Infrastructure Finance
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Lecture - 28
Risk Management

Welcome back to this course on Infrastructure Finance, this is lecture 28, in this lecture and subsequent few lectures; we will be looking at the topic of Risk Management. Before we actually do that, let us spend some time to discuss the questions that we actually had in the end of the last lecture.

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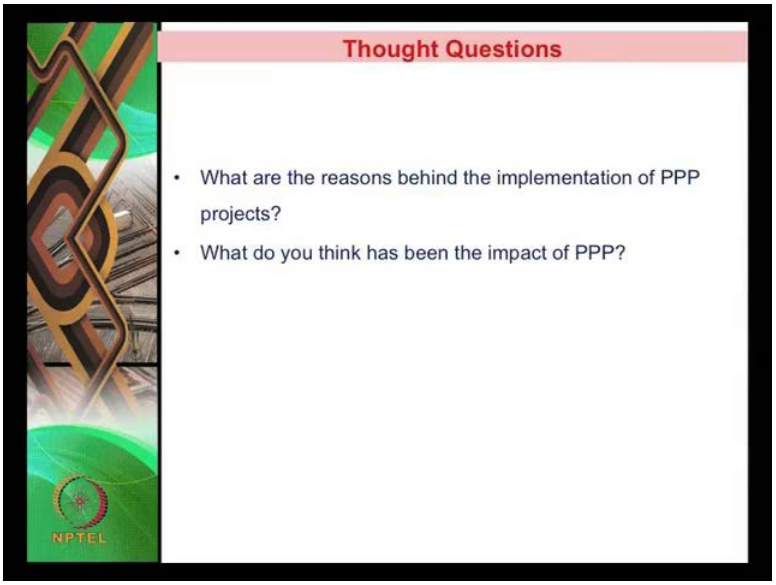

There were two questions; the first question was, what was the reasons behind the implementation of PPP projects. So, if you actually look at it, there are PPP projects is not something new, there has been private participation infrastructure for a very long time. But, in the 1950's and 1960's there has been a resurgence of public sector investments in infrastructure, and again when you look at in the 1990's onwards, there has been a more increased participation of private sector infrastructure.

And so we have actually seen that there is a cyclical movement from public and private sector infrastructure, in the last couple of decades; so the question now is what has been the reason for the implementation of PPP in such a very active manner in recent years. Again if you look at it broadly you can actually classify the countries of the world into

two categories, one is developed countries and the other is developing countries. So, the reasons behind implementation of PPP is has been very different, in the case of both developed and developing countries.

So, let us look at first the context of developed countries, in the context of developed countries the main reason for implementation of PPP is the fact that to introduce the innovation, to introduce efficiency in the infrastructure sector. So, traditionally there has been several studies, which have indicated that private sector is a lot more efficient when it comes to innovation, when it comes to efficiency and so on.

And if you really look at trying to incorporate these principles in the infrastructure sector, people felt that having private sector participation in a much more active way, can bring about this aspect in the infrastructure sector. So, traditionally there has been, the way in which private sector has been involved in the early part of the century is that, most of them in the nature of suppliers or vendors to the project. So, there has be a government implementing the project, but then government would not actually have the entire workforce that is needed for implementing the project.

So, in terms of construction, in terms of designs all of which will be outsourced, so the nature in those relationships was more in the nature of vendor or supplier kind of a relationship, it was not really a partnership. So, what makes now a PPP different is the fact that, it is more of a partnership there has, there has actually been assembling of different kind of stake holders, who actually work in a way that reflects sharing of risks as well as sharing of benefits.

So, when you have this kind of a structure, it is possible to actually bring in certain amount of resources that is not there with the public sector. So, public sector has certain kind of resources like capital, it can have resources in terms of land, it can provide resource in terms of licensing and approvals and so on and so forth. But, then private sectors can bring in issues of efficiency, it can bring in innovation; it can bring in superior project management of the project and so on.

So, we try and bring both, we try and marry the best qualities of all the partners in a PPP arrangement, so thereby it results in a better quality project. Now, if you really look at the rational for developing countries, developing countries need a lot of infrastructure development. And because of the fact you need to have a lot of infrastructure, there is

also a need for capital and there are limitations in terms of how much the government can actually invest in the infrastructure sector, because of considerations of fiscal deficits and are some of the other issues.

So, therefore, it is seen as an attempt to attract additional source of capital when we actually implement PPP. So, there is private sector capital available for investment in infrastructure, PPP arrangement helps to attract private sector capital for investing in infrastructure. So, the reasons of implementing PPP projects are very different, but the philosophy of PPP is to actually bring in different stakeholders in a partnership, like structure not really a traditional vendor supplier kind of a structure. In a partnership like structure, which enables them to share risks and at the same time share benefits from the project in the long run.

So, the next, the question that we looked at is what do you thing has been the impact of PPP, has impact of PPP been beneficial, has it been not so beneficial, is it indifferent. So, before we actually look at PPP, we look at taking a very active role of implementing PPP in the future, we should also try and look at what has been the experience of these kinds of projects in the past. And what do you think should have been the impact of PPP, so if you really look at it, before we actually start implementing or throwing open a project for private sector participation. There are several ways which are used to evaluate, whether the project if implemented by PPP is going to be beneficial or not, so I will kind of illustrate one or two approaches.

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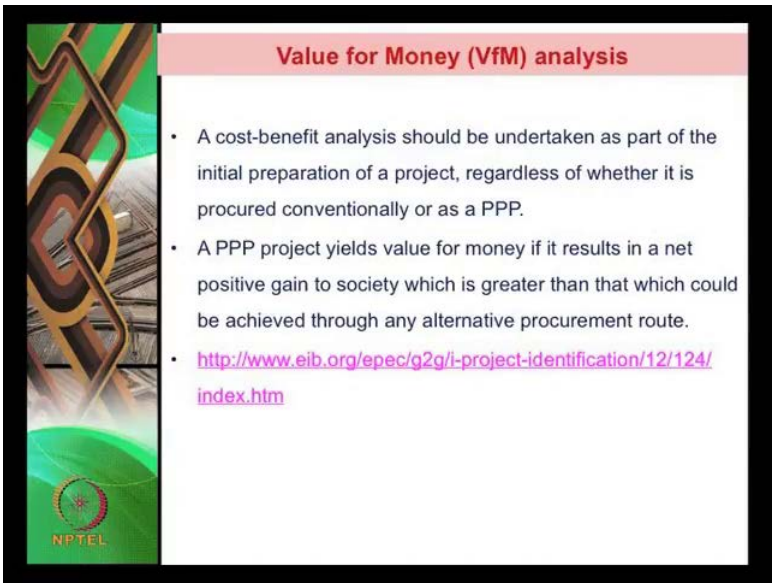

So, the first approach that is undertaken is what is called as your value for money analysis, so this essentially is a cost benefit analysis undertaken as a part of the initial preparation of a project. So, regardless of whether a project is being implemented by PPP or by public sector procurement, we need to undertake basic cost benefit analysis. If the benefits are more than the cost, then we go ahead and implement the project on the other hand, if the costs are higher than the benefits then we do not go ahead and implement the project, so this is a simple value for money analysis.

Now, we do the same analysis for a PPP kind of an arrangement, so we consider the fact that we do a value for analysis for a project and we find that the benefits are higher than the cost. So, the next step is to really look at, should this project be implemented by public sector procurement or through public private partnership. So, we again do a value for money analysis and if we find a PPP project is value for money; that means, it is able to demonstrate a net positive gain to society, which is greater than what it would have been, had it been implemented through any other alternate procurement route.

So, we look at what would have been or the benefits, if it actually been implemented in any other procurement route, which are being implementing by PPP and if you find that the benefits are higher, then we go ahead and implement by the PPP route. So, there is several materials that is available in the internet on how do you actually do value for money analysis, what are the principles behind doing the value for money analysis the

methodology and other related topics. So, I have actually given one of the links, which will give you a lot more information about this topic.

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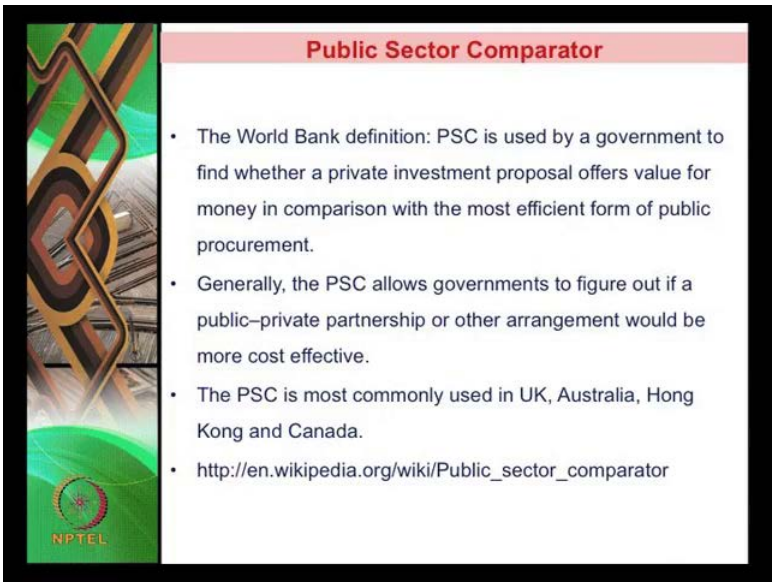

So, value for money is a broad principle, but there are different techniques in which we actually do value for money analysis, one of the most prominent or commonly used techniques is called as a public sector comparator. So, what is a public sector comparator, a according to the World Bank definition, public sector comparator is used by a government to find whether a private investment proposal offers value for money in comparison with the most efficient form of plug public procurement.

So, you have public procurement on the one hand, you have PPP arrangement on the other hand, so we need to really see how much is the public sector procurement comparable to that of the PPP arrangement. So, essentially the public sector comparator allows the governments to figure out, if a PPP arrangement would be more cost effective. So, the most common approach used in some of the developed countries is, once you identified your project to be viable, the next step is to look at and see how it should be implement, should it be implemented by a public procurement or should it be implement by PPP.

And they try and do what is called as a public sector comparator, and if the public sector comparator happens to be favorable to the PPP arrangement, then we actually go ahead and implement the project in a PPP mode. So, the public sector comparator is commonly

used in UK, countries like UK Australia, Hong Kong and Canada; and there is plenty of reading material that is available on public sector comparator. So, I have given a link from the Wikipedia here, and this Wikipedia actually has a lot more links to public sector comparator as such.

So, if you are interested I would kind of urge you to look at some of these links to know more about what is public sector comparator. So, when we actually start with an analysis and then we implement PPP only when it is beneficial as compared to public procurement. So, the answer to the question, the question was what is the impact of PPP, the answer should the question should have been positive, because we implement only those projects in PPP mode, which is considered to be where the effects of PPP is better.

But, what does the results look like, the results are very mixed, so on the one hand you have lot of favorable experiences from implementing PPP, in the OECD or the developed countries. But, on the other hand the experience of implementing PPP in the developing countries has been so and so very mixed; in fact I will give a result from the study that we undertook at IIT, Madras.

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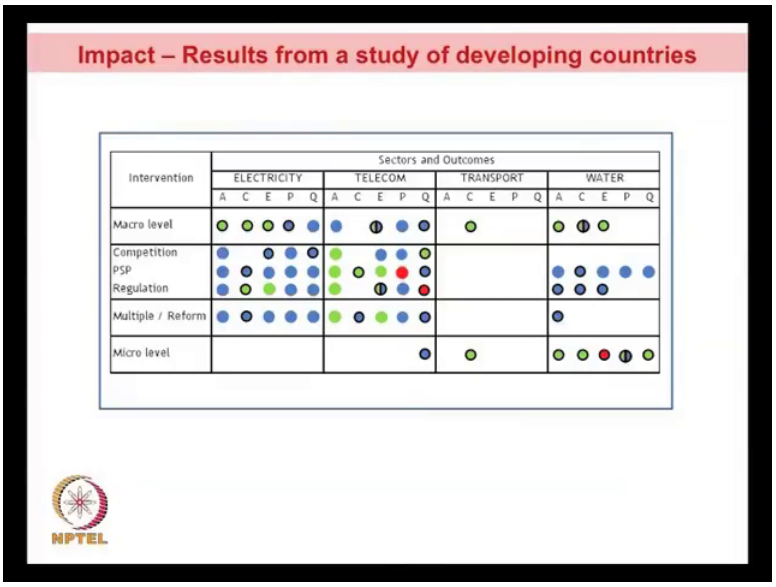

And this is a snapshot of the result, so this actually indicates that different interventions and results of those interventions on various infrastructure sectors. So, we looked at four broad sectors, we looked at electricity, we looked at telecom, we looked at transport and we looked at water and we looked at a broad range of interventions. So, we looked at

some of the macro level indicators such as, liberalization or increasing in transparency and so on, and so fourth.

And then we looked at some of the project level interventions, like competition PSP, PSP is Private Sector Participation which actually is public private partnership. And then we have regulations and then you have intervention that actually comprises more than one of those interventions. So, for example, you have competition and PPP, you have competition and regulation, so this is basically multiple interventions or reform, and then we have what is called as your micro level interventions. So, micro level interventions are generally project level interventions, as compared to competition and PPP's which are called a sector level interventions.

So, we looked at the impact of PPP's across all these interventions for the four different sectors, so the specific interest in this case is going to be the impact of private sector participation. So, again we will have to be very clear when we talk about impact, impact on what, what kind of a outcome. So, if you look at infrastructure project broadly, the outcomes can be classified into one of these five dimensions, no there can be more, but these are the most commonly used dimensions.

So, you have access which talks about how people are able to access the infrastructure facility, then we talk about cost how cost effective the project is, then we talk about efficiency, efficiency is a ratio we have an output and we have an input. So, has the efficiency improved as the result of public private partnership and then we have fourth is price how much are the customers paying after implementing PPP, and then fifth is quality. So, how has quality changed has the levels of quality changed, before as a result of let us say PPP's and so on.

So, we actually looked at the impact of PPP's across these five major outcomes, and what you actually find is, if you actually looked at looked at the circles indicated against the PSP intervention, you actually find a lot of blue circles. So, the color codes for the circles is that, if it is a blue circle then there has been no impact neither positive nor negative as a result of implementing PPP. So, what has been the outcome in a PPP would have been the same as what it would have been, if it had been implemented under the public private, under the public procurement mode.

So, that is the kind of an impact that we are seeing in the case of developing countries. So, there are a few circles which actually show green, which indicates that there has been a positive impact. So, specifically if you look at telecom, telecom as a result of private sector participation has resulted in improvement in access, so there has been a strong improvement in access as a result of private sector participation, as compared to what it was in the public sector mode. Similarly, if you look at efficiency there has been substantial increase or improvement in efficiency in telecom sector as a result of private sector participation.

But, on the other hand you look at price, price is actually shown by a red circle, red circle in indicates that the outcome has not been positive, so therefore the price has actually increased as the result of a PPP. So, that is the kind of a broad indicators that you actually see from our study, so if you look at electricity the electricity there has not been any positive or negative. If you look at water supply, again PPP has not resulted in any major impact on outcomes, and there has been very limited evidence in our study on transport.

But, if you looked at telecom, telecom has some amount of positive evidences, but there are also an instance of negative evidence in the case of telecom. Now, why is the impact on developing countries different from what is being seen in developed countries, I think broadly if you look at it, the analysis that precedes the decision to go for PPP or not is a lot more robust in developed countries, as compared to developing countries. So, we just saw the two ways in which you can look at whether PPP is going to be beneficial or not.

Before, we actually start implementing the project, the value for money or the public sector comparator, so in the four countries that I have just mentioned UK, Canada, Australia and Hong Kong. Any project before it has been thrown to public private partnership is actually evaluated using a public sector comparator or a value for money only then it is then decided to go for a PPP. But, as far as I know in many developing countries this analysis are not undertaken in the same rigor, as we see in the developed countries.

In most cases the PPP is driven by a contingency, it is driven by political reasoning and so on, and so forth. So, therefore, the impact of this kind of implementation is not going to be as satisfactory as what we see in the developed countries. So, the lesson for us is that, in the future before we actually go ahead and start implementing a PPP project,

which needs to be preceded by a very thorough analysis, in terms of whether it will be beneficial to actually implement this in the PPP mode.

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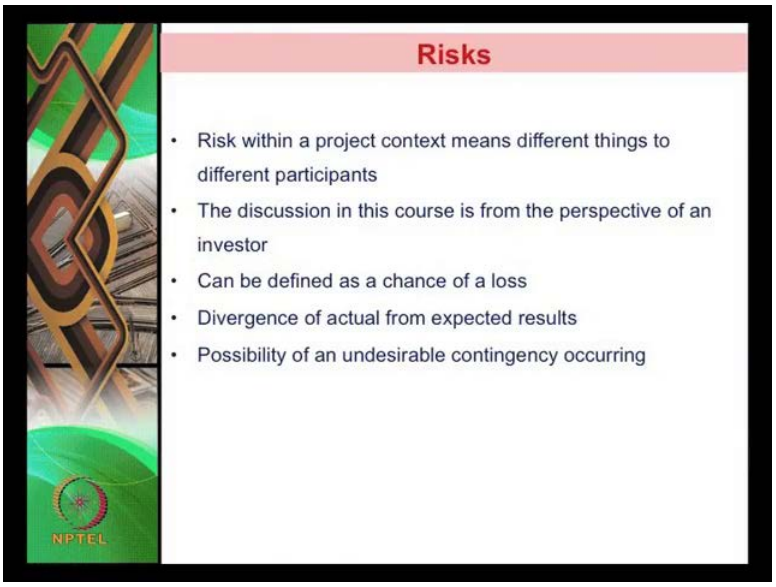

Now, we will actually go to the topic of today's lecture, which is actually talking about risk management, risk management is a very important topic in the area of infrastructure finance, specifically with respect to project finance. Simply because of the fact that the project finance structure operates in a very different way, and unless until the risks are properly managed in this kind of a structure, the investors might not be able to get the returns that they had expected to achieve.

So, if you look at a broad term called risk, it can actually mean a different things to different participants, say for example, if you really look at the government. The government can look at risk as is a project going to be implemented on time, is a project going to deliver the kind of benefits that we think it will deliver and so on. If you look at, let us say the people who are living around the project area for them, the risk could be does implementing the project increase noise pollution, is it going to result increased contamination of water resources, is it going to result in increased traffic leading to a higher level of air pollution and so on.

So, risk in a project can actually mean different things to different people, but for the purpose of this course when you really talk about this risk, we are really looking at risk from the investors perspective. So, that we need to be very clear, when we talk about risk

we are talking about how the risks are going to affect the investors in the project, we are talking about both lenders as well as you equity sponsors.

So, what is risk, the risk can be really defined in a variety of ways, but there are some very simple definitions, a risk can be defined as a chance of a loss or for example, you have investor about 500 crore in a particular project, what is the risk that he will not be able to recover on the capital and the return that you had expected. So, that is basically talking about it is a chance of a loss, so instead of 500 crore and 18 percent return if you recovered only about 10 percent return that is actually is a chance of a loss.

So, what is the risk of your returns getting reduced, so that is one definition of risk, so the second definition of risk is, risk is actually when there is a divergence of actual from the expected results. So, your expected results is that it will be a traffic of now 10000 passenger car units in a toll road every hour, but if the actual traffic is only 2000 passenger car units every hour, so that is basically a risk. So, the actual is actually very different from what was the initial expected result, so this again is a risk of the project.

Another definition of a risk is possibility of undesirable contingency occurring, so a project might get affected, because of various reasons which was not really expected to occur. For example, there can be an earthquake; there can be sudden rains that can be ah fire, so these are all things that can actually occur that can derail the project progress and so on. So, essentially we talked about how we actually look at managing some of these aspects to ensure that the investors are able to earn, the return that they had expected to get.

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So, the first of us talk about identifying risk manage framework, so an appropriate risk management framework is very critical for getting the expected returns from the project. So, what are the major components in risk management framework, the first step is about analysis of the project viability, so analysis of project viability is the simple analysis which talks about is project really viable.

If all the assumptions are met and if the project goes as per the plan is the project going to give returns to the investors, is NPV going to be positive and so on and, so forth. So, the first step is to actually to look at analysis of project viability, if the project is not viable in this analysis then we just drop it, there is no point in taking it further because anyway the cost are going to be higher than the benefits. The next step is to actually look at if the project is viable, the next is to actually look at risk identification.

So, risk identification involves indentifying all the risks, which when they occur can impact project viability, so if there is an earthquake that occurs, then it can actually implement damage the construction. So, therefore, it can impair the ability of the project to deliver services as expected, so therefore it can actually effect the project revenues and therefore, the profitability and so on, and so forth. So, any factor or an event that can actually impact the project viability, occurrence of those factors or events are basically a risk identification.

So, we take a project and then we list down the various factors that can actually impact the project viability. The third step in the risk management framework is to basically assess the risk, so we have identified the different risks and after having identified the risks we assess the risk. So, what you actually mean by risk assessment, so let us understand it in a simple 2 by 2 matrix.

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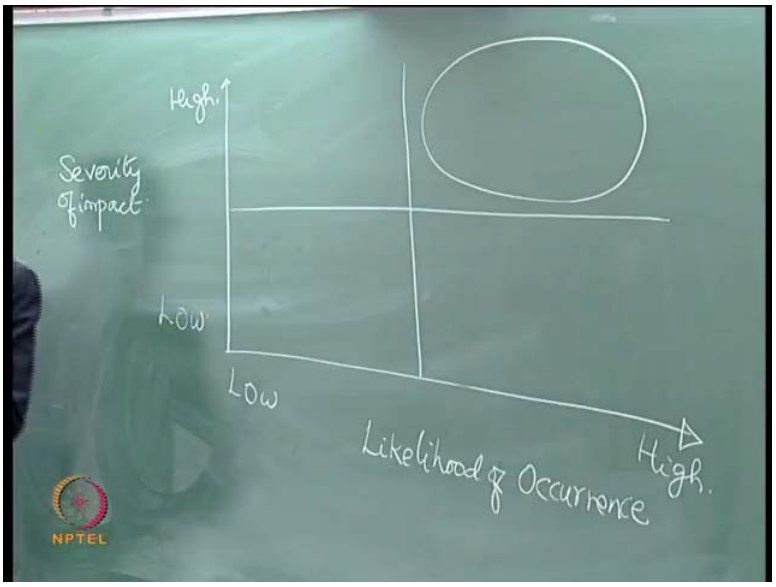

So, this is let us say a simple risk assessment framework, on one axis we have a what is called as likely hood of occurrence likely hood of occurrence. And on the other axis, we have what is called as the severity of impact, so for the sake of simplicity I kind of broadly say likely hood of occurrence, in the left side of the axis is low and the likely hood of the occurrence here is high. And similarly here severity of impact is low and the severity of impact is high, so therefore, in this kind of a framework we can broadly put this into four different quadrants.

So, if you look at this particular quadrant, the likely hood of the occurrence of the particular factor or an event is low, and even if it occurs the severity of the impact on the project is also low. So, in both the cases it is not going to have any substantial impact on the on the project viability, so we try and see how much we can mitigate this kind of risk, but the impact on the project it is not going be very much. Now, we move to this quadrant and the likely hood of occurrence is very high, there is a possibility that this factor or an event will occur, very large likely hood that it can actually occur.

But, then even if it occurs the impact is not going to be very high, the impact is going to low it is not going to substantially alter the project viability. So, that is particular quadrant and then the quadrant here the likely hood of occurrence is low, but then when it occurs the severity of the impact could be very high it can, there is a very, very small chance. May be there is a 1 percent chance of that occurring, but if that 1 percent chance occurs, then it can completely wipe away the project, so the viability is gone, so the severity of the impact will be very high.

And in this case occurrence is high and the severity is also very high, so this is a segment that we need to be extremely careful about. So, once you identify the various risks, we put the risks in each of these buckets, there are four different buckets, we just look at the risk factor and then say oh ok this is an actually a risk that does not going to occur, often and severity of the impact is also very low, so we put it in this bucket.

And there is a different kind of risk it is going to occur very, chance is very of that occurring, but if it occurs in practice also high then you put it in this bucket. So, we actually do an assessment of the various risks that we have identified, we part of the risk identification process. So, what I would ask you to look at is, I want you to actually look at identifying some of the risks in each of these quadrants, so we will kind of spend some time on discussing the risk assessment, the beginning of the next lecture.

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After we do the risk assessment, the fourth step is to actually allocate the risk to those who are best able to control or manage them. So, one of the important tenants in risk management is risk needs to be allocated to those parties who are in a best position to manage them or control them. So, if it is being trusted in a party that is probably not in a position to manage them, then it is not going to be beneficial for the project, so this process is called as a risk allocation.

But, in practice in most of the time it becomes a negotiation exercise, a person who is able to bargain more or in a better powerful negotiation position, he is able to push the risk upon those participants, who are not able to have very strong negotiating position in the deal. So, once you allocate the risk there are different ways in which you manage the risk, I mean the counter party can actually manage the risk in different ways. But, then allocation can be done by variety of means, what is called as the risk management strategy. So, you can actually write a contract or you can actually take an insurance to manage the risk or if it is not possible to actually contract it out or it is not possible to take insurance then as an investor one has to bear the risk.

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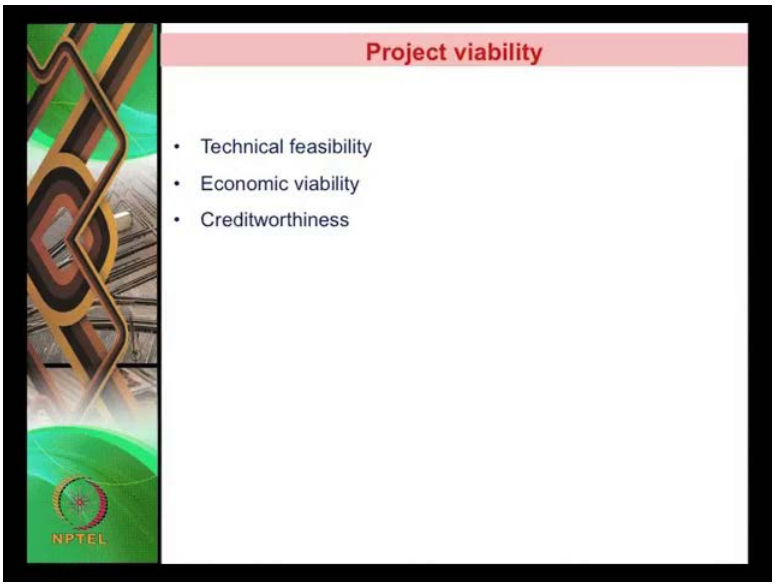

So, we will talk about the first aspect, the risk management framework that we talked about today, the first aspect is to determine the project viability. We first determine whether the project is viable or not, and only if the project is viable we go ahead to the next steps. If you look at project viability, project viability broadly consists of three

different components the first is the technical feasibility, second is your economic feasibility and third is your credit worthiness. So, we will look at each of these three concepts one by one.

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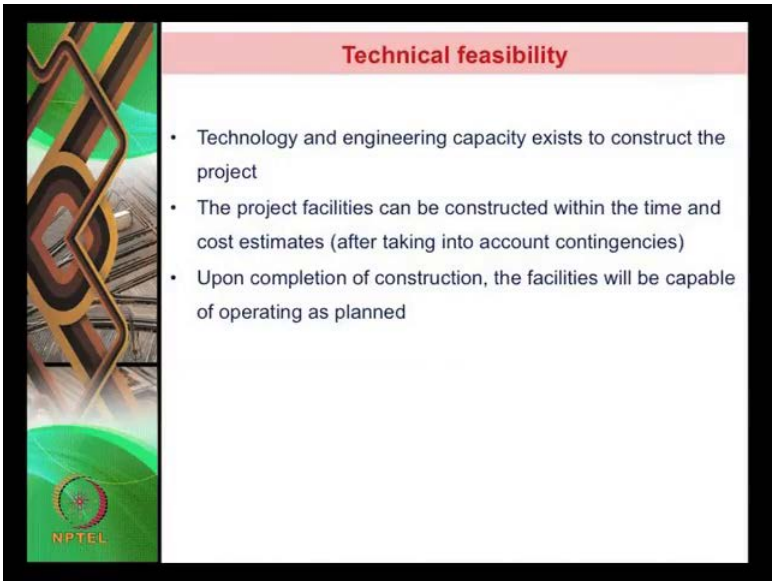

The first is ah technical feasibility, so technical feasibility is done to determine, whether there is a capacity both in terms of technology and engineering, capacity to construct the project. See if you do not really have the expertise to develop or construct the project, then the technical feasibility is not there with the project company. So, what essentially is technical feasibility, so technical feasibility talks about are we able to construct the project facilities within the time and cost estimates.

So, today anything can be acquired at a price, so the question is do we actually have the capacity to construct the project within the cost and time estimates. So, that determines our the project is technically feasible or not, so I mean when we talk about within time and cost estimates, after taking into account the various contingencies as well. So, normally a project will have certain amount of contingencies built into it, could be about 5 percent, could be about 10 percent to take care of any unforeseen circumstances.

So, are we able to actually build the project within the time and cost overrun after taking into account the contingency, so that is actually the question of technical feasibility. Now, second is, so the first technical feasibility in terms of the construction and development, the second technical feasibility is in terms of the operations, we have now constructed

the facility. But, then will the facility be capable of operating as planned, if we construct a power plant of 300 mega watts will be able to operate the plant at 300 mega watts at capacity, so that is your operating technical feasibility.

So, we will have to get a positive evaluation under both these counts, so an important parameter of technical feasibility is a project construction cost. So, we have to first determine in a reasonably accurate manner, what is going to be our project construction cost. And we also need to be very clear about, what are the other elements that actually comprises project construction cost, is it only the project as a standalone entity or does it actually include all the facilities necessary for the project's operation as a standalone entity, so we need to be very clear on that.

So, sometimes the government provides all the facilities for operating the project as a standalone entity for example, the government lays the roads, which will enable the project company to transport all the material, equipment and resources to the project site. The government will provide other facilities like telecom, electricity facilities to ensure that the work happens in the project site, in an uninterrupted way. But, there are several instances where the project companies will have to do all of these investments themselves.

So, the government will not lay the road in terms of that can actually improve access, the other necessary utilities for the site will have to be paid for by the project company. So, we need to be very clear about does the project cost include all these element, is the scope of the project also includes bringing down utilities to the project site, laying down the roads to the project site and so on, because these costs can be substantial. And if you do not account for this cost, then you can entirely alter the technical feasibility at a later stage.

So, many times there may also be some of the other, intangible requirements for ensuring the success of the projects for example, I was talking with a project developer a sometime ago, and so this was essentially a port project. So, the port project for it to be successful, it needed the support of people living in the surrounding villages. So, the people in this villages needs to be rehabilitated, there has to be infrastructure facilities provided to the people who are living in this villages such as, drinking water supply, electricity and laying out roads and so on, and so forth.

So, the project cost then for this port project included all of the facilities that are need to rehabilitate the villages, so we therefore, need to be very clear about what is essentially a project construction cost. And second once we have determined the project construction cost, we should also include a contingency factor to cover for possible design errors or any unforeseen costs. Sometimes you actually start constructing, then there is basically there are some very small minor changes in scope.

So, we will have to account for a contingency, which will be able to accommodate some of these changes and unforeseen situations remember, any major change in scope; obviously, there will going to be a revision in cost and time. But, any minor changes, any unforeseen situations the project structure should be in a position to accommodate all of this. And it is also very important to prepare a time schedule that accommodates the different activities that has happened before, as well as during the construction period.

So, it is very clear what is going to happen during the construction period, there is going to be a lot of construction activity, but then the time schedule that has been prepared should account for the fact, the lot of planning that is needed before the actual construction starts. So, for example, before you actually start the construction work, there has to be a lot of approvals and clearances needs to be taken that could be site permits, that could be environmental clearance and that could right of the clearance and so on, and so forth.

So, many of this can actually have a long lead time, so the time that is actually expected for approvals and this clearance should also be accounted for in the construction time schedule.

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We should also account for the lead time that it takes to procure equipment for the activity, for the project construction. So, sometimes the equipment might be in short supply, number of equipments equipment suppliers who actually provide, equipment for construction might have shortage. So, how long would it take for the equipment to arrive, so that construction can begin, so the lead time that is needed should also be accounted for.

Then there is a lot of pre-construction activities, it could be in terms of design,, it could be in terms of engineering it could be in terms of planning for project management and all of, so the time that is need for all of this should also be estimated. So, if you are able to implement a project within cost and within time, these elements should be essentially present in the project budget. If these elements are not present, then the technical feasibility for a project can change once a the construction starts happening.

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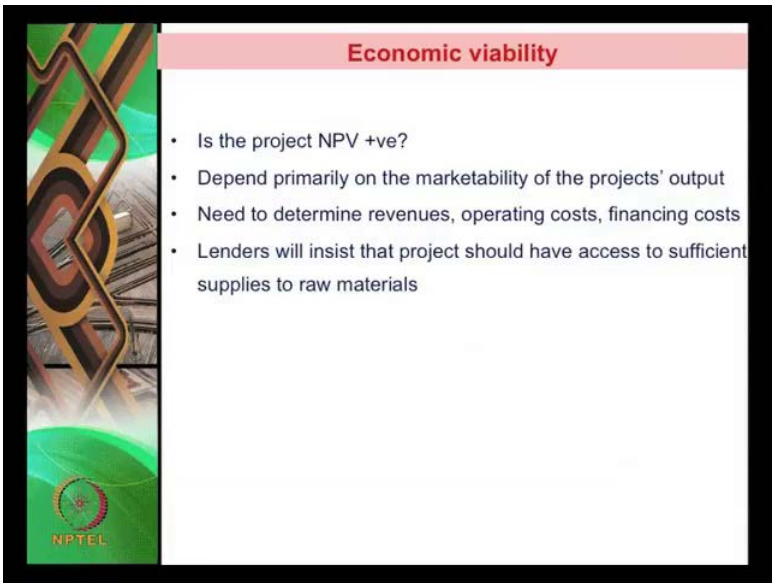

So, the next aspect is economic viability, remember it is actually a sequential process, we do not start evaluating the technical feasibility, economic viability and the credit worthiness at the same time. We start with the technical feasibility and only with the results are favorable would we actually go to the economic feasibility, if the technical feasibility is not there, then we just drop the project, we need not go ahead with the next step of the economic viability.

So, economic viability ask a very simple question is the NPV of the project positive, we talked about NPV and other capital budgeting techniques much earlier in the course. So, if the project NPV is positive, then we say that the project is economically viable, so how do we determine whether the project is economically viable or not. So, basically we need to find out whether there are markets for the products or the services that is going to be produced from the project.

So, this essentially determines the on a project viability, is there a market for the product or the service and what is the price at which the market will operate that is, at what price will you be able to sell the product of the service, and how much will you be able to sell. So, that is essentially going to be the quantity or the volume and three is the market approachable, can we actually go ahead and tap the market one for example, that can be demand and that can be demand at a particular price.

But, then if the project is not able to actually go ahead and access the market for various reasons, because existing competitors are very strong, they are able to produce product or a service at of a much higher quality than what we can actually produce and so on, and so forth. So, we have to first determine the marketability of the projects output, the next step is to look at what are the operating costs, how much does it actually cost to produce, how much does the raw material cost, how much does the labor cost, how much does other administrative expenses cost.

So, we need to ensure that we are able to be produce at very, very economical operating cost, and we also need to consider another aspect of cost, which is your financing cost. So, is the project going to provide adequate returns on debt as well as on sponsors equity, so these are the three essential elements of net present value calculation, we need to know the revenues, we need to know the costs and then we discount it by the cost of capital.

So, the cost of capital is you financing cost and we discount it by the cost of capital, and if the resulting figure is positive, then we actually consider that the project is economically viable, if it is not positive then we consider the project to be economically unviable. Lenders will also insist that the project has adequate access to the raw material supplies, so remember today you might actually feel that the market exists will be able to operate the project in a very competitive manner.

But, then we will not be able to generate the revenues, we will not be able to operate the project unless until we have access to the raw materials. Today if we look at it many power plants in the country are not able to operate, because they do not have access to fuel, they do not access to coal. In some cases the access to coal is there, but then the price of the coal that which they can access to is not as per what they had actually budgeted for.

So, there can be project where it involves extractions of natural gas or oil, so unless until we have an adequate amount of reserves, how can we actually extract oils though you have installed the entire infrastructure above the ground. So, lenders therefore, are going to, in addition to marketability in addition to cost lenders are going to be insisting that, the project has access to adequate supplies of raw materials or fuel.

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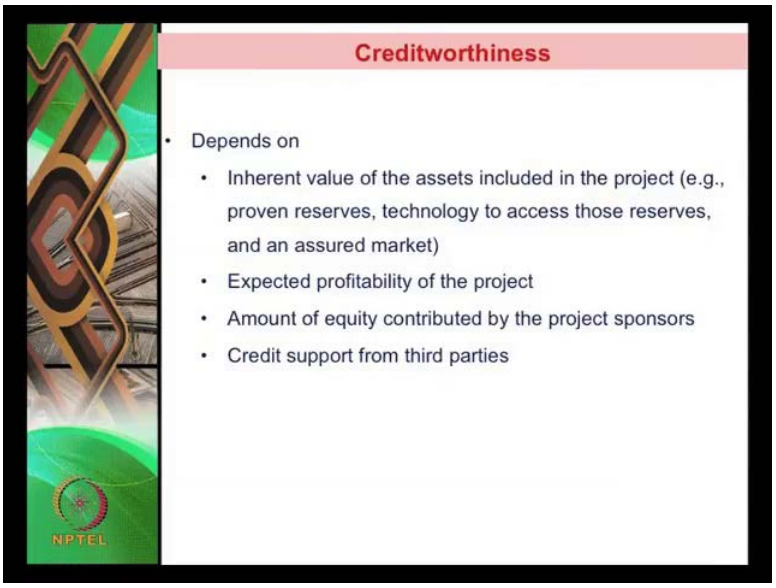

Now, third aspect is credit worthiness, so once a project is economically viable, the lenders will then look at what is the credit worthiness of the project. So, can we actually lend to the project what should be the quantum of lending, what should be the kind of repayment that you should be looking at and so on. So, the credit worthiness of the project depends inherent value of the assets for example, there are results are proven, if there is access to technology, if there is an assured market all of this determines the inherent values of the project.

So, if the project is having good resource, which can be accessed at a very low cost, then it is considered to be more credit worthy, if there is a ready market that is available for the produce of the project, then the credit worthiness is very high. Credit worthiness depends also on the expected profitability of the project, if the profitability is going to be very high or comfortable, then the credit worthiness is high. A project with a profitability of 15 percent will be having higher credit worthiness as compared to project with a 5 percent margin, so better the margins, better the credit worthiness.

The third is the amount of equity contributed by the project sponsors, all things being equal, if the sponsors contribute more equity, then it increases the credit worthiness of the project why, because then the sponsors have more skin in the game, sponsors are actually taking in more risks in the project. And because of that the sponsors will, so a lot more commitment as compared to situation where the sponsors have very little

investment in the project. So, the amount of equity, larger the equity contributed by the project sponsors can actually increase the credit worthiness of the project, it is actually sending a signal about the comfortness of the sponsors in investing in the project.

And finally, credit support from third parties, so third parties could be the sponsors, if the parent organization of the sponsors can actually provide credit support to the lenders that substantially increases the credit worthiness of the project. So, the credit worthiness is a matter of degree, so if we have actually have more of these elements, then it actually increases the credit worthiness as compared to a project, which has less of these four elements that we talked about.

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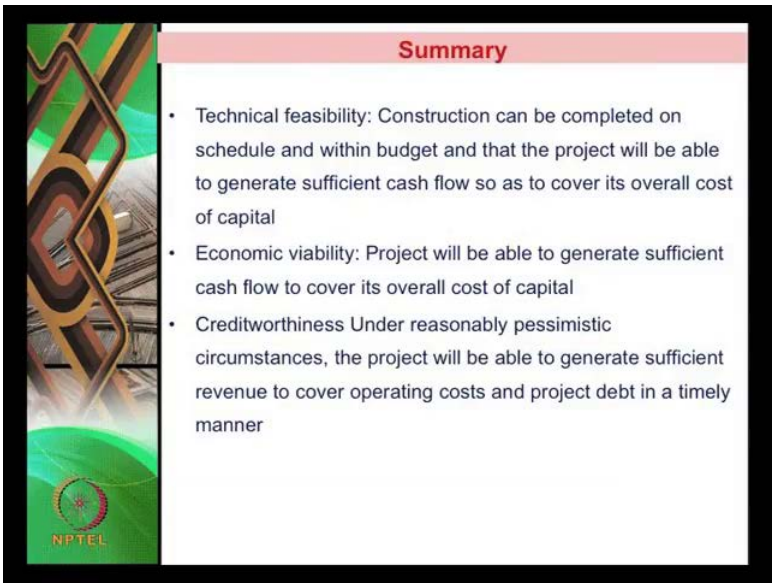

So, to summarize this discussion on project viability, project viability can be classified into three broad heads, technical feasibility, economic viability and credit worthiness. And these are actually done in sequence, these activities are done in sequence rather than simultaneously, only if the project is considered technically feasible, we undertake economic viability. Only if the project is economically viable, we determine what will be the credit worthiness of the project, what is technical feasibility; technical feasibility is an indication to check whether construction can be completed on schedule and within budget.

And the project will be able to generate sufficient cash flow, so as to recover the overall cost of capital. The economic viability is to actually look at determining, whether the

project will be able to generate sufficient cash flows to recover it is overall cost of capital. So, technical feasibility talks about cost construction, economic viability talks about markets, price, quantity, volume and so on. And then finally, we have the credit worthiness, so credit worthiness is even though the project is technically viable and economically viable.

Under circumstances that are unfavorable or pessimistic will the project still be able to generate sufficient revenues, to cover the operating cost and project debt in a timely manner. So, that is your credit worthiness under pessimistic or under unfortunate circumstances will the project be still viable.

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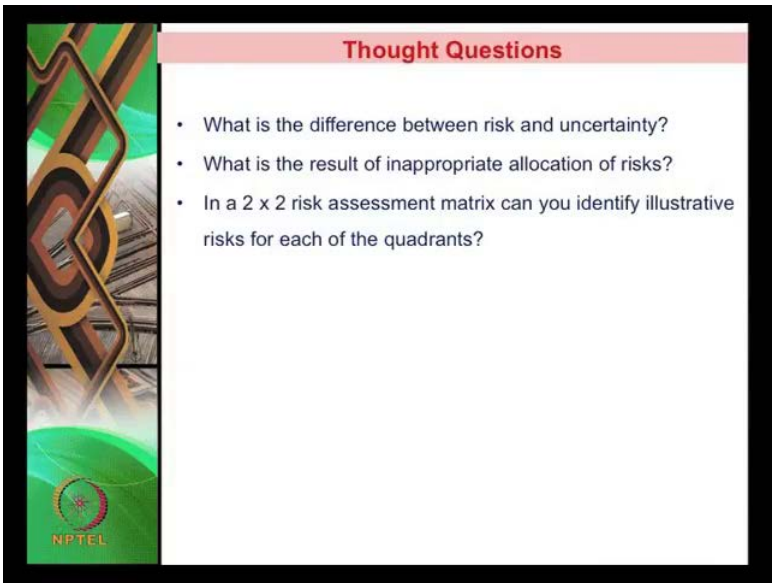

So, now let us come to some of the questions for this lecture, we have three questions, question one is what is the difference between risk and uncertainty, are they one and the same or if there is a difference, what is the difference. The second question is a risk allocation, so we talked about risk would be allocated to those party, who are in a better position to control or manage them. So, what happens if there is an inappropriate allocation of risk, how it actually impacts the project.

The third question is regarding risk assessment, so we talked about risk assessment using a simple framework that looks at the likelihood of occurrence, as well as the severity of the impact. Can we actually think of examples in each of the four quadrants in the risk

assessment framework that we discussed, so think thorough some of these questions and we will discuss in the next lecture.