Advanced Green Manufacturing Systems
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Lecture – 09
Value Engineering Green Plan: introduction

Good morning. Welcome back to the course on Advanced Green Manufacturing Systems. Till now what we have discussed, we have just had an introduction on manufacturing system, we had an introduction to optimization techniques, we were talking about the quantification of the greenness. We have just gone through the certain techniques examples on that or the case studies on that with take in the forthcoming lectures. So, in this specific lecture, I will discussed Value Engineering Green Plan.

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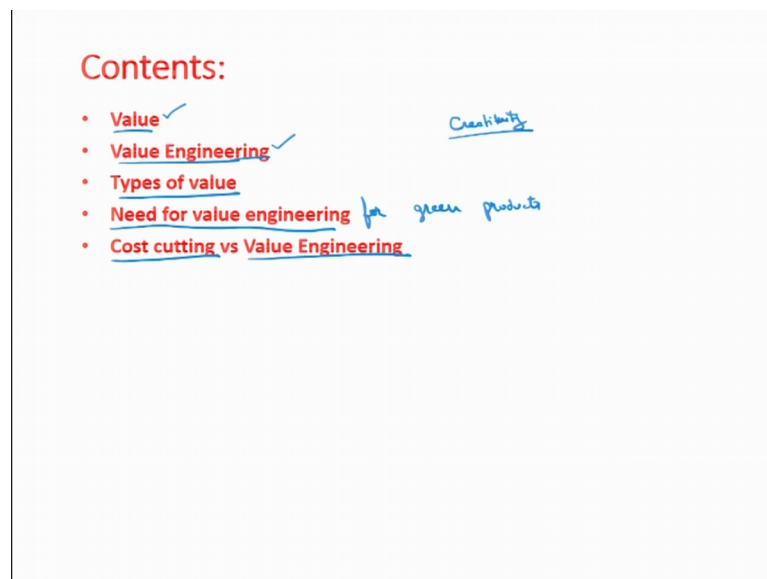
The contents will go like this. I will discuss what is value, then I will discuss what is value engineering. Now, by the end of this lecture, I suppose you would be clear that why we are discussing value engineering, why we are discussing about the value of the product, what is the value we will discuss about various values. And also we will talk about green value, which is one of the values here.

What is value engineering? Value engineering is accomplishing the necessary functional of the product. We do not work on the product like we do for instance I am designing a table, we do not work design of a table. We will design on the functions something on which one has to keep it is belongings, something on which a computer has to be kept, something on which the office stationary has to be kept ok, it is to support objects that is the function. We will discuss about this in detail.

So, we will discuss about value engineering with the steps in value engineering, then I will take a case study on conducting value engineering in the whole process we discussed here. Then we also institute green objectives into it that will take when will just proceed with the lecture.

So, all it is discussed about the types of value. The need for value engineering for green products what is the need, we will see that value engineering has a specific domain that is known as creativity. You know what is creativity, creativity is just forgetting about the proved facts and then thinking about the product in a way that is something new something creatively.

As we say like kids are very creative kids do not know the facts, they just have an idea in the mind, just they became up with that idea. And they just do that thing sometimes. And sometime those things are really a implementable those things are really you know can be induced in the daily life. So, we will discuss about the creativity in the detail, we will discuss about the definite needs of creativity. And how creativity could help for us has helped the people in developing the green products or processes ok.

Then we will discussed general cost cutting versus value engineering. As we know that basic or the prime motive in manufacturing or in manufacturing systems is cost reduction, profitability improvement. The primary function is be fulfil the need of the customer. Now, cost cutting is a cost cutting or profitability is the concern of manufacturing people. Now, when we institute greenness or ecological products or green products or sustainability into this, in this case all the stakeholders have to be aware. Now, we will discuss that how value engineering can help in having a better or greener product.

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What is value? Value the definition given by Mudge, there is a very famous book on value engineering by Mudge, you can just follow that book. The value is the lowest cost to reliably provide the required functions or service at the desired time and place with essential quality; you see they are three constituents required functions number-1.

Number-2 functions or service we can say (Refer Time: 04:41) of the products service or can also have some functions to be done ok. Then desired time and place, this is number-2. Then with essential quality is number-3. So, there are three components in the definition of value. If I talk about the value in quantitative terms, I can put a formula here. Value is equal to utility per unit cost ok.

So, value engineering or value analysis, I will discuss the difference between engineering and analysis as well. It is primarily concerned with the economic value will I will discuss about the types of values. So, value as I said is a lowest cost. So, the objective qualities of value consists of use value and cost value. So, this is use value, what is the use of the product, and what is the cost of this is, how we can define value ok.

The value gives ultimate satisfaction to the customer. The value can be many things like utility is for instance I need something to make a call, I purchase a mobile phone. I purchase a mobile phone that is something to make a call, what is the cost of the mobile phone or a cellular phone that can just make a call primary function of mobile phone is actually to make calls, receive calls, send messages, receive messages.

In 90's, when just these mobile phones came into the hand of the people, those were the only function that it could; now we have smartphones ok. If we just need to purchase a mobile, what is the cost of that mobile to compress which just a primary function is the cost of that mobile could be around maybe 1000 rupees you can that get that product ok, utility is 1000 for that ok, for just accomplishing primary functions. The cost of that product the basic mobile, basic function can be accomplished in a 1000, but I get a mobile of may be 2000 rupees ok.

In this case, I can say this value is less than 1, if I am thinking about the basic functions. So, in this case we can just quantify the value in this way, but in the today's era in the contemporary scenario what we have? We have smart phones. Mobile phones are just not to do the primary functions now for me.

For instance, the functions of functions is in a mobile that I need to do I need to see my emails, I need to download documents any documents in that, so that I have full size screen, for that for instance I can spend around 10000 rupees for a smartphone ok. This is a basic cellular phone.

Now, for smartphone ok. I am willing to spend 10000 rupees, but I get a product of may be in to say 15000 rupees or 12000 rupees ok, so this value is less than 1. So, something that a smartphone can do for instance, I am not concerned about camera, it is about for instance there is a mobile that is having very good camera, but is coming in 12000 rupees. In another mobile that is coming in 8000 rupees, but I was willing to spend 10000 rupees this is greater than 1. This is I can say case-1, case-2, case-3. In the case-3, I have got a better product this is value.

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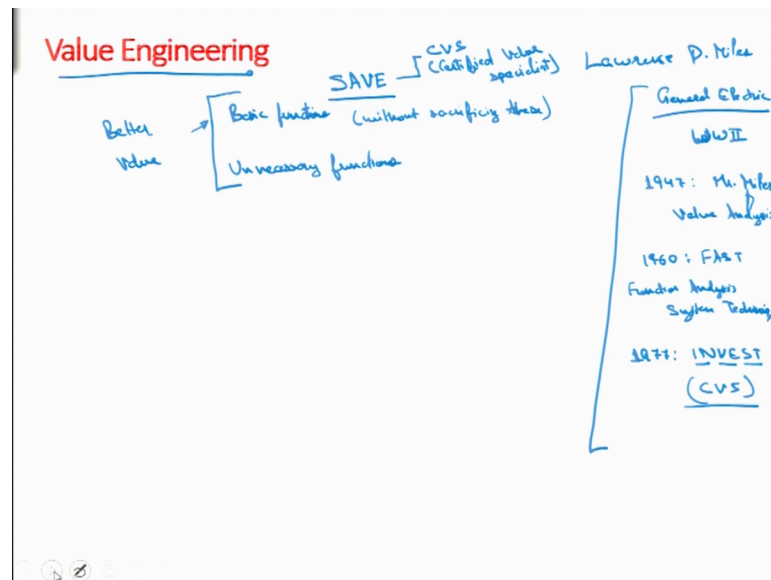
So, next I have with me is value engineering. Now, this is value engineering Lawrence D Miles is the father of value engineering, he practiced value engineering. And there is a society known as SAVE Society of American Value Engineers. Now, mister miles was infused to find the ways to produce products for general electric's see work for general electric's ok.

After world war-2 after world war-2, we know that the viscosity of the products and mister miles use a technique to develop number of products for the need of the people, then what happened. These values engineering methodology was developed, but later than US bureau of ships decided to use this value engineering aspects by miles. So, they added new implies and engineers and analysis.

So, then trade was air mass, what is value engineering again? Value engineering is accomplishing the basic functions, eliminating the unnecessary functions. The purpose of value engineering is to get the better value without sacrificing the basic functions. So, basic functions I will put here without sacrificing these. We need to have a better value, how could we have better value? We know this is numerator and denominator we have utility and cost, at the we have a better utility, utility enhancement or cost reduction or both ok, this is improving value.

Now, to do this we have a methodology known as value engineering job plan, we will talk about value engineering green plan. This utility can be this can be time ok, this can

be performance. For instance, I was talking about the cellular phones ok. If my cellular phone is having better performance, there is no lag in starting or they may be switching on and off. And my emails or whatever the function I like to do in that, that is just happening in an a very short instance, so that is performance.

Then it is quality. Quality is subjective term, it has different meaning for different people (Refer Time: 12:13) some people, this performance can also be quality. So, basic function has to be accomplished ok. So, this is how we can improve value. So, value engineering was implemented by US government. And it was used in environmental protection agency, department of transportation, federal highway administration, then certain other like they are is a society save have a certification that is known as CVS. CVS is Certified Value Specialist.

So, value engineering started in world war-2 ok. Later in 1947 Mister Miles practiced value engineering. And actually he practiced value engineering in general electric, and it with team was developed. And it was a sign to the purchasing division to study new property concepts were succeeding, and developing and amazing new package of techniques, him name that value analysis the word value analysis came here.

So, then it was the a parallel technique to cost cutting, but it has something more in that. So, the certain other milestones in 60's the first 1960 for the value engineering functions first technique was developed. First is function analysis system technique ok.

Now, this happened and there is various other things keep on coming. What happened in India in 1977, when people started practicing value engineering, so then society was developed society was devolved which is INVEST. INVEST is Indian Value Engineering Society. So, the certain companies, they joined hands research was done in coordination with each other, and value engineering was practiced altogether. So, this serves Indian industry by dissemination of specialised knowledge to professionals, who in turn could help industries to improve their profitability through the technique of the value engineering.

Now, INVEST organizes awareness training programs, and workshops in which again the CVS certified value specialist certification is given. And other experts from both within and outside the countries come to train the people here. So, the conference is here

provide an exciting forum for exchange of knowledge among active practitioners, which help the practitioners to adopt, and innovate in the area of work.

So, SAVE society is working with all agencies nationally and internationally. INVEST is the one of the you know you can say component or the associated body with save. I believe you would have an better feel, when I actually discuss the value engineering job plan. And I am just introducing, what is value engineering, and how from where did you come from.

And people have implemented value engineering job plan in getting green processes, and green products as well. We will discuss all those also we will try to have a small case here. We will first we will discuss general value engineering study, how does it this happen, then I will institute green planning to this. And I will actually do or try to practice here the value engineering green plan, and also a task that will given to you that you can do at your home.

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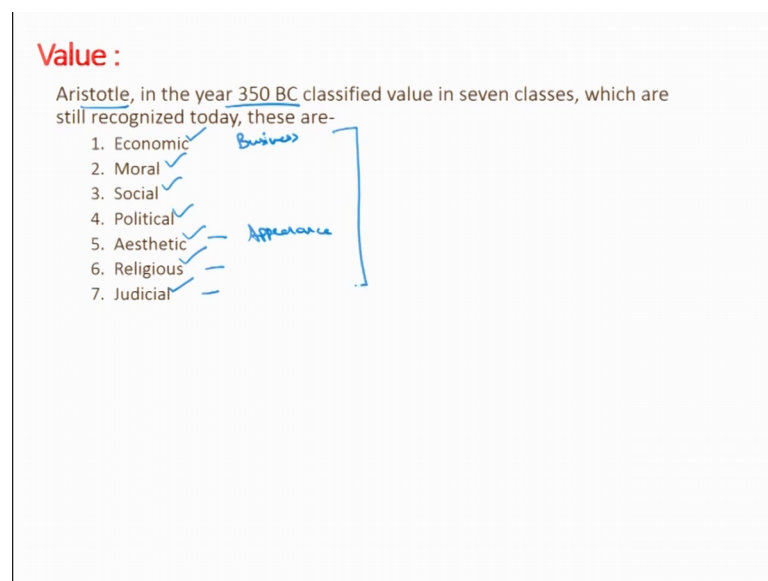
So, value the concept of value came the very year of 350 BC when Aristotle classified value in seven classes, which are still recognise today. He said value can be classified into economic, moral, social, political, aesthetic, religious, judicial. Economic value is the cost value that is there in business. The moral value that value is like someone say, I believe in values. When he say believe in values, he actually believes in moral values

which are instituted by to him or her from his parents or may be the teachers, so those are moral values.

Social values are something similar to moral value, it is something how one deals with the people in the society, so that is social value, political value, aesthetic value. Aesthetic value is talking about the appearance ok, appearance of the product of the people. Religious value people have different religious values, they believes in judicial values all these values are here.

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So, I will talk about the value analysis in which economic value consists of subjective and objective qualities. It comprises of four specific kinds as follows. Number-1 is use value, now use values are properties or feature or qualities that accomplish a use or work or service. These relates to attributes of a product which are unable to perform its function. So, I can say the basic use of the product or work or service. I will just discuss about the use value detail.

First of all let us see what are these four values. Esteem value is the properties or features or qualities, I can say then that make an ownership of an product desirable that is an esteem. It is the additional premium price with which a product can attract people, like because of indentation attractiveness to the purchase of for instance if you gone a purchase a motorbike, for instance say a youngster of maybe 20 years age, he will like to

purchase a motorbike, what he would look? A motorbike should it should run should run properly, it is the use value ok.

Now, his esteem value might be like if he is a you know if you like to drive a very fast, you like to have a motorbike that can run may be at 120 kilometres per hour or he would like to have a motor bike that is a of red colour, he will have might be motor bike that is having a very great pick up ok.

These are actually performance things, but I am if I talk about red colour that is an esteem value ok, if you know the mars close need hierarchy diagram in which we have this kind of mars close need hierarchy diagram is he said the basic needs ok. Basic needs are generally if we talk mars law that we said the basic needs of basic needs of human, which is food, shelter, and clothes ok, then he said security ok, they need to have security, then social needs, then they have esteem needs as well. After that they have self-actualization that is something can different tangent.

So, when we talk about the product, the basic needs of the bike is something to ride something to ride for two people. Security is it should run safely, it should run safely, so as the balance and everything is good. Social need in bike we can say similar to his work or all those things are you can do. Esteem is the appearance or a aesthetics that is a esteem value. So, it adds a premium price or additional premium just to attract the customers.

Next is cost value. Now, these are the properties, which is sum of the total cost of the product. The total cost can be the material cost plus labour cost plus overhead cost this cost that is the cost value. So, this is the cost required to produce or manufacture sum, it is the total cost of producing the product ok.

Next is exchange value, exchange value is the properties that make it possible to prepare an item by trading. Like in an international market we have exchanged value for dollars. Exchange value is what is the value in which or on which we can exchange the product, we can just have the trading between the products that is exchange value. So, it is sum of attributes, which enable the product to be exchanged or sold.

Now, I will discuss about these values. Also I will put another value here that is green value. Now, green value is producing eco-friendly products, how could we do that? We

will see about the life cycle analysis, and then I will discuss that the certain life cycle stages.

One is when I am using the product, for instance I am using my computer I am using this, this tablet to write notes, so this is during use. Before, use the product is manufactured, product is manufactured what happens during that. And after use, what is there? After use this is disposed of is it recycled, is it reused or is it just disposed of at the three stages, what is that we are like contributing to the environment.

Even if I do not say, I cannot say contribute actually (Refer Time: 23:35) less we can deteriorate the environment. So, this is the green value. So, actually whenever we produce something some negative impact on the environment is there, so reducing that impact moving one step forward can be said to be a step towards greenness, we will discuss on this ok. So, this is green value. I will discuss about different values use value, esteem value, cost value.

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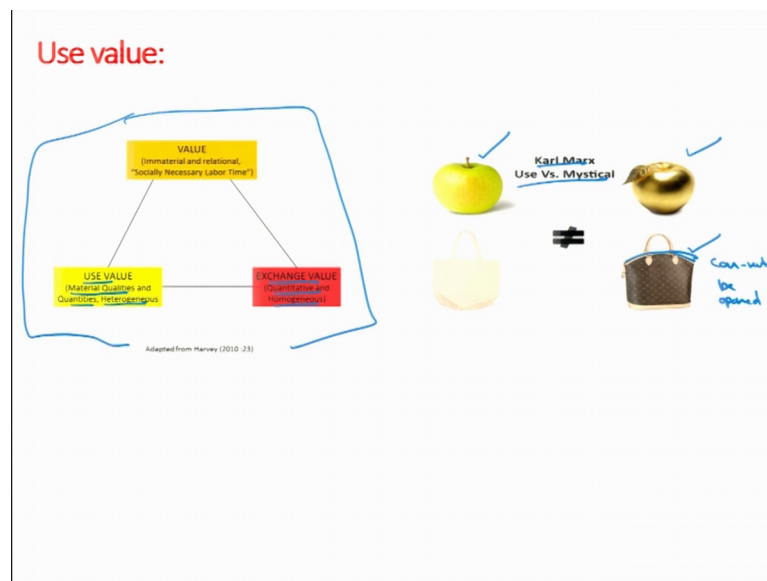
I have some examples for you to explain the use value with its value that we have discussed here. So, the value basic value that we are talking about is in value engineering is use value. So, if I say use value, cost value, these are the two values, which are generally talk about in a product ok. Then we have esteem value that adds something an additional premier aside as I said. Then green value with the proper customer awareness with the customer incline towards purchasing green value, it can also add something.

So, basically the use value is the basic performance value, you can say I have with this figure here. This is an apple that you can eat, if you get an apple of gold or if you get a bag that is just locked that cannot be opened cannot be opened. We should like to purchase if you are hungry, and you are now gone a to eat something, we should to have to have an gold apple one can think ok, gold apple in an Amazon or something and that a place is not desirable. Gold apple here you can send gold, and purchase something that is different part of a story.

But, yes when you are really hungry, you would like to have something that could be used, you need something to eat an apple that is or you can say a replica of a apple in gold is not desirable ok. Then the bag that cannot be used that is locked. For instance, you want a purchase a shirt. And in the showrooms there are dummies; dummies have the shirt, for instance there is a shirt with a dummy that is a locked completely, you cannot un button, it you cannot use that would you like to purchase that that you cannot wear, you would not purchase that.

So, the basic function or basic performance has to be there. So, this is value use value and exchange value are related to each other. So, use value are the material qualities, and quantities which has heterogeneous, and these are quantities and which are which are homogeneous. So, in material and relational values are here with that we are discussing.

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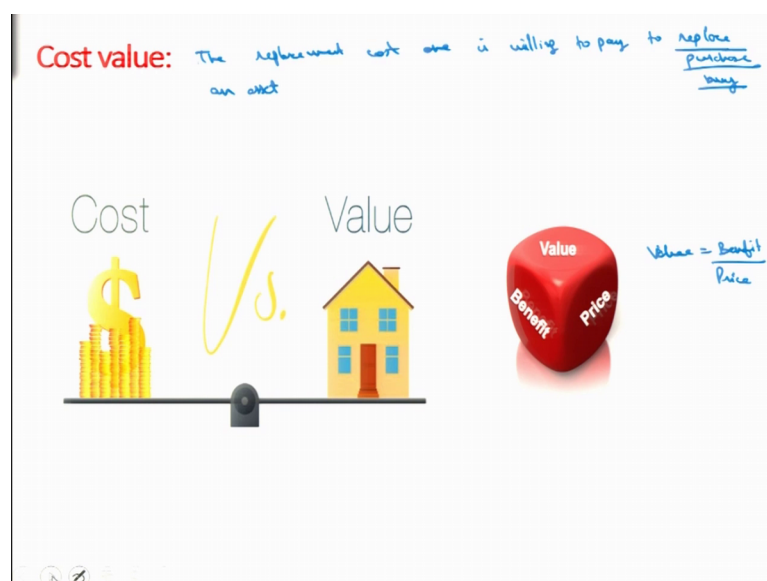
Next is cost value. Now, cost versus value, now this value as I said value is equal to benefit by price. Use value is the utility of consuming a good that satisfy the power of a good or service in a classical economy I would say. So, in Marks Critic Karl Marx used these examples here inside that any product that has a labour value, and a use value and if it is traded as a commodity in markets, it additionally has an exchange value, this is the concept that he gave ok. So, most often expressed as the money you can say, so this is use value.

Now, cost value is the replacement cost or replacement value that refers to the amount that one can pay the replacement cost one is willing to pay willing to pay to replace an asset replace or I can say purchase or buy. (Refer Time: 27:55) cost value for just having the Smartphone or for having a basic phone, the cost value is rupees 1000 in 1000 rupees I can get a phone. Even if I believe there in the market, where the mobile phones the cellular phones of rupees 500 also. So, the 500 rupees the cost value, the basic value one is willing to pay for that.

For instance, in insurance industry replacement cost or replacement cost value is one of the several methods of determining value of an insured item ok. When we ensure your car, what is the replacement cost? If formal buys your used car, so what is the replacement cost of that? For instance, I have purchased a car of 5 lacks, and after two years of use I would like to get that insurant, they would replacement value of that car. For instance, there they put 3 lacks of that value that is the cost value of that car at that junction, after 2 years of use.

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So, next is esteem value. Esteem value can be defined as subjected value to a client that attributes to the product that makes them feel good about or in the product. For instance, Apple mobile people say I have an Apple I Phone generally this is the perception they say apple I Phone apple I Phone mobile, some esteem value associated with that. Esteem value is something that adds to the style to the you know higher living standards of the people. So, this is esteem value.

So, esteem value is I can say subjective value. So, this makes the owner feel, feel good about on in their product ok. So, I can say you feel with that makes the owner feel good or admired ok, it is something that is something we you by yourself admired or something you need to have some respect or admiration or you know some honour or some praise, so that some time people purchase the products as well. So, this acts some things to the product or the choice of the people as well. So, this is esteem value.

So, next is exchange value. As I said exchange value is the quantified worth of one good a service expressed in the terms of the worth of another, expressed in terms of the worth of another ok. For example, in business as I said like the exchange rates for appearance of foreign exchange, the value of each currency is expressed in a terms of value of another currency ok, like price of dollar, 1 dollar today the price is may be 71 rupees, this is the foreign exchange.

Now, this creates a value or exchange rate for each currency relative to benchmark currency. So, this is benchmark currency. So, this is exchange value. So, exchange value does not need to be expressed in money price is necessary or I would not go much detailed in exchange value but green value is the prime concern in this course, what is green value.

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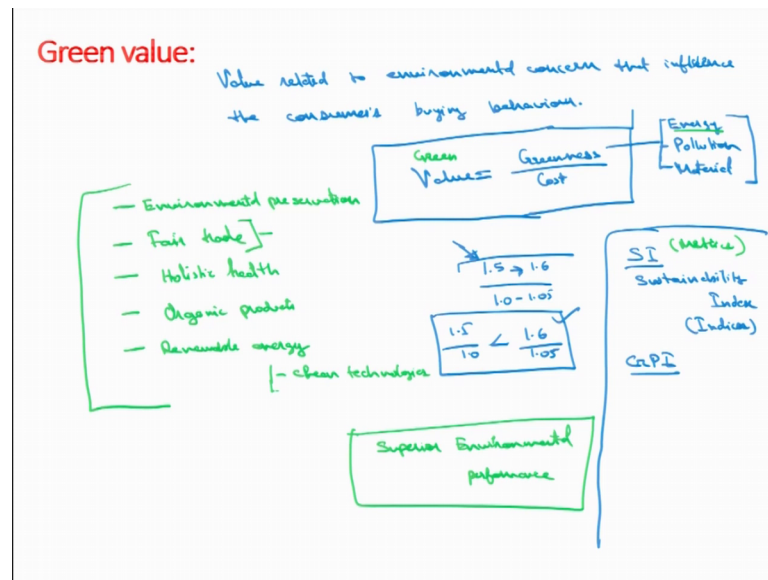
So, green value is the value that is related to the environmental interest of the people or environmental concern of the people that influence the consumers buying patterns. So, if the consumer is aware or he would like to purchase an eco friendly products, so these values can be instituted value, this is value related to environmental concern that influence the consumers buying pattern, buying behaviour see if I say green value. This green value again to sustainability index. So, we can say it can be greenness per unit cost.

I am just using a simple formula. However, this value can be subjective, and we can use various relations in that, we certain things, we will discuss that is SI that is sustainability index. However, it is actually not index, it is indices, sustainability indices are there ok, then also we have a green performance index certain indices, we will discuss in the forthcoming lectures.

This greenness per unit cost, greenness can be you can say you can say green energy or green I can say reducing pollution a green material. These things we will discuss energy can be while using the product, while manufacturing the product or after use. For instance while manufacturing the mobile phone, what is the total energy that is consumed or that is a where that we call as embodied energy. The energy that is used to produce one unit of product in that specific product that we called embodied energy, it is during manufacturing ok, this is energy.

Pollution, what is the pollution that is reduced that energy can be produced first of all rate of mode energy. Energy can reduced either, we use renewable sources of energy or we device certain processes that helps to reduce the energy or try to minimise the energy. In that case the cost that would be incurred can be same or even it is at higher if greenness is higher much higher, then we can have value.

For instance, if their value, the greenness has improved from I will tell you how to quantify greenness. So, I will I will say greenness has improved from 1.5 to 1.6 and the cost has gone from may be 1.0 to 1.05. Again we can save 1.5 by 1.0 is less than 1.6 by 1.05 from where does these numbers come this we will discuss is Dr. Deepu Philip will be discussing quantify greenness. This we will discuss for this ratio is greater so that means, the green value is improved green value.

Now, this greenness when we talk about the green value, this can be the certain parameter certain characteristics or certain areas in which that could be done that can be done by having environmental preservation ok.

For instance, ITC is planting trees; it is having vertical gardens in its plant. For instance a company is manufacturing something and it is producing 1 ton of carbon footprint. To mitigate that 1 ton of carbon foot print, if we cannot do much, it can do something like reforestation or certain measures can be taken to add something to environment, this is called environmental preservation ok.

So, again fair trade, because we are talking about manufacturing systems manufacturing systems, they also come the supply chain. And supply chain fair trade whereby where one can think of buying something that is close to their plant ok. Buying locally available machines or having the ancillary units at the very closer places, those can be were example of fair trade also we have a holistic health.

When we talk about green manufacturing systems, we also need to talk about the future that we would talk about sustainability and the current scenario as well. In the current scenario, we will need to talk about the holistic health. Like the in the previous version of this course, the this the sustainability through green manufacturing systems, it is a course we discussed about a manufacturing practice of manufacturing system, in which we try to control the arrow souls which are produced during machining.

Cutting fluid is there, when cutting fluid is dispersed or is thrown on the work piece using the smaller ways in the way that we used was minimum quantity lubrication in which the mist of the flu is thrown to provide lubrication and cooling where the machining is happening. But that mist is also dispersed or spreads in the environment that should not deteriorate the worker's health to minimize that spread or that dispersion is also one of the issues. So, holistic health will can have health insurance plans and all those things. So, regular checkups can be made. So, those are the part of the green manufacturing systems.

Next, we can have organic products, then we can use in the case of energy when we talking about energy, we can use renewable energy using clean technologies. So, the environmental performance or sustainability metrics are increasingly considered important criteria in the property of investment decision, when the companies are trying to invest somewhere. So, they are considering the environmental performance or sustainability metrics that we will discuss that will be the metrics here sustainability metrics.

So, investors require information on the costs and benefits associated with developing, managing, investing in the manufacturing in the factories with the superior environmental performance. You can just put a term superior environmental performance, this is the ultimate aim. One of the reasons is if we going green also helps to reduce cost that is there.

Going green, the customers are generally sometimes willing to pay more for greener products there is a study that happened in a specific shopping centre in US, where they try to identify how many customers are asking for green products. They observed that 50 percent 50, 50 percent of the customers are asking for green products in US. In India, because the basic needs as I said food, shelter, and clothes is not being met. So, the customers are not asking for green products these days.

But yes, because the pollution is too high Kanpur where IIT Kanpur is located now. Now, the Kanpur city is one (Refer Time: 41:47) in the top of the list of the most polluted cities in the world. So, this is we are living in the most polluted city here in Kanpur. So, this has made people somewhat aware to think about greenness. For instance there is a firm that, that it is generated by IIT Kanpur alumni that is help us green.

So, these guys Ankit and I cannot recall other name, these are the IIT Kanpur alumni, who identified that millions of tons of the flower, flowers are offered to the in the temples to the God ok. To what happens, what happened to those flowers after the specific occasion. For instance if hap, if it happens in on the day of Shivratri. Shivratri is the birth of the Lord Shiva of in that night that it happens next day, the very next day all these flowers are thrown into river corners, so that becomes a kind of waste.

So, what they decided, they decided collect those flowers, and make a material that is a substitute of thermocol, the biodegradable substitute to thermocol ok. Thermocol can be replaced from that specific material number one. Then they made incense sticks of that. So, this is an initiative, and they also recognised by UN now, United Nations. So, these are the certain initiate the people obtain and those are very successful. And people are now willing to pay for green products.

Now, out of the other the example that was talking about in the study that happened in US regarding, the awareness of the people on green products, the people who asks for the ecologically friendly products 50 percent of them asked out of 50 percent those who did not ask 34 percent are not even aware that green products exists. So, awareness has to be there.

So, everyone is the part of the body, every party has to be associated or has to be involved in this. So, this is we can say fair trade note with in the business, but with the consumers and all others as well. So, a number of empirical studies has swat to explore the economics of sustainability and energy efficiency in residential and commercial buildings, in factories, in machining, in water treatment in all these things and they have investigated the contributions of policies that promotes the sustainability.

Despite of the growing prominence of the sustainable efforts this strength of research is still in its infancy. And the existing techniques are just a piecemeal are fragmented, we do not have a holistic way how to deal with greenness however, people are much aware now nowadays. So, but still we need to have a specific system.

So, that is why we are trying to having try to have a look on green manufacturing systems in this course value engineering can be one of the techniques. In which we apply the creativity or creative approaches to get the greener product. Similar to value engineering the certain other quantifying ways, we will discuss on those as well.
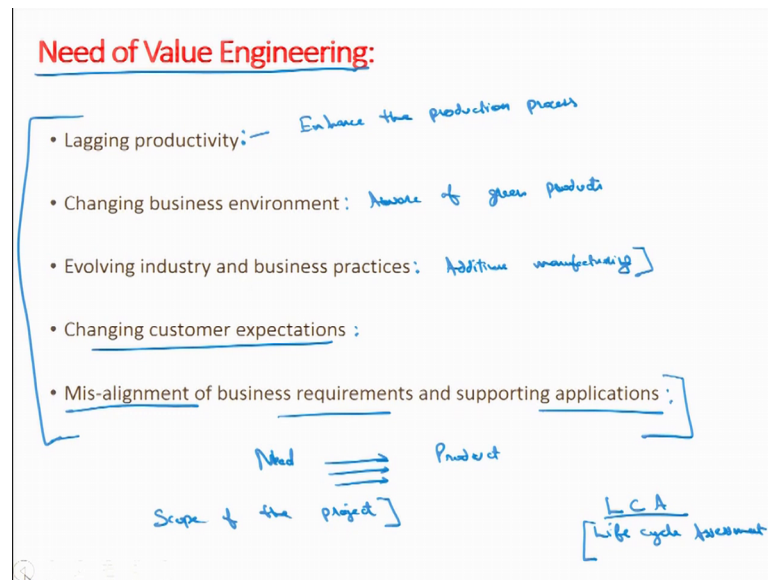
But we will discuss value engineering in this specific lecture. Now, what is the need of value engineering, as I told you the stories and certain things which are happening in the environment. So, this is from the business view point business and lagging productivity and they need something to enhance their business performance enhance the production process ok. Then the changing business environment people are being aware of green products ok. Then involving industry and business practices this is again green products and certain other practices for instance additive manufacturing, additive manufacturing is coming up.

Now, basically the product is manufactured using the subtractive method when we sub we need to produce something. For instance, if we need to produce a table what we do, we have to just scrap the extra wood of the basic size that is required or whenever we need to for instance, you need to manufacture something is sharp a material has to removed.

Identifying manufacturing is we do not have to take the scarp of you just keep on adding the material that is it also known as rapid manufacturing that also we will discuss a later on, how rapid manufacturing is also somewhat green this will discuss. Now, changing customer expectations, that is also one of the needs of value engineering.

Now, misalignment of business requirements and supporting applications, this is the basic thing, what is the need of the customer and what is the product ok. It has to be very

much aligned this misalignment cannot be there apart from this there is poor communication in developing a project scope, scope of the project, we will talk about life cycle assessment ok. The life cycle assessment the very first step is to identify the scope of the product sometimes the lack of consensus among the project stakeholders is there. So, with regard to project scope then outdated or inappropriate design standards are there then some assumptions are there, those are not correct then see previous designed peoples do believe their sometimes wrong believes.

So, these are the basic need of value engineering to get the green product. So, the reason for value engineering can be if marketers expected product that can become practically or statistically obsolete within a specific length of time, they can redesign it not only to last for the specific lifetime, but also to have a better performance or something ok.

The products could be built with a higher grade components or but with value engineering, we do not talk just do not know do not talk about the higher grade components, we talk about that why not we impose something, so that the unnecessary functions are inherited. Now, value engineering will reduce costs the costs those are generally looked upon.

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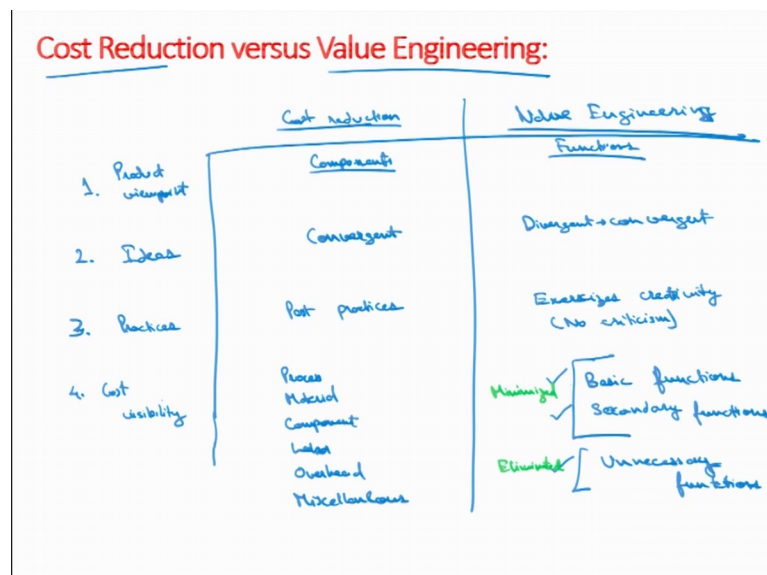
So, in that I will discussed about the general cost reduction and value engineering. Now, cost reduction and value engineering can be compared in these parameters. Now, what is a product here, product view point in cost reduction, we think about the components. We

only think about the components or items ok, but in value engineering, we think about the functions. For instance this is my pen the component or product this is stylish actually, the stylish as I had this button these buttons, this is a eraser button at the end. So, it has a tip here.

So, how can I will just think about the components? So, this component, this component how, how can I make it green, how can make the cover maybe, I can have a paper that is biodegradable material, I can have those many things that can make the product green, why do not we think about the function. The function of this should write something, why do not to have the complete body the complete material that is gained. The function is just to write on a tablet or we think about the pen. So, the functions are focused in value engineering.

Second is the ideas, when we talk about cost reduction, the ideas are just convergent converging towards only specific product. But in value engineering what happens? Because we have creativity first we have a number of ideas one of the techniques of creativity is brain storming, we have number of ideas and those ideas are first diverged then we pick from then and then converge. So, it is divergent and convergent, first divergent then convergent.

Now, practices, now this follows past practices that is analytical approach is there. And this exercise is creativity value engineering exercise is in creativity, we do not criticize the ideas no criticism. Now, cost visibility, now cost visibility in general cost reduction is what is process cost what is material cost or you can say component cost, then we have labour cost, then we have overheads and miscellaneous. But in case of value engineering, we talk about the functions as I said the certain basic functions, then we have secondary functions, basic function of this product for instance a pen is to write to mark, to make mark I can say.

The secondary function is for instance my daughter, she said say papa, I will would just like to get a pen that is blue in colour, the body should be blue. Now, her requirement is blue body pen, so that is the secondary function in the pen, the pen cover is made in blue, but the basic function is the ink and the nib that is writing. So, those facts secondary functions are also important sometimes ok, those are not basic functions, but important.

Apart from this they can be functions that are not necessary. So, these functions are to be are to be identified.

Now, the cost is being viewed as the cost for getting, the basic functions done, for the secondary functions is done, in the cost that is associated with the unnecessary function. This cost can be eliminated and this cost can be minimised. So, this is minimised; this is eliminated ok.

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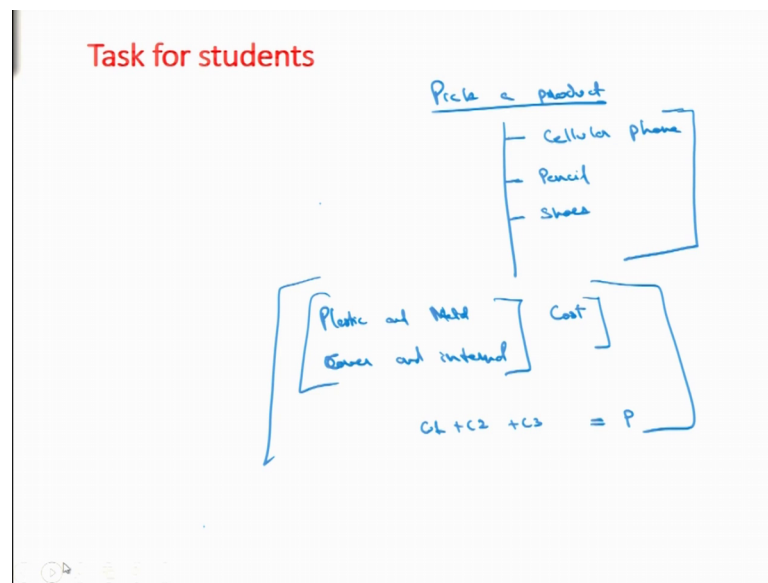
So, this is value engineering before going to the value engineering methodology have a small task for you people to just pick any product pick a product, a product that could pick any product that is there daily use. You can pick your as I quoted cellular phone or you can pick your pencil ok, your shoes, anything that you like a chair or anything that you like.

So, try to see different components. You can search on internet what are the different components of cellular phone, what is the material of that component and try to segregate those into different areas. For instance, we talk about cellular phone plastic and metal, then you can say cover and internal components.

Now, these are just identifying the components. This will help you then you please try to find out the cost of these components. Let us try to sum up the cost and try to see whether components that you have for instance component 1 plus cost of component 2

plus cost of component 3 is it coming equivalent to the cost of the product ok. This is one thing. Second thing is this is from the cost view point as I said from cost reduction view point if you say.

Now, we will see the value engineering view point try to see. Now, pick an example of shoe for instance shoe has laces on it ok, you have aces or a scrap or something then it has sole. Try to first see the cost of this.

Now, you need to see the function of the space, what is the function of sole, what is the function of the profile of the sole, internal profile, what is the function of the colour that is there of the shoe ok, what is the colour function of the laces. And all these things, you can just try to identify different functions and cost of that. So, just broadly you need to identify I will give you a detailed task in the forthcoming lectures. So, then we will see that. So, let us meet in the next lecture.

Thank you.