Course Name - Operations and Revenue Analytics

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Week - 01

Lecture - 01

Welcome friends, I welcome you all to a new course on operations analytics. We all know that analytics has become a buzzword which you can use with any domain, any domain of decision-making wherever you need decisions which should be supported by appropriate data, more and more data, data which is continuously coming, you can use analytics in all those domains. In this particular case, we are starting a course where the role of data is in the field of operations management. So, we are calling this course operations analytics. Now, in this first video, we are going to discuss the scope of operations analytics, what all we are going to cover in this particular course, so that you have a fair amount of idea of what the field of operations analytics is.

Because there are courses available in the field of big data analytics, supply chain analytics, human resource analytics, marketing analytics, and so on. So, you should be able to clearly differentiate between various other courses where analytics is used and how operations analytics will add more value to your decision-making capabilities. So, with this idea, this course is conceived, and we are going to discuss in this particular session what is the new landscape, the evolving landscape of operations management. We will give you the introduction of operations analytics. What is the value proposition? What additional value this field of operations analytics is bringing for you?

How your decisions will become more impactful? How your decisions will bring more efficiency? How your decisions will help you in achieving the objectives of your organization? All these aspects are related to the value proposition. We will be discussing these things also in this particular course and then we will also see that in how many

different aspects we can classify the business analytics part. So, that is what we are going to discuss in this particular first session of this course.

Now, we are going to discuss in this course what operations analytics is. We will be talking about descriptive and predictive analytics as well. The role of data will become very important wherever you have more and more uncertainties. There are a large number of operational areas, for example, forecasting, supply chain decision areas, where a lot of uncertainties exist. We will see how analytics will help us in managing these uncertainties in a better way.

For that purpose, we will be talking about what the optimal level of product availability is because you want to serve customers and keep the cost minimal. Now, these are contradictory objectives. Now, with the help of analytics, how can we best achieve these contradictory objectives? That is a very important area. We will be talking in detail about this aspect.

Then, we will also discuss revenue management activities. This is a new field in the area of operations analytics. Where we see how capacity allocation and pricing can help in maximizing revenue. So, a good amount of our course is dedicated to maximizing revenue, or you can say revenue management activities. So, these are the different areas and topics we are going to cover in this particular course over 40 different sessions.

Now, let us start first with the evolving landscape of operations management. Now, traditionally and even today, operations management is summarized with three C terms. QCD. These three letters actually summarize the entire operations management. Q means quality, C means cost, and D means delivery. How to offer better and better quality to the customer?

Continuously, we need to see how we can improve our quality and give better quality products to the customer. As a customer, I also want superior quality every time. The other thing is cost. I want better quality products at a lower cost, and that is another challenge which is coming for operations management. We want faster delivery.

We want deliveries in the minimum possible time. So, 'we' means whether I am part of a supply chain, any intermediary, or I am the final consumer of the product. We all want products to be delivered to us in the minimum amount of time. So, delivery times are also shrinking day by day, and we also expect that whatever our supplier has promised, that okay, I will deliver you in 3 days or 4 days or 5 days. It should be delivered on that particular day.

So, there are two aspects of delivery. One is how we are able to reduce delivery time and deliver on time. These are the two aspects. So, when you are looking for faster deliveries. It is expected; now you see Q and C, they are in opposite directions.

If you are looking for improving the quality, the cost is also going to increase. But as a customer, I want better quality and lower cost. This is what the customer expects, and this is what the industry believes. Similarly, if I compare cost and delivery, in that case, I also want faster deliveries. As a customer, I want the product to be delivered to me in the minimum possible time. So, I am expecting faster deliveries, and when I am going for faster delivery, I take all those modes of transportation and delivery that can deliver products at a faster rate. I feel that the cost is going to be up. This is the industry perspective.

But as a customer, what I want is that the cost should also be less, and the delivery should also be at a much faster rate. This is the customer. So, the customer expects both delivery and cost to be reduced. The customer wants better quality, and the cost should also be lower. But if you compare these things from the industry perspective, it is slightly opposite. And therefore, this is the evolving landscape of operations management: competing in this type of environment where customer expectations are continuously rising, and we have to fulfill those customer expectations with the help of available tools, which are data-driven tools.

So, therefore, the role of analytics is becoming very, very important in the field of operations management also because of these expectations of the customers which are increasing. The industry and companies are becoming more and more challenging in terms of how we are going to fulfill expectations because the general perception and the

customers' expectations are not matching. Therefore, we need to see how we need to evolve ourselves so that we can fulfill these expectations of the customers. Now, along with this QCD, we have more phenomena which we are expecting in the changing role of operations management. We traditionally explained QCD, and now we are moving from QCD to QCDF, where F stands for flexibility.

Because customer expectations of quality may change very fast. So, you need to develop a system which is flexible as well. So, a lot of expectations of flexibility are also there on the operations management. So, these are the entire changes which are happening in the operations management. And I think all of us are capable enough to understand how technologies are changing.

How computerization, automation, the use of the internet, and the internet of things in our operation management are enabling the operation management to act in a more strategic manner. In this evolving landscape of operations management, operation management is no longer a reactive function in the organization. It is becoming a proactive function. Where we feel that how operation management can also contribute to strategy formulation, strategy development, and strategy execution. So, in this present scenario, operation management has moved from that reactive role where you are always considering operation management just to support the other functions in the organization.

Now we have realized that operation management can also contribute to the strategic significance of the organization. So, all these things are only possible when we understand and appreciate the evolving role of OM in the success of any organization. Now, coming to this after understanding how the role of OM is changing, another important thing is: what is operations analytics? Now, operations analytics is simply the application of data analysis to improve decision-making efficiency and streamline everyday operations in our real-time decision-making environment. Like in our olden days, we used to do EOQ calculations.

I hope most of you are aware of these EOQ calculations, economic order quantity. And once you decide EOQ at the beginning of a year, every time you place an order, you place the order of the same quantity. But now, because there may be multiple changes in

the annual demand. So, it is not advisable to have one EOQ for the entire year. With the help of data analytics, now we are able to regularly update our EOQ calculations. That is one simple benefit of operations analytics in the field of decision-making.

Operations analytics is supported by data mining, AI, machine learning, and it requires a team of experts who are not only capable in the domain of operations management, but they also have good knowledge of various analytics tools. And in this team, which is kind of an interdisciplinary team, people who come from the background of data analytics and people who come from the background of operations management come together and are able to produce solutions that are required by the organization. With the help of operations analytics, you can identify areas for improvement, optimize processes, and predict future outcomes. Now, when we are recording this particular course, today is June 3, 2024, tomorrow is June 4, 2024, and it is a very important day because of the general elections.

We are going to have results of the election. Now, if you see, a huge amount of data is generated as a result of polling in so many different constituencies, not only 543 constituencies, but every constituency has so many assembly constituencies. And in each assembly constituency, there are different types of classifications of gender, education level, urban, rural, maybe caste classification, and all that data is a very important source of data for the political parties for the next election, to make their strategy based on the data which they have developed in this general election. So, data helps you in improving your performance, optimizing the available resources,

And then you can see that you are going to have a better outcome in the next elections. So, in the same way, operational analytics is used in almost all the bigger organizations because there is a myth during the course we will be talking about, that also, that the cost of implementing these analytical tools. Sometimes, it may be prohibiting for the small organizations. So, a small organization remains refrained from applying these tools in their day-to-day decision-making because a lot of data collection, keeping that data, analyzing the data, and not only analyzing the data but interpreting those data for good decision-making, it all requires a lot of resources also. So, small and medium enterprises

generally suffer from fewer resources, and therefore, as of now, I say that this field is more applicable, more useful for larger organizations.

Let us see what additional value operations analytics will offer to the organizations. As I continuously see, better decision-making, improved decision-making, and not only improved decision-making but possible changes, or you can say possible course corrections, which is rather a better word, that is possible with the power of analytics. You are going from city A to city B. In the beginning, you thought, let us say, it will take 5 hours. Now, after some time, you realize that in covering, let us say, some distance, it has already taken you 2 hours, and then you can make a course correction that for this remaining journey it will take 4 hours.

So, the total journey will be 6 hours. So, these types of course corrections are very frequently possible with operations analytics. So that, in the end, you can minimize the surprises not just for you but for all the stakeholders associated with your operations. So, you are ready to set new milestones, new goals, and new objectives with this course correction, regular course correction. Enhanced efficiency: we are able to minimize waste, and that is the point we are trying to highlight in all these three points. Whether I say enhanced efficiency, increased productivity, or reduced cost.

Actually, we are minimizing the wastage, and when we are minimizing the wastage because of better decision-making, you will have more scope for profitability and productivity. So, that is a very significant value proposition which we are able to add because of the implementation of analytics in our operations area. Better quality, reduced cost, faster delivery, etcetera, will help in improving customer satisfaction. So, all these three points are possible with the implementation of operations analytics in our organization. So, there are multiple ways through which you will be able to add value to your organization by implementing operations analytics.

Now, let us see what the different types of analytics are. I understand, I realize that most of you may already be aware of this broad classification of business analytics, from descriptive, which is in fact the most basic type of analytics. This is also very important, and many times, without going into the complex algorithms or complex tools of

analytics, just by properly arranging your data, you will be able to get many insights which may be very useful. So, you just need to do proper collection of data and arrange that data in different formats. For example, let me tell you that as simple as mean, median, mode, that is itself standard deviation range. All these are different ways through which you will be able to get some very meaningful insights.

For example, whenever you are selecting an institute for your higher education, for your MBA level courses. We get one very important piece of information, which is what is the highest salary, lowest salary, average salary, and median salary. Most of the prospective candidates are able to make their decisions with the help of these four data points only. So, descriptive analytics, which is very, very easy and quite simple. But if I have to make many decisions very, very fast, I think the appropriate use of descriptive analytics itself may give you a lot of insights. Here, we should be very clear about which tool to use. For example, a very common descriptive analytics indicator is the mean or average.

But many times, this mean or average may be a very misleading indicator, and then you have to realize that you have made a big mistake just based on the mean or average data. So, along with the mean or average, you need to understand what those other indicators are that can give you more insights. So, during the course, we will see how descriptive analytics is used and how easy it is to use. You can use simple tools like Excel, and that will give you a lot of descriptive analytics about your data. When you have a huge amount of data with you, you just arrange that data in ascending or descending order, and that itself will be very, very useful for some kind of simple decision-making.

After that, the second level of analytics is predictive analytics. Now, this predictive analytics is slightly, let us say, more involved analytics, and in this involved analytics, we try to answer questions like what might happen? Descriptive analytics answers questions like what has happened, which is simply the representation of what has actually happened, what data has been generated. But predictive analytics gives you an idea of what might happen, like a very common use of this predictive analytics, which we will be doing in our forecasting and time series analysis. Okay, historically, things are going in this way.

So, the first period has only one dot, the second period has two dots, the third period has three dots, and the fourth period has four dots. So, you can easily make, you can easily predict that in the fifth period there will be five dots, and this is the outcome of predictive analytics. So, this is also very common, and in operations analytics, we use it very, very extensively, very, very extensively—the predictive analytics. We may use different methods, different algorithms for predictive analytics. This is just one example that you are analyzing something.

You have some historical data, past data, and using that data in a particular manner, you are going to predict the future also, what might happen. Third is, in a particular state election, you know that every time an election happens, there may be a change in government. This is, let us say, Party 1, this is Party 2. So, this was the first time this party won, next time this party won, next time this party won, next time this party won. So, now based on this phenomenon, in the next election, I will say that this party will win.

This is predictive analytics. However, however, it is possible that this may not be true, it may not be true, it is also possible. There may be a new phenomenon which may emerge or which may affect my decision or this trend that we need to see how holistically we are doing our predictive analytics. And now, third is, what should we do? One is what might happen on its own, but what should we do?

What is the best decision regarding these things that are going to happen? But whether these things that are going to happen are in the interest of the organization or not? Can we do something to improve our decisions? That is prescriptive analytics. For example, optimization modeling where I am going to make product A and product B.

How much of product A and how much of product B should I produce to maximize profit? Those who have taken courses on operations research know that at the beginning of OR, when we start linear programming problems, we handle such types of situations. During this course, we will also be using a lot of heuristic algorithms. Given a situation and this type of data, this will be the most optimal or the best decision for your

organization. So, in this particular course, we will be talking about descriptive, predictive, and prescriptive analytics very often, almost in every session.

You will see that there are some very good cases where organizations have used analytics for better decision-making. This is a case of a very popular organization, Amazon, which is using operations analytics very effectively in their e-commerce activities. They are able to predict demand, optimize their inventory management, and use it for optimizing delivery routes, determining which route is more efficient and which will provide faster delivery options. All these things are used very efficiently by Amazon. Not only Amazon, but in India, companies like Zomato, Ola, and Uber are also using analytics very successfully. I can say that the use of analytics by these organizations is making them ahead of their competitors.

So, with this, we come to the end of this first introductory session of this particular course. We will be talking about more serious stuff from our next class onwards. Thank you very much.