

Practitioners Course in Descriptive, Predictive and Prescriptive Analytics
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Lecture - 03
Decision Needs and Analytics

Good evening, welcome you guys to the and yet another lecture of applied analytics a practitioners approach. This lecture today we will be discussing some of the aspects of why decisions are needed, why analytics is needed? And all other aspects of it and I am Doctor Deepu Philip from IIT Kanpur. So, today's topic of lecture is decision needs and analytics. So, we all have it is a very simple words I need for decision making and why is analytics necessary. So, today when we are going to see is.

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Overview

- Business entities have to make decisions at various levels - result in:
 - Varying impacts — impact period → duration to which the impact of decision remains. (Tata-land rover acquisition) → 1.
 - Scale — how big or how much of the organization is impacted by the decision (financial value). eg: GST vs. state tax.
 - Scope — the area to which the decision impacts.
eg Boeing - Dreamliner (787) composites → (production of aircraft) → better operational fuel efficiency.
- Strategic vs Tactical decisions (day to day)
 - ↳ long term decisions
 - ↳ short term decisions (operational decision)

Decision needs can be classified into four layers on scale and degrees of freedom available to the decision maker (Saxena, R. and Srinivasan, A., 2013)

Handwritten notes:
Business organizations (for profit organizations)
These decision by business entities result (or) influence various aspects of the organization
Visionary aspects

Why is decision and important thing for business entities? So, we all know that business entities; business entities which we implies that business organizations Or here we are mostly dealing with for profit organizations, this is applicable to non profit organizations as well, but today we are more focusing on for profit decision making. And we saw an entity how to make decisions at various levels. So, decision makings happens at different levels or various levels within this and these decisions by business entities result or influence various aspects of the organization. So, when we say that we make decisions at

various levels what we are suggesting is that; these decisions will have various impacts in the organizations; various aspects of the organization will be influenced by this decision.

So, the first part we are talking about it is the various impacts, the varying impact. So, when we talk about this we are talking about impact period which implies the duration to which the decision the impact of decision device; impact of decision remains. So, for example, it can like a classic example of this would be like a Tata land rover acquisition; here we know that land rover is a British company which makes us assured is and it was acquired by Tata motors of India. And that was more of a long range or a long term acquisition where the impact of this acquisition was is shown in Tata motors till today.

Because I had to take a lot of money and how much of that another aspect of be taken into picture and the finances of the company was affected and all other aspect. But land rover made lot of profit; so, that also help with the Tata motors in getting their annual sales up in a much larger value. So, the decision there was together to acquire that Jaguar land rover was the quest decision that was to be made by then CEO of Tata motors. And so that impact of the decision even after that CEO was left; when new CEO came in and another CEO just now joined Tata motors. Till now the impact of the decisions that decision is still lingering in the company.

So, the impact of the decisions the time period with which this impact happens is one of the most important points what we can talk about in why business entities make the decisions. Second aspect is about the scale of the decision which means how big or how much of the organization is impacted by the decision. Classic example of this you would be like you know; you can think about is a financial value of the decision in a way. So, example let us talk about is the GST versus state tax.

So, let us talk about the GST which is something that was; the impact of the GST is across the entire nation, the country of India. Whereas, let say the state of Andhra Pradesh increases the tax by something then the only impact besides within the state of Andhra Pradesh. So, the scale of the impact of the decision made by the parliament of Andhra Pradesh will probably be just limited to the state of Andhra Pradesh, whereas the parliament of India when did made the GST decisions; to impose GST in the country that decision impacted across the nation for every states all together. So, the scale of the

impact of the decision in that case was pretty large. Then the third aspect we talk about this scope of the decision which means the area to which the decision impacts.

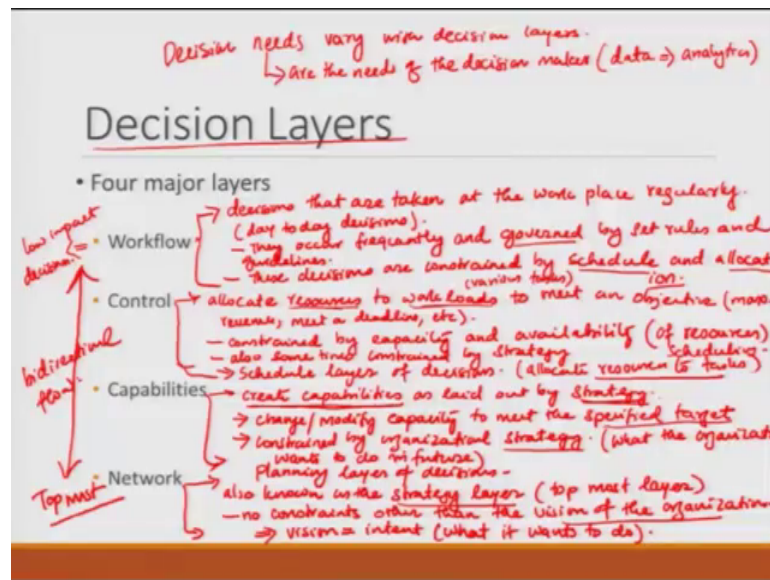
So, for example when Boeing we will do this is an example when Boeing decided to make dream liner or what we call is as the 787 aircraft with the help of composites. The impact of it was; initial impact of this was or the initial scope of the decision was to the production of aircraft. But due to the weight reduction of that was insulating out of the usage of composite materials; that decision had a larger scope because during the time of operation; find out that because the weight was reduced, since weight was reduced that necessary to that was necessary was also reduced. Another process, the drag was reduced and it results in better operational fuel efficiency.

So, you can think about it as the decision to use composites to build 787 aircraft; the scope which was to the manufacturing of the aircraft, later translated to the operational scope; where their craft return, fuel efficiency due to reduced weight. Then we also talked about two type of other decisions which is called as strategic and tactical decisions. In a simplest way to think about it is strategic decisions, the strategic decisions are typically they are long term decisions. The duration, the time period of impact of this decision are quite long, whereas tactical decision; they are short term decisions.

Sometimes tactical decisions are also called as operational decisions. So, what we are doing here is this is to tactical decisions mostly deal with the day-to-day aspects of a business whereas, strategic decisions are mostly long time which are also another way to look about his visionary aspects or we can think about it a long time growth another aspect of a company.

So, after this what we will now do is we will try to talk about the needs of the decision; decision needs. We can classify this into four layers or four categories or four groups on the scale; the scale of the decisions and the degrees of freedom that are available to the decision maker. This four layer has been proposed by Rahul Saxena and Srinivasan in 2013 and this is actually a meeting, this concept is of quiet importance into this analytics.

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So, let us see what does that actually amounts to. So, there are four major layers of decision making; so, what we said is decision needs vary with decision layers. As the layers changes, the needs of the decisions; these decision needs are the needs of the decision maker. And when the decision maker is making decisions, he would require different data.

So, data which will be particularly provided by analytics; so, since the needs are different, data are different and the data is different; so, the analytics to be done on that particular decision maker is also different. So, the layers of decision; the four major layers are we talked about the layer number one we talked about is the workload decisions.

So, these decisions that are taken at the workplace regularly; Saxena at all define it this way or what we can basically think about these are; these are day-to-day decisions and the decision maker is the workout himself. And the occurrence, they occur frequently and governed by set rules and guidelines. So, there are rules and guidelines that are available for this and they basically control though they basically govern these decisions. And other aspect of this that these decisions, the workflow decisions these are all the workflow decisions; these decisions are constrained by schedule and allocation.

So, when you search schedule; we all know what is schedule is about schedule is who is going to do what and allocation is who is allot what task. So, depending upon this

schedule and allocation which is the constraints for the decision maker; workflow decisions are made, but these are day today decision they are basically made in the workplace. They are made on a regular decisions their impact is not very high ok.

So, these are also you can think about is as the low impact decisions they are important, but; that means, their impact on the organization is not that huge. The next what we talked about is the control decisions; so, let us see what is the control decision is. The control system decisions, they allocate resources to workloads to meet an objective and what are some of these objectives? The objective should be maximized revenue, meet a deadline etcetera.

So, in this control layer of decisions what the typical decisions is; you allocate resources to workloads. Resources can be man, machine, materials, money, methods those kind of things and workflows you can think about the various tasks; various tasks needs to be performed. And these decisions are typically constrained; these decisions are constrained by two things; what is capacity and availability.

So, we are constrained by capacity and availability of whom? Of resources, the capacity and availability of resources constrains such type of decisions that are in the controlled layer. And there is one more constrained that part of this; this is also sometimes, not every times sometimes constrained by strategy. Because what happens is you know; here you are basically allocating resources to workload. Hence in many times; this is also known as the schedule layer of decision making. Because scheduling is the process of allocating; allocate resources to tasks this is called as scheduling.

So, when somebody says this is scheduling means or you are doing a schedule, you are allocating resources to task. Hence this control there is also called as the scheduling line, then, we talked about the next layer which is called as the capabilities layer. In the capabilities layer the aim is to create capabilities as laid out by strategy.

So, in this case what we are doing is the strategy says we have to; any manufacturing facility the strategies says double the production; currently less assume that is a car manufacturer who is producing 1000 cars. And the strategy says double the production to 2000 cars; so to do that we have to there has to be additional machine certainly be procured, new people need to be hired and all those kind of things.

So, that kind of things by the new machines, a hiring new person that is all result in what we call as creating the capacity. So, once you have create the capacity you will be capable of meeting this strategy and this capacity of which case are allocated to resources, from there you do day to day operations.

So, here, what we are typically try to do is; we change or modify capacity to meet the specified target that is one part. And the constrains on this decision; typically constrained by organizational strategy. When we say constrained; the way we are losing the weight constrained we are using the word in the form of a governing. So, here the organization strategy what the organization want to do in future? You can think about that has being the roughly the word strategy here. Depending on that you will come up with a new specified target and using that you create the capabilities to meet the target.

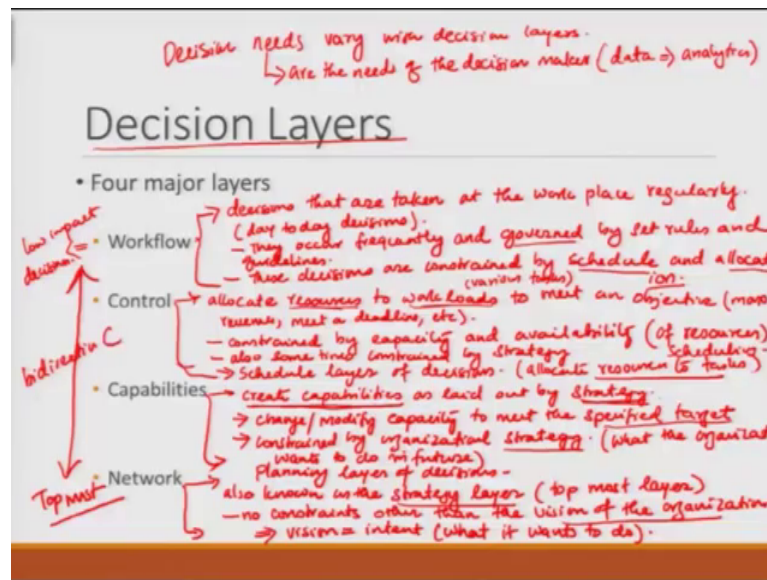
So, hence in some of the cases this is also called as the planning layer of decision making. Because you are making, doing or sort of plans to meet your organization strategy and then the last layer of decisions that we are going to talk today is a network layer of decisions; is also known as the strategy layer. And this is also the top most layer of decision making and there are no constraints in this, other than the vision of the organization.

So, like for example, every organization has a vision; a long time vision why do they exist this a common goal. For example, an organization like Greenpeace; their existence is for the betterment of the earth and mankind and ensure that every the entire earth is protected, the ecology for tracking and then those kind of things. And if Greenpeace decide to build a nuclear bomb that will be against the vision of the organization.

So, other than the vision of the organization those constraints that; the network decision or the strategy layer decisions are not constrained by anything else. So, the vision of the organization; in another way we can think about it as the vision is equivalent to the intent of the organization, what it wants to do. So, this vision of the organization decides how do we go from there?

So, this is the top most layers; as I said we and from here the decisions typically flow in one direction. It can be flowing in other directions also, some decisions taken in the workflow can also come this way. So, you can think about the same bidirectional flow.

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So, now let us talk about the needs of the decisions; now we talked about what are the layers. So, as we said earlier decision needs vary according to the layers in which the decision is made. So, in which layer; so, if you are doing the; if you are making the decision of the lower most layer or what we call as the work flow layer, two top most layer; which we can also call it as the strategy layer or the network layer. The needs of the decisions or decision makes are quite different. So, each layer determines how do we go from there.

So, these decisions needs you can classify them into three major decisions needs. So, the needs for decision can be classified into three categories and these needs all have a specific place where these decisions are being made. So, the first one we talked about is the proactive decision needs. So, the proactive decision needs they arise from the need to set and drive policies.

So, you need to set and drive policies; hence the origin, originates at the network layer or the strategy layer; network or the strategy layer. And what typically happens is; these needs then cascades down to other layers in the form of; in which form? In the form of policies. So, various policies that are said the strategy layer drives the need for decision.

So, the productive literally means take decisions in anticipation; if we are going to think about this is going to happen; if this happens how we will be deal with this decision and that is what we are going to do us part of this. So, the productive (decision) typically sets

in the policies and that policies chart to trickle down into the lower layers of the decision making.

Then the second one we are going to talk about is the reactive decision making. So, the reactive decision needs; reactive needs or reactive decision needs are done when there is an alert about something in this system. So, here what we are taking is take decisions after the occurrence of an event or a flag in this case.

So, the main aim of this decision is to align this decision needs to align; align the execution policy, execution to policy making. So, as we said earlier is when the policy decisions are typically done in the from the proactive. And what you need to do is, you need to align the execution or the operations to that of the policy on a daily basis. Not a daily basis on a frequent basis, this need to be done frequently. Second part is these needs; typically originates at the control layer; what the control systems layer.

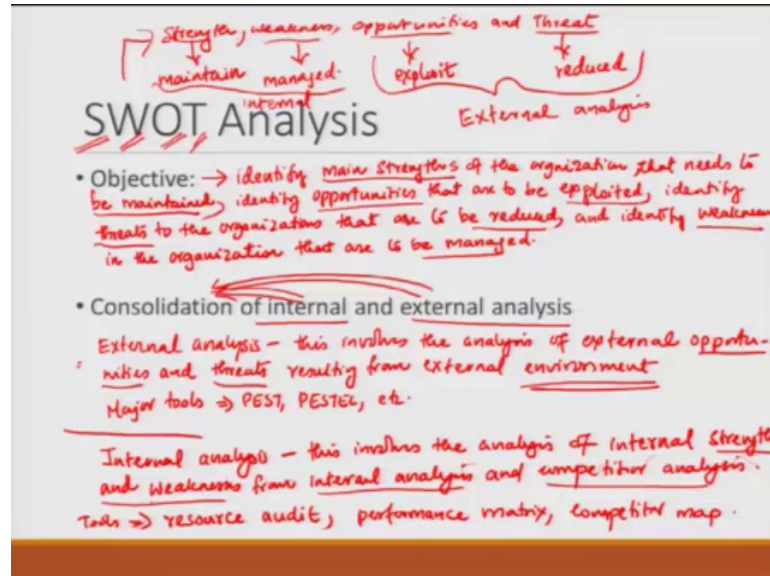
So, the aim here is that these decisions are typically driven, these needs typically driven other reactive. These reactive decisions are typically driven at the control system layer and time to address; these decisions needs are short or you require quick decisions. So, anybody who drives these decisions, need to understand the fact that these decisions need to be taken quickly. And then the last one we need to do is the adaptive decisions; so, the adaptive decisions is something what we talk about it as the ability to sense external and unpredictable events and adjust to mitigate the impact or impacts of those events.

So, here is that aligning in anticipation; so, like if there is a tsunami that happens in Japan; how is it going to impact? So, classic example is when the tsunami happened in Japan, it actually affect the production of various Japanese sort of motives in the country like especially Toyota and Honda in India; where their engine manufacturing plants were filled with water and everything and the production have to be held in fall. So, that is where then they import the engine from other plants and then they were used to cover of the short form.

So, that is what you call as the adaptivity; so the origin of this; the origin is from outside the system and this percolates to all four layers of decision making. So, that is what we are talking about the needs of decisions; so continuing on to what we are talking about

the decision needs and decision layers and other things; let us talk about something called as a SWOT analysis.

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This is typically something that is done by all organizations and the SWOT analysis is a tool that where is conducted at the top most level typically and it is done for different purposes. So, the SWOT analysis typically does stands for strength, weakness, opportunities and threat.

So, an analysis that comprises of the strength, of the weakness opportunities and threats is what we call as a SWOT analysis. So, the objective of such an analysis that is done is typically at to identify main strengths of the organization. So, identify what are the main strength of an organization and organization that needs to be maintained.

So, identify what are the strength of the organization they need to be maintained second is also to identify opportunities that are to be exploited. Then third one is identify threats to the organization; that organization that are to be reduced and identify weaknesses in the organization that are to be managed. These cases so, we are to identify the main strength that need to be maintained. So, you maintain the strength; strength maintain them then we talk about the opportunities that need to be exploited; opportunities to be exploited. So, exploit they exploit the opportunities then identify the threats that are to be reduced.

So, the threats are to be reduced and then the weakness that are to be managed. So, whatever the weaknesses are that need to be managed. So, this is the objective of the SWOT analysis; so, this kind of gives you what you call as all possible aspects of a got an organization and it also gives you the strength that tells you how the organization can go forward, grow another things.

Weaknesses where all we need to pay attention to; so, that we can manage them opportunities where we can exploit it. So, that we can grow, we can become big in the future and threats we identify which are the threads in organization and how do we reduce them so, that the organization flourishes what it is supposed to do.

So, be there are two type of; in a way this is done with the help of internal and external analysis. And both these analysis gets consolidated in this case internal and external analysis actually get consolidated to come in the form of a the SWOT analysis. So, what is the external analysis? When we say what are we doing here; this involves the analysis of external opportunities and threats resulting from external environment.

So, the opportunities and threats are typically derived from what we call as the external analysis. The contributed to them is typically the environment in which the organization is functioning. So, the external analysis typically provides you the various opportunities that are associated with the organization and the threads that are also part of the organization. The major tools that are used here, major tools in this case are the PEST, PESTEL analysis those kind of things etcetera.

Whereas, the internal analysis so, this internal analysis; this involves the analysis of internal strengths and weaknesses; from weaknesses from internal analysis and competitor analysis. So, what we are doing here is that we are saying that the internal analysis in this case and the competitor analysis put together helps us to analyze the strength and weakness of the organization.

So, these comes from the internal aspect or the internal analysis. So, now the tools is like there are many tools that are used and the major tools include what we called as the resource audit; then we also; something called as a performance matrix, competitor map these are all part of the internal analysis.

So, we seen this kind of a tool which is done quite a lot of the time to decipher the strength, weaknesses, opportunities and thread to an organization and decisions are based on this. And you can see that for each type of analysis; you require different set of tools. And the analytics that are required to make decisions about each one of them, to decide whether this is a strength, whether this is a weakness, whether this an opportunity, whether a thread; they are different.

And hence we can also see that same also in decision layer; various layers of decisions which requires various decision needs. And same way for a SWOT analysis which is supposed to be done at the higher level of the typically of the network layer; we can see that still you require a wide variety of analytical tools to provide the capabilities to that decision maker.

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→ a high level analysis

Customer Value Matrix

- Objective: → Identify customer segments according to the value they provide to the organization
- Important facts:
 - Customer who buy the most are not necessarily the most valuable customers *Quantity of purchase is not the most important aspect.*
 - Most valuable customers are those who can bring new valuable customers through recommendations *not just about buying ⇒ helping to bring more valuable custo*
- Four categories:
 - Champions: → high buyers (buy the most) and good advocates (recommend)
 - Affluents: → high spending customer without making any recommendation.
 - Advocates: → makes the most of the recommendations but do not buy a lot.
 - Misers: → low value customers in both purchasing and recommendation.

the decision needs ←

different ←

Another thing that we talked about today will be the customer value matrix analysis; here is another example for this. The customer value matrix; we talk about is that the objective is to identify customer segments according to the value they provide to the organization.

So, the customer value matrix is typically again high level analysis; in this analysis what you trying to do if you are trying to identify customer segments or you trying to classify the customer; according to the value they bring to the organization; sounds very simple,

but typically some important facts of important aspect that you need to understand for the customer analysis.

The first thing is the customer who buy the most; are not necessarily the most valuable customers. So, the quantity of purchase is not the most important aspect; so, the customer who buys the most, need not be the most valuable customer. So, then who is the most valuable customer? The most valuable customers are those who can bring new valuable customers through recommendations.

So, it is not just about buying instead helping to bring more valuable customers. So, when we are saying that a person who can bring more valuable; new valuable customers through recommendations is somebody who was more important to an organization than the person who buys the most. Do not say that the person; who buy the most is not important, but the other person is more important than such a person.

So, a customer can be broken down into four categories and depending upon this categories; the way in which you deal with the decision or how you decide upon how to deal with the customer also various. The first category is what we called as the champions; the champions are typically called as high buyers or they buy high amount of or here is the buy the most and good advocates; so or recommenders or they recommend the most also; so, buy the most; they recommend the most also, alright.

Second what we talked about it is the affluents; these are the people they are called as high spending customers without making any recommendation. So, these are the customer who spend the most, they spend lot of money, but they do not make any recommendation. Then comes the people they are called as advocate; makes the most of the recommendations, but do not buy a lot.

So, these customers do not spend too much of money; that do not buy a lot, but they make most of the recommendations. So, such type of customers are called as advocates and then the last one is called as the misers; they are low value customers in both purchasing and recommending. So, you have seen that depending upon the category of the customer; their behaviour changes. So, if you find a customer who is the champion; if you come across a customer who is a champion then the decisions needs for a champion is different from the decision needs of a misers; so these decisions needs are different.

So, when a decision maker come across the champion customer; they would treat the customer with the different aspect than that of a misers customer. Even though the rule says all customers are important, treat customer, customer is a king, but in between the kings also there is gradations and that type of a analysis that an organization do; to identify the value that a customer brings into, it is called as a customer value matrix. Using this analysis, better policies of different policies are actually set in this case; using this we would be able to; the decision maker will be able to make better decisions.

So, having said all of this what we conclude from today is that the needs of making decisions; depends upon the time, the layer, the significance, the scope at which the decision is remain. And depending upon the decision needs; the data, the information that is necessary to make the decision also varies. And hence the analytics that provides that information for the decision maker, the tools, the aspects, the tricks that needs to be that are associated is with analytics to make that information happen to the decision maker will also change.

So, that is one of the reasons why there is no single tool to solve the problem in analytics. There is always a bunch of tools and you have to learn a lot of tools so, that you can apply different tools for different decision needs. Hope that makes sense to you guys and we will see you in the next lecture soon.