

Principles of Construction Management
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Lecture – 25
Implications of construction accidents

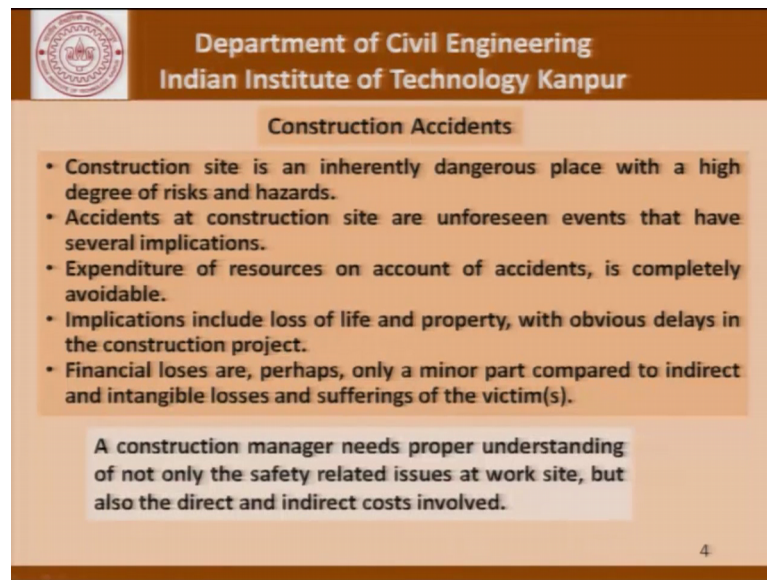
[FL] and welcome once again to these lectures on Principles of Construction Management where we are talking about different aspects different facets of managing a large construction project.

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In the last few lectures we have been talking about construction safety, the importance of that the statistics of construction safety, the personal protective equipment that is used by the workers to make sure that the injury arising out of an accident is minimized and so on. And today the discussion focuses on implications of construction accidents and the cost of safety.

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Construction Accidents

- Construction site is an inherently dangerous place with a high degree of risks and hazards.
- Accidents at construction site are unforeseen events that have several implications.
- Expenditure of resources on account of accidents, is completely avoidable.
- Implications include loss of life and property, with obvious delays in the construction project.
- Financial losses are, perhaps, only a minor part compared to indirect and intangible losses and sufferings of the victim(s).

A construction manager needs proper understanding of not only the safety related issues at work site, but also the direct and indirect costs involved.

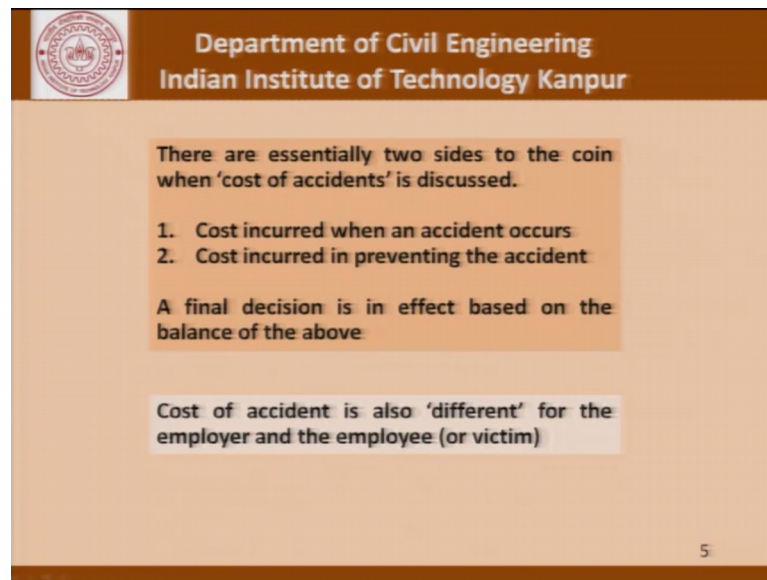
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Now to recapitulate a little bit about construction accidents construction site is an inherently dangerous place with a high degree of risk and hazards they will be work at heights, they will be work in confined spaces, they will be work underground, but that does not mean that the construction activity should not happen. All that we need to do is to take precautions so that an accident does not happen.

Accidents at construction sites are unforeseen events that have several implications. Expenditure of resources on accidents is completely avoidable. If we get this thing clear in our mind that accidents are avoidable a lot of things would fall in place. Implications of an accident could include loss of life and property with obvious delays in the construction project, financial losses, compensations, hospitalization costs, cost of investigation and so on are perhaps only a minor part compared to the indirect and intangible losses and sufferings of the victims and also the indirect loss that the company or the employer suffers on account of loss of reputation and so on.

A construction manager needs proper understanding of not only construction related issues at work like the PPE the labour loss and so on, but also of the direct and indirect costs involved in the case of an accident and its prevention.

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The slide features a brown header with the IIT Kanpur logo and the text "Department of Civil Engineering Indian Institute of Technology Kanpur". The main content is on a light orange background. It states: "There are essentially two sides to the coin when 'cost of accidents' is discussed." followed by a numbered list: "1. Cost incurred when an accident occurs" and "2. Cost incurred in preventing the accident". Below this, it says: "A final decision is in effect based on the balance of the above". A separate box at the bottom states: "Cost of accident is also 'different' for the employer and the employee (or victim)". The number "5" is in the bottom right corner.

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There are essentially two sides to the coin when 'cost of accidents' is discussed.

1. Cost incurred when an accident occurs
2. Cost incurred in preventing the accident

A final decision is in effect based on the balance of the above

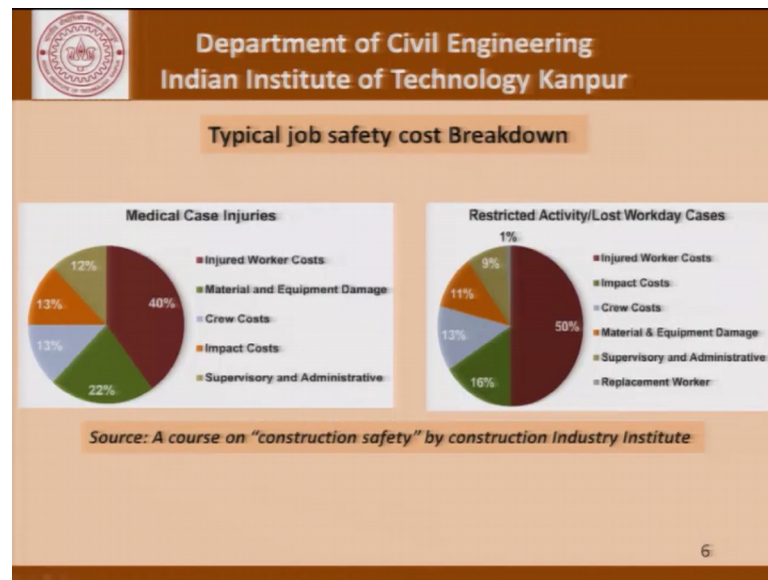
Cost of accident is also 'different' for the employer and the employee (or victim)

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There are essentially two sides to the coin when we talk of cost of accidents - one is the cost incurred when an accident occurs and the other side is the cost involved in preventing that accident. Preventing that accident the cost incurred in the later part is basically what can be called the cost of safety. A final decision is of cost taken on the basis of the balance of the two, if the cost of the accident involved was negligible then nobody would spend any resource on preventing that accident, but if the cost of the accident involved is unacceptable then; obviously, as much resources as may be required shall have to be spent in preventing that accident. This balance is basically at the route of all hard thought processes when we talk of construction safety and try to understand the cost implications.

The cost of an accident of course, is different for the employer and the employee or the victim. We must remember that as far as construction accidents are concerned the person who gets injured or perhaps loses a limb or life is not necessarily the employee it could be a bystander, it could be a passerby or it could be somebody not directly working with the employer which is responsible for that accident. So, those are some final details of the issues involved, but essentially we must understand that the cost to the employer does not necessarily all the time include all the costs that the employee or the victim has to incur.

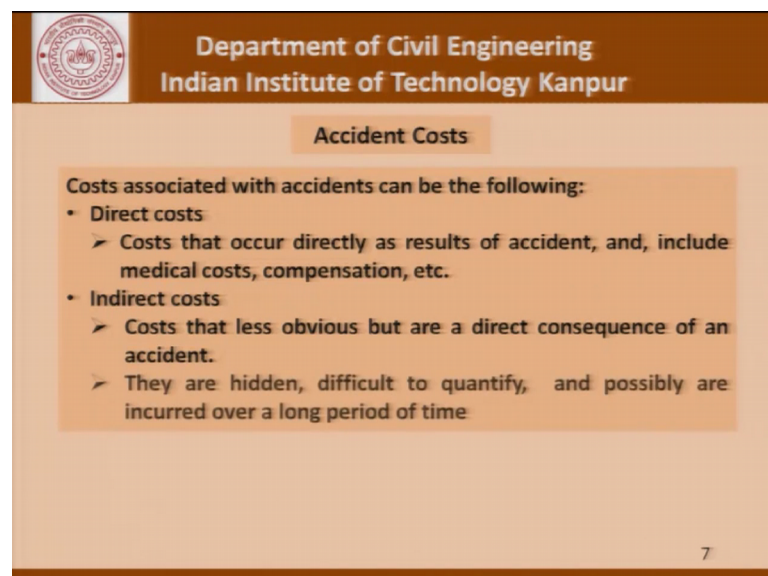
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Now this here is a typical job safety cost breakdown in the case of medical case injuries there is cost associated with injured worker cost, material in equipment damage cost, crew cost, impact cost and supervisory in administrative cost.

When it comes to restricted activity and lost workday cases the distribution between the injured worker costs the impact costs crew costs material in equipment damages supervisory and administrative cost and replacement worker is given on the figure on the right hand side.

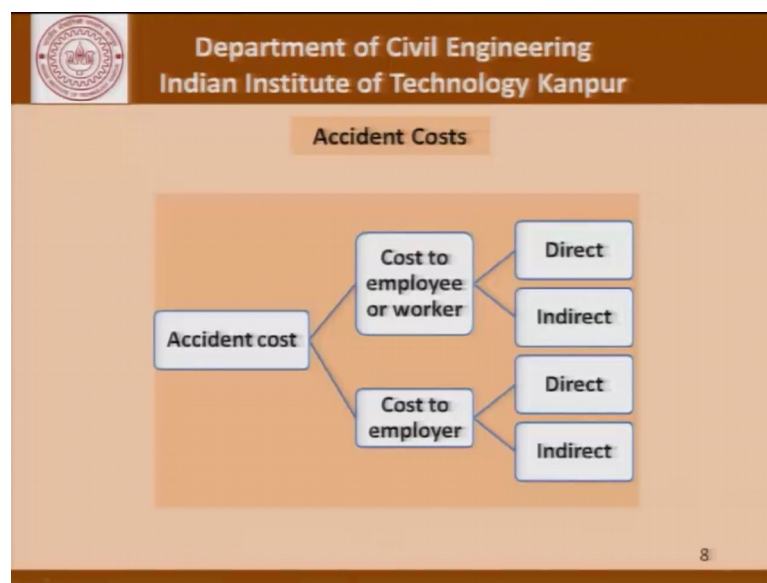
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Now when it comes to accident costs the cost associated with the accidents can be the following. One is the direct costs that is cost that occur directly as a result of an accident and include medical costs compensation and so on. As far as indirect costs are concerned these are less obvious, but a direct consequence of an accident.

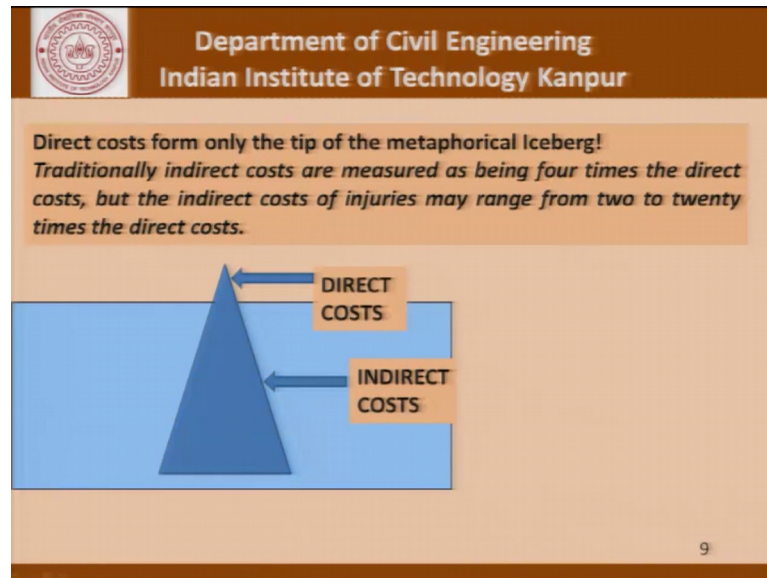
The indirect costs are hidden difficult to quantify and possibly incurred over a much longer period of time. By the same token direct costs are incurred over a reasonably or relatively shorter period of time after the occurrence of the accident.

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Now this is a very simple way of looking at the accident costs we look at the costs to the employee or the worker or the victim and we look at the cost of the employer and in both cases we need to look at the direct and indirect components.

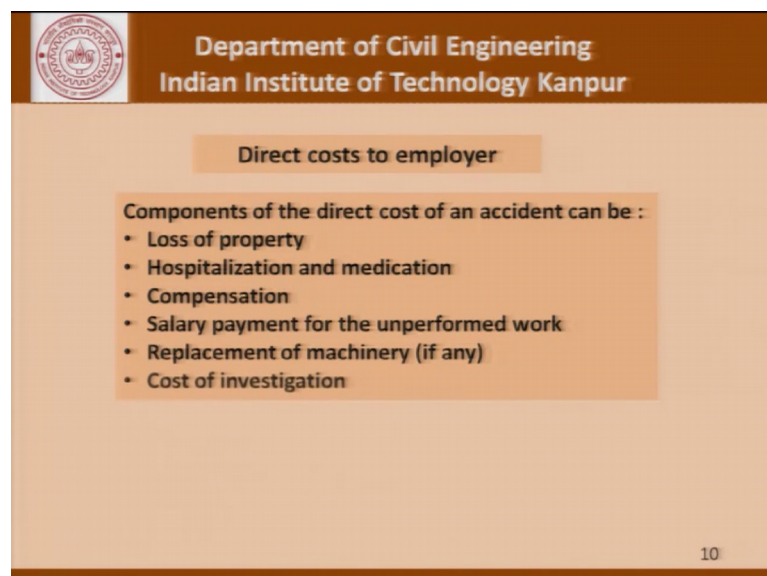
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This is the proverbial tip of the iceberg representation of the direct and indirect costs traditionally indirect costs are measured as being four times the direct costs, but the indirect costs of injuries may range from 2 to 20 times of the direct costs.

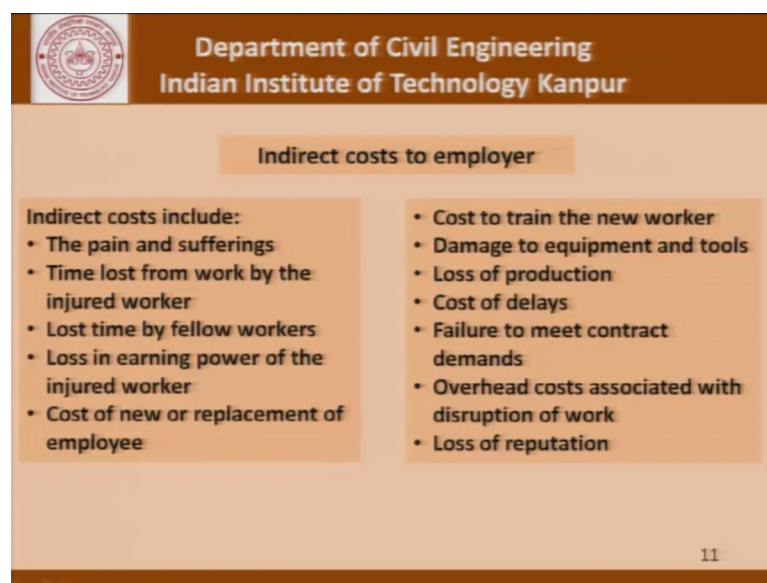
So, it is not important to assign a value to it, but it is important to understand that the direct cost is only a small part of the overall or total costs involved whether it is the employer or it is the victim or the employee. Now let us look closely into some of the components of these direct and indirect costs with respect to construction accidents.

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As far as the direct cost of the employer is concerned it could be loss of property, hospitalization and medication of the victims or the people who have been affected by the accident, the compensation which has to be paid to them, the salary payment for the unperformed work there are provisions in the contract that if a worker is injured while performing his duties employer will pay him full wages for the time that he is hospitalized or incapacitated that is salary payment for the unperformed work, replacement of machinery if involved and the cost of investigation. So, these are some of the direct costs.

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Indirect costs to employer

Indirect costs include:

- The pain and sufferings
- Time lost from work by the injured worker
- Lost time by fellow workers
- Loss in earning power of the injured worker
- Cost of new or replacement of employee
- Cost to train the new worker
- Damage to equipment and tools
- Loss of production
- Cost of delays
- Failure to meet contract demands
- Overhead costs associated with disruption of work
- Loss of reputation

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Coming to indirect costs of the employer the list is very long and let us begin with the pain and sufferings this is simply very difficult to convert in to monetary terms. Time lost from work by the injured worker and lost time by the fellow workers very often in a construction related accident the time lost that occurs is not only because of the absence of the worker who is hurt or who is incapacitated, but also fellow workers who have to immediately take care of him accompany him perhaps to the hospital and so on.

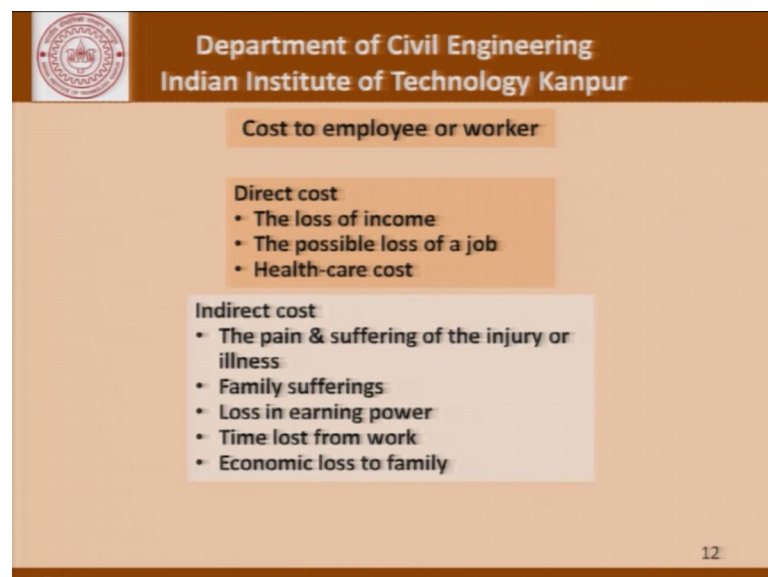
Loss in earning power of the injured worker cost of the new or replacement of the employee, cost to train the new worker damage to equipment and tools loss of production and productivity cost of delays an accident could cause appreciable delays in the project. Depending on the severity of the accident the work at a construction site could be actually closed till sustainer's investigation is completed and that kind of a stoppage is

unplanned and could be very dear as far as the contract is concerned and as far as the project completion is concerned.

Failure to meet contract demands overhead costs associated with the disruption of work and loss of reputation loss of reputation would include a possibility that the contractor or the employer is debarred from bidding further in other projects for a certain period of time.

Now as far as the cost to the employee or the worker is concerned the direct cost is basically the loss of income and the possibility of loss of job and the health care cost.

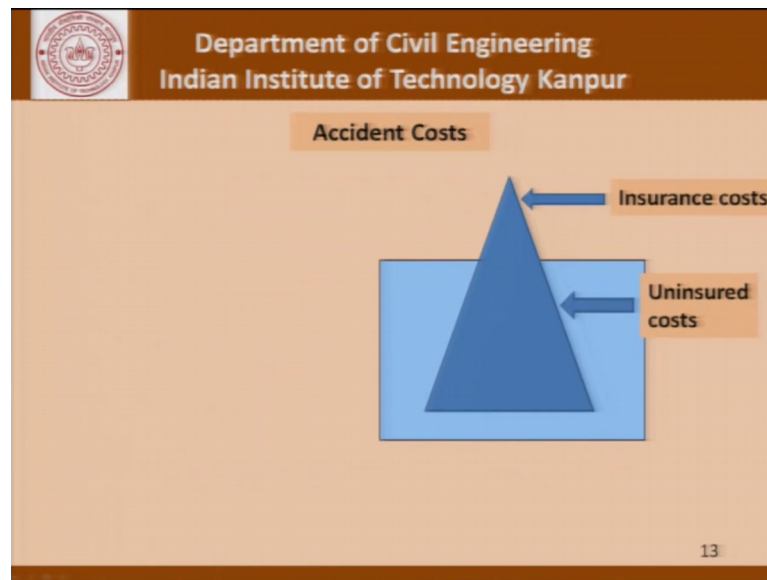
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No matter how much coverage is there from the employer or the insurance company as far as health care cost is concerned there will be a substantial amount of expenditure which will be incurred directly by the employee or the worker or the victim in health care depending upon the severity of the accident.

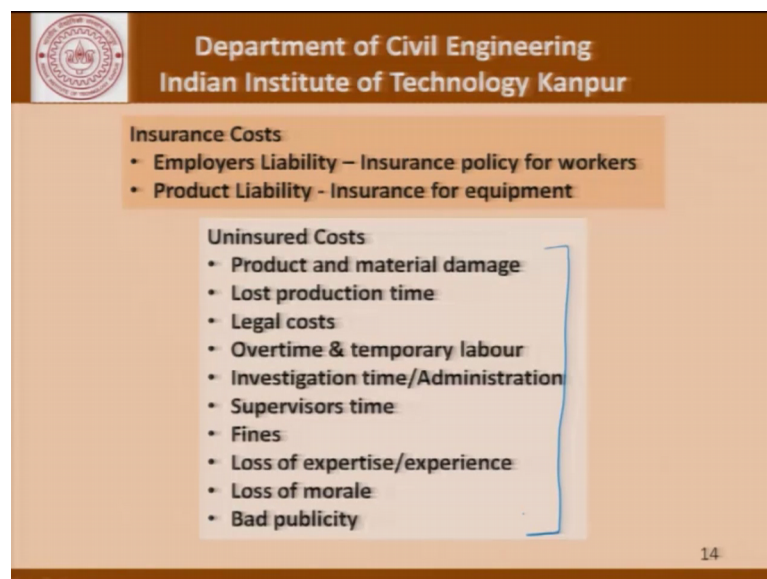
As far as indirect costs is concerned it is the pain and suffering of the injury and the illness the family sufferings is not only the person whose injured or incapacitated who suffers, but all those around him go through a very difficult time in the course of recovery. Loss in earning power, time lost from work and economic loss to the families. So, these are some of the components of the indirect costs as far as the cost of the employee is concerned.

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Now construction accidents can also be looked at in a very different way. There is a component which could be called the insurance costs and the uninsured costs. Depending on the provisions of the contract the employer or the contractor takes insurance policies which cover the possibility of an accident, but some of the implications of that accident are covered by the insurance policy which is what is being called as the insurance costs, but then there are several other things which are simply not covered and that is what is being called as the uninsured costs.

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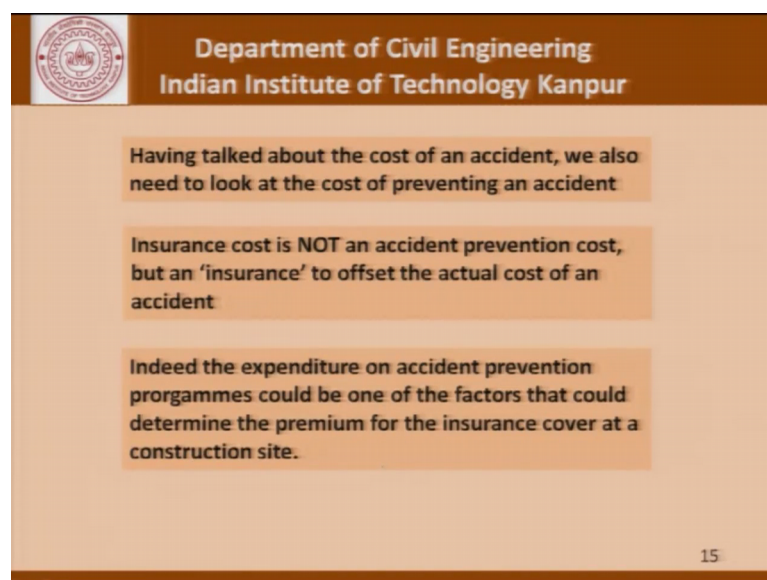
Now looking at the insurance costs or the cost which is covered by the insurance company it is employers liability in terms of the insurance policy for the workers which could cover hospitalization and other compensations depending on the severity of the accident and the product liability which could be insurance for the equipment.

As far as the uninsured cost is concerned it would be the product and material damage lost production time, legal costs, over time and temporary labour investigation time or administrative costs, supervisors time fines involved loss of expertise or experience loss of morale of the workers and bad publicity. There is no way that these costs can be insured against simply because it is completely uncertain as to what the kind of costs would be bad publicity is something which cannot be simply converted to money terms.

Similarly, fines it is very difficult to figure out what the kind of fines would be imposed on the contractor in the case of an accident similarly loss of morale is also something which is simply cannot be compensated and so is the loss of expertise or experience in case of the worker which has been lost or incapacitated.

Now having covered some discussion and having a better understanding of the cost involved let us move for step further and discuss the following.

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Having talked about the cost of an accident, we also need to look at the cost of preventing an accident

Insurance cost is **NOT** an accident prevention cost, but an 'insurance' to offset the actual cost of an accident

Indeed the expenditure on accident prevention programmes could be one of the factors that could determine the premium for the insurance cover at a construction site.

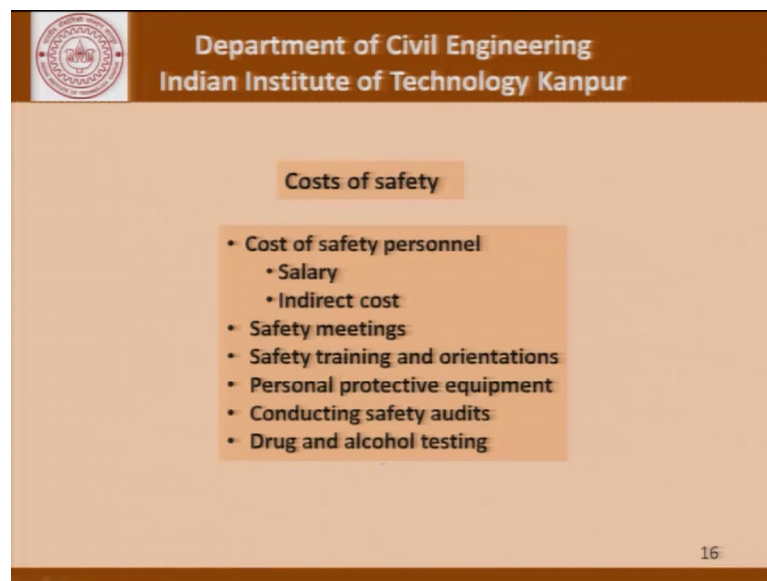
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Having talked about the cost of an accident we also need to look at the cost of preventing an accident. Now we must remember that insurance cost is not an accident prevention

cost, but an insurance to offset the actual cost of an accident it is very difficult to take an insurance policy to prevent an accident the insurance policy only protects you against large amounts of expenditure in the event of an accident.

As far as the accident prevention is concerned it is the employer who has to take appropriate preventive measures of course, the expenditure on accident prevention programmes could be one of the factors that could determine the premium for the insurance cover at a construction site. What is being said is that if the employer takes a lot of precautions and the insurance company believes or feels that with these measures in place the likely hood of an accident at that site is lower the premium could be lower. So, let us try to look at the elements of the cost of safety. What does it cost to a company to prevent an accident?

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The first thing that comes to mind is the cost of the safety personnel, the employer has to have a very elaborate setup of trained safety personnel at their head offices at each construction sites, they have to be qualified, they have to be experienced and they have to be given responsibilities as we have discussed it.

The safety personnel have to be experienced qualified and cost to the company that is there is a salary involved and there is indirect cost in terms of all their benefits. So, this standard cost that is applied to all other employees is also applicable to safety personnel, so all the expenditure that the company incurs in terms of safety department is

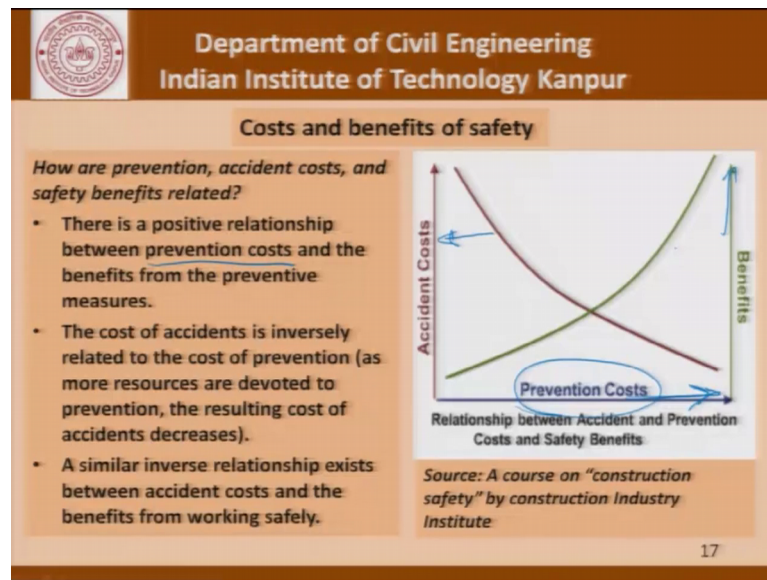
definitely billable or accountable in the sense of a cost of safety. Moving further there are safety meetings where not only the safety personnel, but also people from the other departments participate.

So, this time that other spend in safety meetings is also part of the expenditure toward safety and that accounts as part of the cost of safety. Safety training and orientation programs whether they are held every day whether they are held only at the time of induction of the worker, whether it is only for the safety personnel to upgrade their skills or for everyone else to better understand concepts of safety and its importance all these safety training and orientations programs that time spent by all the employees of the company is part of the costs of safety.

Personnel protective equipment of course is definitely part of cost of safety and conducting safety audits which could be carried out by people within the company or outside the company and drug and alcohol testing any kind of medical testing which is part of a safety program because it is very clear that healthy workers are our prerequisites to having a safe environment. So, at times we can say that yes drug and alcohol or any medical testing which is a part of the worker programme can also be counted towards the cost of safety though in the larger sense this could be part of a medical insurance programme or the cost of health as far as the company is concerned.

So, without getting into the final detail as to which way we should count them we must understand a comprehensive picture that yes in order to prevent accidents there is a cost involved and that cost is made up of several components which has been discussed in this slide. So, moving forward what we really have to do is to be able to carry out a cost and benefit analysis as far as safety is concerned.

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What that means, is to find out how are the prevention and accident costs and the safety benefits related. There is a positive relationship between the prevention costs and the benefits from preventive measures. So, if we increase the preventive costs that is we spend more money spend more resources in preventing an accident the benefits from preventing those measures are positively related they also increase also the cost of accidents is inversely related to the cost of prevention as more resources devoted to prevention the resulting cost of the accident decreases. And a similar inverse relationship exists between the accident costs and the benefits from working safely.

This is represented in this systematic diagram here which talks of the relationship between accident costs, prevention costs and benefits. So, if we increase our prevention costs then the accident costs which is shown here decreases and as we increase this the benefits increase. So, this picture here is a schematic representation when of how the accident costs, prevention costs and benefits are related.

So, this comprehensive discussion of how these three parts are related more or less brings be to an end of the discussion today were we briefly talked about how to look at the cost of an accidents from the employers perspective and from the employees perspective in terms of direct and indirect costs. And we also spend some time talking about the components of the cost of safety and insurance this here is some of the references which we can suggest and you may use to deepen your understanding about

these aspects relating to safety and I look forward to talking to you once again on another topic.

Thank you.