back to this and you will alternate like this in reality and that is how the actual problem solving happens. And, lot of the time, the Decision Support System can help you in these portions.

So, DSS can assist in all the areas . So, while feeling the difficulty is usually outside DSS. These things can be within DSS. So, this is in another way you can think about how the actual problem-solving process and how a DSS can integrate in both these aspects. Now, how does Actual Decision Process happens in Organizations? So we just talked about the problem solving in the general problem solving or the actual problem solving approach.

This can be individual, organization, research, etc. So this problem solving can be applied all across.

Actual Decision Process in Organizations (business)

Broadly three steps.

(1) Finding occasions for making a decision → look for problems
→ Fancy term: look for opportunities ⟶ Intelligence

(2) Finding possible course of action → propose solutions
→ Fancy term: re-engineer re-innovate ⟶ Design

(3) Choosing among the various courses of action → pick a solution
→ Fancy term: Identify best fit ⟶ Choice

But when you talk about an organization, or when you talk about a business organization, how does this process happen? How does the Actual Decision Process happens there? We can make it in the form of broadly 3 steps.

So step number 1, finding occasions for making a decision or in another way people call it as look for problem. The newer term or fancy term or management term is look for opportunities anyway. So, generally the fancy term for this is what they call it as Intelligence.

You can call whatever you want. But the idea is that, you are trying to find an occasion to make a decision or you trying to find an opportunity where you can do something. The second step is this is broadly how the organizations do is finding possible couse of actions. And, this is what we call as a propose solution. The fancy term for this is re-engineer or re-innovate. You can put whatever as part of this.
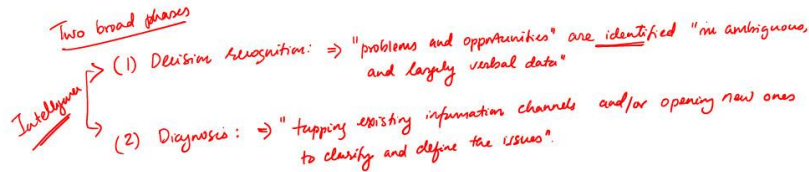
The general idea of all of this is what we can call it as the Design (Design the solution) or design your action. So, that is the intelligence then the second part is the Design and then, the third one is, what we can call it as the other 2 cases finding the third one is Choosing. Choosing among the various courses of action. So you propose a solution and here you are doing is pick a solution. You want to do a fancy term? I do not know the fancy term for this but management people may have some fancy term for this obviously.

Maybe we can give a fancy term also we can also call it as Semi Management. So, fancy term might be something like identify best fit. So, something like that and I am becoming

a management best fit. So, this portion is called what we call as the Choice. The Intelligence, Design and Choice as part of it.

So these are the 3 aspects that broadly happens in industry and various phases software does not help that is the part of that. So, let us look into all the 3 phases separately now and go from there.

Decision Making Process: Intelligence

Two broad phases

Intelligence

(1) Decision Recognition: ⇒ "problems and opportunities" are *identified* "in ambiguous, and largely verbal data"

(2) Diagnosis: ⇒ "tapping existing information channels and/or opening new ones to clarify and define the issues".

So, the decision making process let us talk about the Intelligence. What we are talking about as part of the Intelligence and 2 broad phases. You can call whatever you want, but we   can   break   it   into   2   major   phases   as   part   of   this.

Phase number 1, we call it as Decision Recognition is the broad term for this. And, the one way to think about is the problems and opportunities are identified in ambiguous and largely verbal data. So, I remember my supervisor doctor at Mooney as part of this, once when I was trying to move back from US to India I complained that India has so many problems. So, I had always used to say you can think about as a problem or you can think about as an opportunity to do something. So, these problems and opportunities are usually identified.

In the Decision Recognition, you identify them as ambiguous; ambiguous means they are vague, not very clear, and largely verbal data. So, somebody will come up with a very fancy statement you know it is like if you ask someone who is going to get married you will ask them what type of a person or lady that you are going to marry.
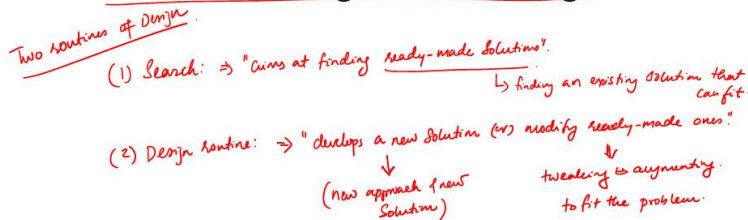
The person will say they should be tall, fair, look like this, have long hair. So, that will all be very vague statements like verbal data, but you would not be able to put a face or a individual to that data. So, that is an ambiguous that is the one way.

The recognition of idea is that. I want to get married kind of a thing. So step 2 is diagnosis. So, if you broadly explain in the terms of Dr. Mooney again, you can say it as tapping existing information channels existing information channels or opening new ones to clarify and define the issues.

So, either you tap the existing information channels use whatever you have or you try to open it. So, if I go to a doctor and say I have a headache, doctor checks my BP and all those kind of things and find these like, did you go to the rain? as I got little bit rain in my head. Yesterday looks like a common cold go take a steam inhalation. So, doctor is basically recognizing that I have a headache and might be having a problem. And, from my verbal data, he gets into an idea and then he explored the existing channels of the patient in front of him and then says okay fine go do that.

But sometimes he may suspect or he may have a sinus infection, so he says I suspect a sinus infection, so I want you to go a lab and test your nasal swab and etcetera. He may suspect COVID and say I want you to go do an RT-PCR. So, that would be tapping a new channel as part of this. So, these 2 steps, the decision recognition and the diagnosis forms what you call as the organizational decision making intelligence step.

Decision Making Process: Design

Two routines of Design.

(1) Search: ⇒ "aims at finding ready-made solutions".
      ↳ finding an existing solution that can fit.

(2) Design routine: ⇒ "develops a new solution (or) modify ready-made ones."
    ↓ (new approach ↑new Solution)
    ↓ tweaking & augmenting. to fit the problem.

The second step is what we call as the Design. Remember that where the second aspect is. So, remember we talked about this intelligence design and choice. So, in finding the possible course of action we can say, there are again 2 routines of design. There are 2 routines associated with this. So, the first one we call it as, the general word is Search.

Search everybody knows search and rescue kind of a thing okay. In the broader sense, we can call it as Aims at finding readymade solutions. In an organization remember when this design aspect if somebody says I am searching for a solution usually means, that I am

trying to find an existing solution that can fit to this. So, a readymade already available, so this is like finding an existing solution that can fit.

Number 2 the design routine. So, in the design routine, the idea is that, you searched and you did not find a readymade solution. So, now you develop a new solution or modify readymade ones. So the idea here is that, how to come up with a completely new solution? This may be a new approach and new solution okay. The process and the output outcome can be different in this case what you are doing is, you are tweaking or augmenting. There is an existing readymade solution you tweak it or you augment it to fit the   problem.

So, whatever is the problem that you identified you are trying to fit the solution or the augment the readymade solution to fit what the decision is.

Decision Making Process: Choice

Broadly have three routines

(1) Screen: ⇒ used when search generates more ready-made alternatives that can be intensively evaluated.
⇒ So many alternatives ⇒ too much time, resource, commitment (80/20)

(2) evaluation-choice: ⇒ actual choice between the alternatives.
↳ Three modes to this
(1) (Intuitive) judgement
(2) bargaining   } these choices need not be optimal.
(3) Analysis

(3) Authorization: ⇒ approval of the selected solution from higher-ups in the organizational hierarchy.

Now comes the third one Choice. This is again I remember, that we are going through this, you are finding the occasion and the possible course of actions. We gone through the intelligence and design. Now we are at last phase choosing among various course of action. So, the choice one in this regard is, if you look into this, it broadly has 3 routines. Other 2 are hard to each, but now we have 3 in this.

Number 1 is the Screen Routine. So, it doesn't mean that all the 3 will be used every time. This is in general sense which is used when search generates more readymade alternatives that can be intensively evaluated.

So, what happen, you did a search and you came up with many readymade solutions and you came up with so many of these readymade alternatives. It is very difficult for you to

that means. So many alternatives which implies too much time commitment time and resource commitment. So, hence the cost of the decision will go up.

So, in screen means you are like, I am going to narrow this down. So, people use something like 80-20 rule or these kind of things are all used for such kind of screening. Number 2 is the evaluation choice the second routine. So, what happens here, this is where the actual choice between the alternatives. Whatever the alternatives that you have decided, is where you are doing the actual choice between them. And, I would say there are 3 modes to this again and these can be Intuitive Judgment.

You are using your intuition to make the judgment. Number 2 is Bargaining. You are bargaining with whoever it is. Number 3 is Analysis. So, once you use your intuition to evaluate the choice your judgment.

Second one is you debate, bargain if this and this is a committee type decision. And, the last one is the Analysis. So, in this, you actually look into data and all those kind of stuff and then from there, you make a data driven choice. The third one is Authorization and what is Authorization?

The Authorization is the approval of the selected solution from higher ups in the hierarchy in the organization hierarchy. When you are a researcher, you may not need the authorization. You are self authorized, you check by yourself and stuff like that but in a business, once you have higher ups, you have organization hierarchy.

If you are a manager, you have a general manager above you. If you are general manager, you may have vice president above you or president that is a CEO above you. If you are a CEO, there is a board above you.

So, if you are board, then you have a shareholders which are the public. So, you go through the higher ups to get the approval and that is where you get the decision authorized in a corporate board or in a business organization. So, then the last question that we have is usually because if we look into this, we have said, you are making a choice and these choices need not to be optimal.

Why are Decisions Sub-optimal?

Fact: Decision is a result of decision-making process where a decision strategy is applied to the information.

⇒ Suboptimal decisions hence be attributed to:
  ↳ sub-optimal strategy ①   ⎫ two main causes.
  ↳ Suboptimal information ②   ⎭

⇒ Human cognitive capability ⇒ the information processing capability of human
   ③   beings are limited.

Drivers of Suboptimal decisions are ① and/or ② and/or ③

So, the question is, we had made this discussion why are decisions sub optimal? What drives or what causes the decisions to be sub optimal? The three main reasons for this. So, the first one is you can say it as, Decision is a result of decision making process. It is a result of a decision making process where a decision strategy is applied to the information. So, instead of calling it as one let us call it as the fact.

So, the decision is a result of the decision making process. We have seen what the decision making process the general one, the organizational one, the individual. So, what happens a strategy is applied to the information. So, therefore sub optimal decisions will be attributed to one sub optimal strategy or two sub optimal information can cause either sub optimal strategy or sub optimal information. Either one of them can drive the sub optimal decision. So, these are the two main causes.

Now, there is one more thing that you can think about which is called as the Human Cognitive Capability which means the information processing capability of human beings are limited okay. Even if you have perfect strategy and perfect information, still you may be limited by the cognitive capability because the individual or the human being cannot process the information in the best possible way and because of that you can end up having a sub optimal decision.

So, when somebody talks to you about sub optimal decision, it is either due to the sub optimal strategy or it is to the sub optimal information or it is to the Human Cognitive Capabilities. So, these three are the major causes or things that drive the decisions to be sub optimal.

So, drivers of sub optimal decisions are one and or two or three. So, it can be all the three, can be one or two of them, can be something else as part of them. So, with this we conclude today's lecture and we hope that you had a clear understanding of how

organizational decisions gets made and how the business decision the terms that are used and the major phases and aspects of it.

So, when we get into the Business Decision Support System, you are easily able to recognize the three phases the Intelligence, the Choice, the Design etcetera and also, you are able to identify different aspects of whether the Intuitive Decision a Bargaining Decision? Whether it is a analytical decision all those aspects that you will end up seeing and you will understand how this moves back and forth as part of that.

So thank you for your patient hearing and hope that you have enjoyed the lecture and we will see you soon in the next session.

Thank you very much.