System Design for Sustainability
Prof. Sharmistha Banerjee
Department of Design
Indian Institute of Technology, Guwahati

Week - 6
Lecture – 3
Sustainable Product-Service System Design – Methods and Tools

Welcome to our second lecture on methods and tools for Sustainable Product Service System Design.

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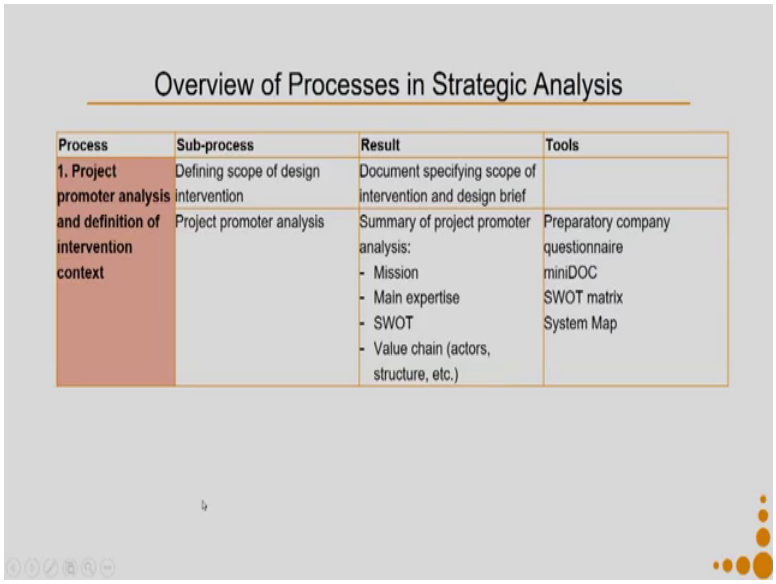

So, in our previous lecture what we were trying to discuss is how to do project promoter analysis and defining the intervention context. So, today we will go the next process in strategic analysis the next process is called as reference context analysis.

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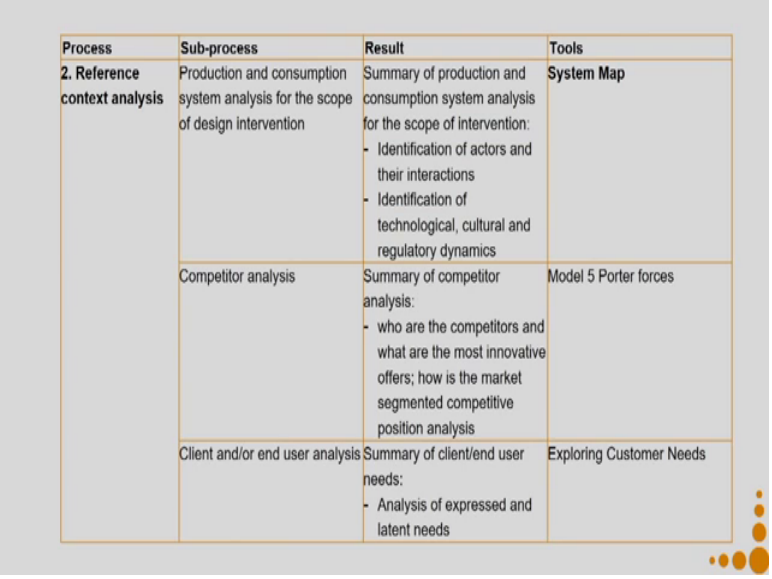

Process	Sub-process	Result	Tools
2. Reference context analysis	Production and consumption system analysis for the scope of design intervention	Summary of production and consumption system analysis for the scope of intervention: - Identification of actors and their interactions - Identification of technological, cultural and regulatory dynamics	**System Map**
	Competitor analysis	Summary of competitor analysis: - who are the competitors and what are the most innovative offers; how is the market segmented competitive position analysis	Model 5 Porter forces
	Client and/or end user analysis	Summary of client/end user needs: - Analysis of expressed and latent needs	Exploring Customer Needs

What we try to do in this particular process is, there are 3 sub processes involved. First one is production and consumption system analysis for the scope of design intervention. So, we have identified a particular scope of design intervention, this has been identified as a result of our previous step.

We will keep on iterating onto this, but for the current starting the sub process we have identified one particular scope and we will move ahead with that scope of design intervention. So, I have to understand the production and consumption in this particular context.

So, what I try to do is I have to do a summary of production and consumption system analysis for the scope of intervention by first is identification of actors and their interactions that they do amongst each other. Then I will identify the technological cultural and regulatory dynamics, what I will do is use a systems map for doing this. So, we already discussed on how to do this particular aspect, how to identify actors and their interactions. So, I will not discuss again on how to make the systems map. So, the earlier systems map in our previous slide. So, our earlier systems match map which we did here in the process 1 project promoter analysis that was to do the systems map for the current system.

This particular systems map that I do over here is for the intervention context. So, for the scope of design intervention I create a new system map the next step is doing a competitor analysis. Why do I do a competitor analysis after the identification of design

scope? The reason behind that is once I know what my intervention scope is, 1 intervention scope it might be also couple of intervention scopes. I will only then be able to understand who my competitor is. Say for example, our previous example from the last class of fresh which is into manufacturing of water purifiers and I want to create a my new intervention scope is also defined as a piece of solution for, providing safe drinking water to my domestic consumers.

As soon as I tell put this as a design scope for intervention, I can identify who is my competitor? Will I call I company like a soft drink manufacturer, say Pepsi or coca cola, will they be my competitors? No, because in the light of in the design scope that I have identified, they are not my competitors. Who else can be my competitors may be all other water purifier manufacturers.

Say there is a particular setting in which people are more used to buying bottle drinking water. So, they can also be my competitors in the light of the scope of design intervention. Hence competitor analysis is done, once I would have identified my scope of design intervention. Again as I have mentioned in design there is no linear process we keep on iterating. So, once I would have identified the competitors and do a competitor analysis I might understand that I might have to change my scope definition of , design intervention scope and which his quite the most normal design process.

So, for doing the competitor analysis, first we identify who are the competitors, then what are the most innovative offers that they have an how and the market is segmented for competitive position analysis. I use a method called as model 5 porter forces, then my next sub process is client and or end user analysis. Why this is done right now? Because now when I know my scope of intervention I also know my competitors, I again do my analysis of my user, the consumers client and our end user analysis means the analysis of the customer. So, that I know what is their needs. So, analysis of their expressed and latent needs.

So, the needs might be expressed explicitly by a customer and they might be certain needs which are not expressed clearly, but they are latent needs which I do by using a exploring customer needs tool.

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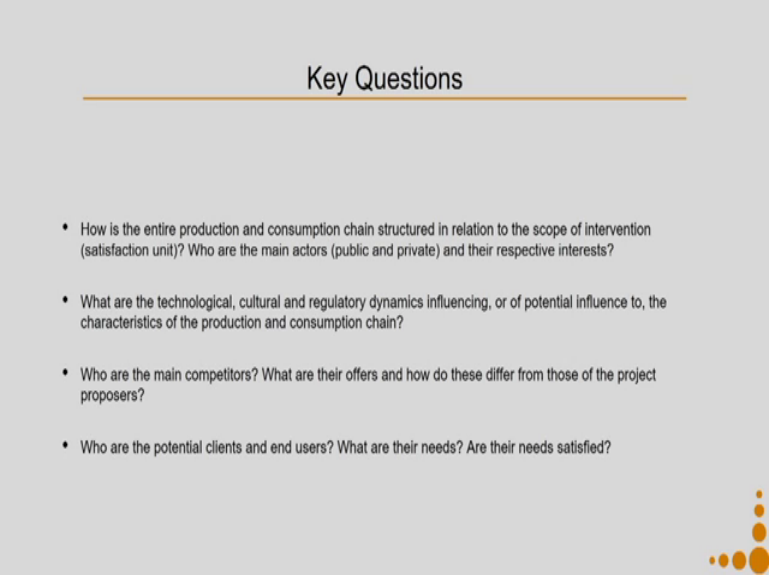

So, let us see how these tools work. Before that we will look at the key questions that we need to ask in this particular process which is the reference context analysis. First question is, how is the entire production and consumption chain structured in relation to the scope of intervention or satisfaction unit. Who are the main actors, both public as well as private actor and their respective interest, what are the technological cultural and regulatory dynamics influencing or of potential influence to characteristics of the production and consumption chain.

Then who are my main competitors, what are their offers and how do these differ from those of the project proposers. Who are the potential client and end users and what are their needs are their needs satisfied. So, let us because we have already seen how to do the system map. What we will start with in this particular lecture is how to do competitor analysis by using a method called less model five porter forces.

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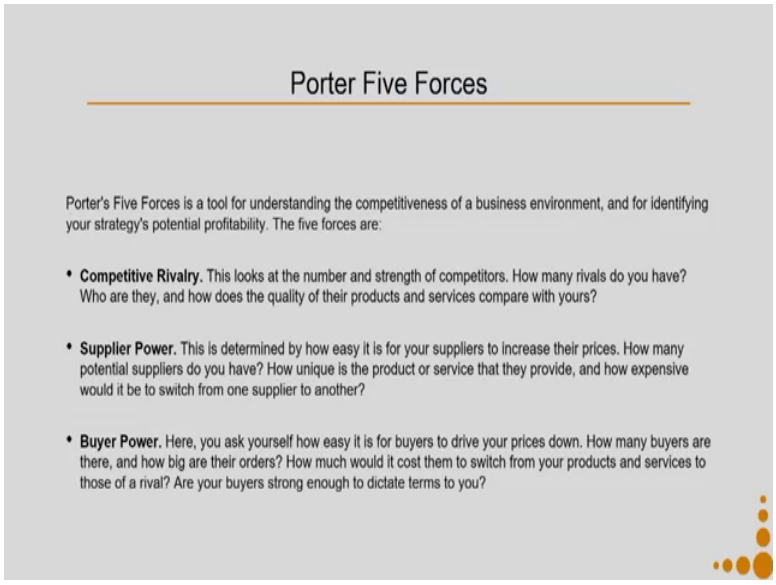

So, porters 5 forces is a tool for understanding the competitiveness of a business environment and for identifying your strategies potential profitability, this is called as 5 forces because there are 5 forces in this.

So, force 1 is competitive rivalry, what it means is, this looks at the number and strength of competitors say for example, for the case of fresh and say the design intervention con context is PSS for supplying safe drinking water to domestic uses. I will have to look up all different devil competitors in that particular kind of a segment, I will not look exactly in the PSA segment. May be there are not many competitors in that particular segment, but I will also have to compete against all those companies who sell their water purifiers and which can be also be a substitute product. So, I will look at the number of those competitors and I will look at their strengths.

So, say for example, there is another company X which is away which does not offer a piece of service at this moment, but they are a big company and in once they see that fresh is becoming very popular and gaining market strength because of its strategy they might be very easily switched to PSS that is a possibility to. I need to understand the number and the strength of competitors in that particular domain how many rivals do you have, who are they and how does the quality of their product and some services compare with? Yes, when you know the comparison then you can build up your product or service in a manner that the competitive gap is very large.

Then next force is supplier power this is determined by how easy it is for your suppliers to increase their prices. So, in order to make your dispenser, you will buy components or part from certain suppliers. If a supplier is a very strong they might increase the price and then your margins can in suffer see for example, a company X manufactures smart mobile phones and by its chips from a company Y, which at this moment is very strong, very big in providing high quality chips, but now company Y also decides to enter into the smart phone, domain they because they are the global leaders in making chips. They can any day increase the price of the chip, they can also say I will not supply chips to company X because they are now my competitors in the smart phone market.

So, now company X understands that my supplier of chips, which is the most important component in my smart phone is very powerful. Let me bring in other suppliers otherwise my smart phone can be killed any day just because of the fact I am not be able to have the chips or have them at a competitive price. So, how many potential suppliers do you have? So, you might have one supplier from whom you are taking the product right now, but you should also be able to identify potential supplier. If there is only one supplier in the whole market, you become overly dependent on that supplier and supplier can charge you high prices for the product. Hence, identification of potential suppliers is very important.

Now, how unique is the product or service that they provide and how expensive would it be to switch from 1 supplier to another. The next one is buyer power, in this context you ask yourself how is it how easy, it is for buyers to drive your prices down, how many buyers are there and how big are their orders say for example, there are large number of buyers they are say there are 10 million buyers, but each one of them buy. So, 1 rupee only, but in that particular context even with 1 rupee you are going to be able to make 10 million rupees.

But say your product is going to fetch you 1 lakh rupees, but you have only 5 buyers. So, you are anyways making only 5 lakh rupees. So, it is very important to understand, how many buyers as well as what, how big are their orders and then take a appropriate decision accordingly.

How much would it cost for them to switch from your production services to those of a rival say for example, most of the, set of boxes in our homes, they come from a

particular company who sells you the service along with the set of box and the dish antenna may be which comes along with it.

The you pay for that set top box as well as the dish antenna, it cost you something around 2000 to 30000 rupees, that is not a very big amount of money which will create a barrier between switching from 1 service provider to another, but it is usually seen that even that small amount of money is a big enough barrier people do not want to switch to another company for until and unless the previous company extremely bad with its services.

So, it one has to understand, what would it cost them to switch from your products and services to those of a rival. Are your buyers strong enough to dictate terms to you say for example, there are context in which bias forums are extremely strong and they can actually dictate a manufacturer to behave in a manner the forth force is called as threat of substitution.

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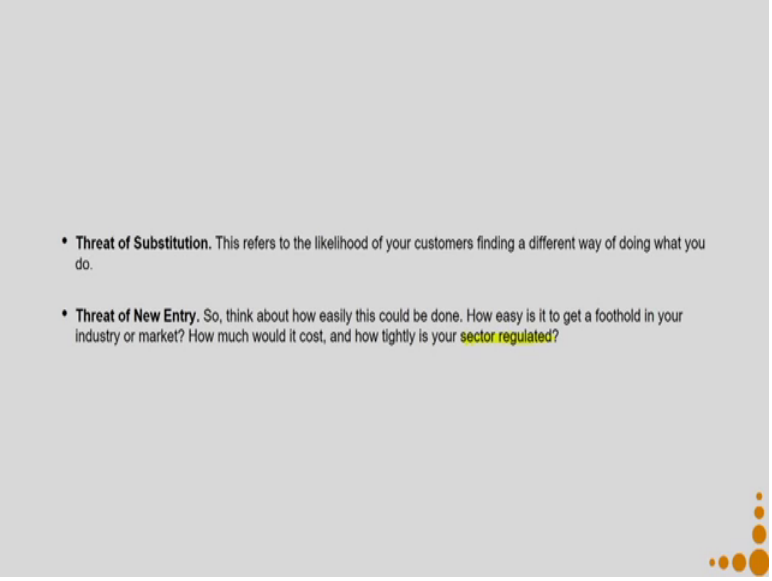

This refers to the likelihood of your customers finding a different way of doing, what you do say for example, the, certain municipalities decide that they will have their own supply of drinking water to each and every home and the water will be so, good quality that you do not need purifier, it purify it using any particular device or say building constructors. Decide that I will start building houses with inbuilt water purifiers which are from up which are industrial scale or um, bigger scale water purifier and give connections to everybody's house.

Or say for example, the local consumption pattern changes and people shift to bottle drinking water or for say an example people become aware of the fact that the water quality is decent enough and you do not need any kind of water purification tool. So, these are situations in which substitution can happen from your current product. So, you have to understand what are the threats of substitution.

Then comes threat of new entry. So, think about how easily this could be done, how easy is it to get a foothold in your industry or market how much would it cost and how tightly is your sector regulated. So, another company who sees the success of your product or your product service system and wants to enter into that field that is the threat of new entry. So, you have to understand how easy it is to enter into the market in terms of technology development in terms of infrastructure development for entry in terms of the finances required for doing the same in terms of building customer loyalty, also in terms of something called as tightly is your sector regulated.

Say for example, the sector the medical sector is very highly regulated. So, for threat of new entrant is slower over there, but there are so many other sectors, where regulation is not very strong and hence new players can enter more easily because of the regulation being upset.

So, in the context of the reference context analysis, we do a competitor analysis. After that we need to try to understand the client or the end user by doing exploring customer needs. This is the point at which we actually define our market definition complete. So, when I would have designed. So, there are so, as we discussed in our LCA how to do a lifecycle assessment. We had a framework which was for the design framework which was different from the reporting framework.

So, when you are doing design all these steps that I am talking about they are done in an iterative process. One steps gives you more information and you can go and change certain steps which were previously done, you can repeat them you can modify your design intervention that is one part, that is one way of doing it iteratively when you are doing in the design process.

Then you are going to do reporting of your design process. At the end of the design process you can follow the structure as it is stored in that particular case because all of your concepts have been refined perfectly. So, when you write about the scope of design

intervention, you write the final scope of design intervention that you have identified as a result at the end of the whole design process that we are going to have.

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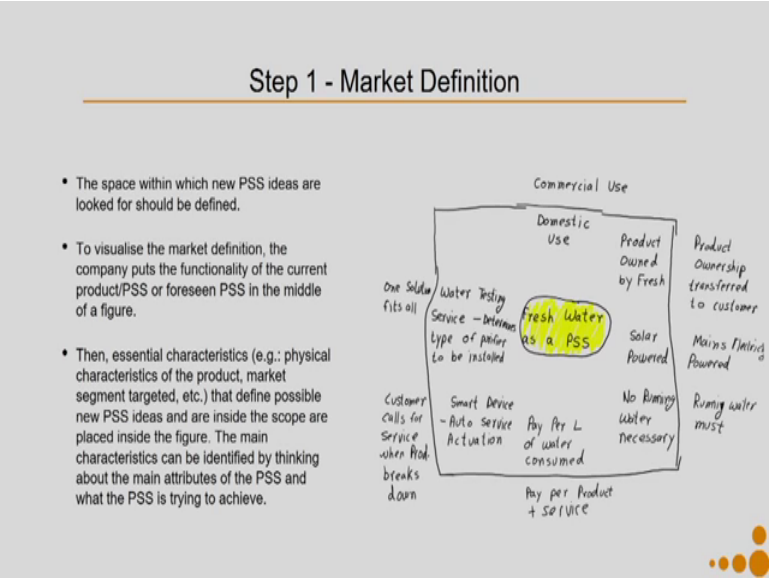

So, let us see how do we explore customer needs though in exploring customer needs. We have 2 steps, step 1 is we try to define my define the market. So, how do we try to do this the space with which new PSS ideas are looked for should be defined to visualize the market definition. The company puts the functionality of the current product PSS or the force in the one which you want to design PSS in the middle of the figure.

So, say for example, in the middle of the figure I have incorporated the new PSS that I want to come up with which is fresh water as a PSS. So, that is my market definition, main market definition.

Then what I try to do is then essential characteristics, example physical characteristics of the PA product market segment targeted etcetera that define possible new PSS ideal and are in inside the scope for scope are placed inside the figure. So, here you can see there is a boundary that I have.

So, inside that boundary I will put say my product characteristics my service characteristics my market segment that I am writing that I am going to target all these different aspects which define what my market definition for PSS is what it is and it is

also very important that when you want to say my product is this and not that. So, outside the boundary I put things what my product is now.

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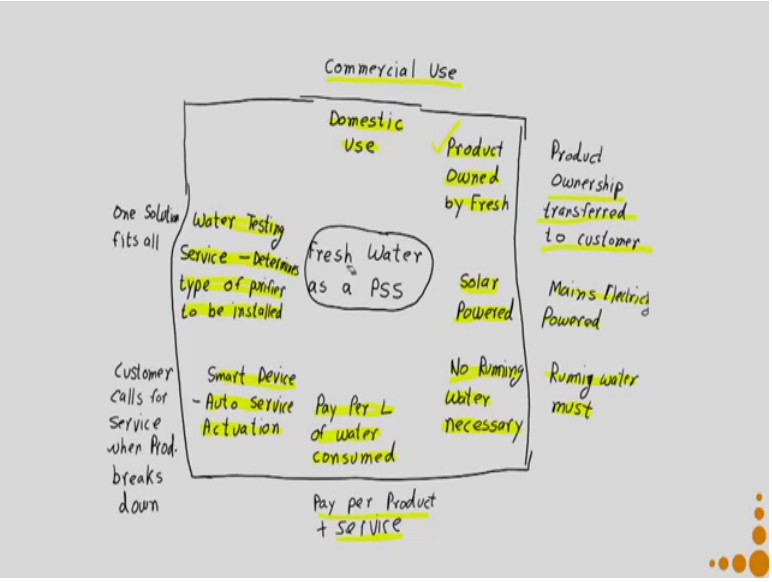

So, let us see a bigger picture of this and try to discuss it in detail say for example, after my previous step brainstorming I say that my market definition is going to be fresh water as a PSS. So, firstly I define my target is domestic use, I kept commercial use outside the box because I want clearly say that its meant for domestic use and it is not meant for commercial, commercial use is outside the scope.

So, domestic use then the product should be owned by fresh what is the opposite for that product ownership transferred to the customer. So, I am clearly refining that my offering will have product own fresh I say that my product will be solar powered my other option which is main electricity power I can I have put completely outside the box, you can also consider because it is your design and it is a mutually agreed between client and your customers and everybody can also design to have a hybrid power product [noise.

But in this, but in case you want a hybrid power you again define it in this particular box since in this box I wanted to say I want a product which is solar power and not means electricity power. So, I have kept them totally outside then comes no running water necessary. Again a product characteristic definition this will have all these things, solar power running no water running inside they will have an implication or a new product

specification whereas, the domestic use that will also have a um, implication on your specification.

Product own by fresh that will have an implication on the how you make money out of this scheme how people pay for it. So, I put running water outside. So, when I say no running water necessary it might also mean that if you have running water there is not a problem. If I would have sent said that it runs only by when somebody fills water into it that has a different meaning as compared to no running water necessary. So, it is very important that you choose the words in a manner that you can define those words properly, what do they exactly imply in terms of product specification.

When I say no running water necessary it means it can run even if there is running water and even if there is no running water then I say pay per liter of water consumed that is in the market definition. How I am going to make people pay for it and it is contrasted to the paper product service. So, then smart device I also wanted to become a smart device, what my smartness will be in this case is auto service actuation.

So, it has some components which detects therefore, the product is going to breakdown that it is going to breakdown and it sends a message to the service center and they come and repair it because right now the product is owned by fresh. So, it should be done that particular manner otherwise if the product is not running then fresh is not making money.

It might be also like if your product breaks down repairing it at that point of time might be more expensive for fresh then water testing service which determines the type of purifier to be installed. So, right now in the market it is like one solution.

It should be the testing which determine to be installed right now in the market it is like one solution fits all whatever be your source water quality, you always have one particular product, but what I am saying that in my offering I will give a water testing service which determines which type of purifier because it is a PSS in which the product is owned by the company. So, the company actually does not make more money by selling you a more expensive machine. What they are making money on is giving you safe drinking water.

Again in this particular context, if we come back to this. So, if we come back to our center which had the definition of fresh water as the PSS again be very careful whether

ores that we are using does fresh and safe have different meanings fresh water, safe water, pure water mineral water, all of these have very different meanings. So, whenever you are doing a market definition and if I say freshwater I have to define them because right now I am talking about customer needs. So, I have to understand what customers definition of fresh water is. So, be careful about the words that is being used.

So, the step 2 of this exploring of customer needs after market definition is improving understandings of needs fulfillment.

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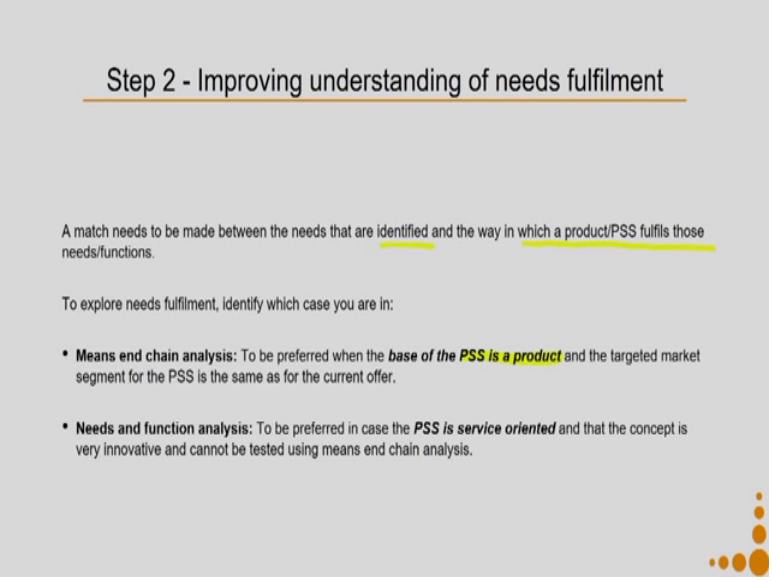

What we do over here is a match needs to be. So, ma we need to mm do a match between the needs that are identified and the ways in which the product or PSS fulfils those needs of functions. So, say for example, in our previous slide we spoke about delivering freshwater, we did not speak about delivering safe drinking water mineral water or anything else we declared that we will give fresh water. So, we have to understand whether the identified and the way in which a products or PSS fulfils those are in sync or not or do I need to change it.

So, to explore needs fulfillment identify which case you are and you can either do a min means end chain analysis or you can do a needs and function analysis. So, what is the difference? So, means and chain analysis is to be preferred when the base of the product the base of the PSS is a product. So, you remember when we were talking about that

types of PSS, we said there are 3 types of PSS product oriented, service oriented and result oriented.

So, when I am in a PSS which is a product oriented PSS and my target market segment for the PSS is the same of as of the current offer from the company then a means end chain end analysis is good enough then my PSS is a service oriented PSS then and the concept is very innovative and cannot be tested using means and analysis then a needs and function analysis is suppose to be done.

It does not mean that for a product oriented PSS, you cannot do needs and function analysis is the way much more in depth analysis and gives you much better as it because it tells you that it, it can give you real good innovative push towards new product designs. So, let us see what means end chain analysis is about.

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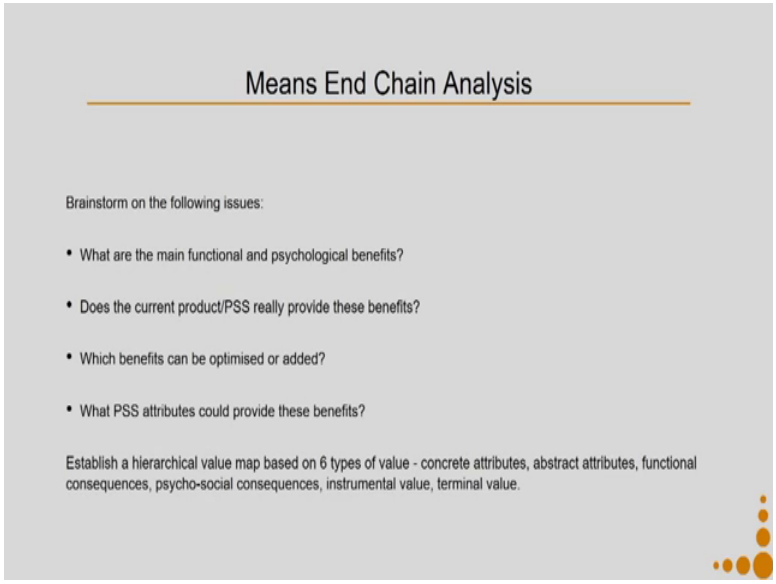

So, before doing this analysis, first in the team we try to bring brainstorm on some issues. First is what are the main functional and psychological benefits. So, from the ma fresh water purify PSS by functional Beni main functional benefit is safe drinking water my psychological benefit is when I told fresh water that is a psychologic that I am trying to target I am not saying safe water is a different psychology fresh water is a different psychology.

So, there can be other psychological benefits say which can be related to your status symbol to may having a designer product in your house to have a responsible product in your house all these are psychological benefits. So, anything that you buy or anything that you use gives you functional benefit and psychological benefits.

So, first in a team you try to identify all the functional and psychological benefits then try to see does the current product or PSS really provide these benefits which benefits can be optimized or added once you have done whether it is being fulfilled or not then you identify which can be optimized or added and what PSS attributes could provide these benefits.

Once the brainstorming is done the means and chain analysis comes into picture which is basically analyzing the brainstorming whatever you have got out of the brainstorming. Why you do this analysis, you will be able to come up with more of these functional and psychological benefits.

So, how we do this particular analysis establish a hierarchical value map based on 6 types of values. So, these 6 types of values are concrete attributes, abstract attributes functional consequences psychosocial consequences instrumental value and terminal value.

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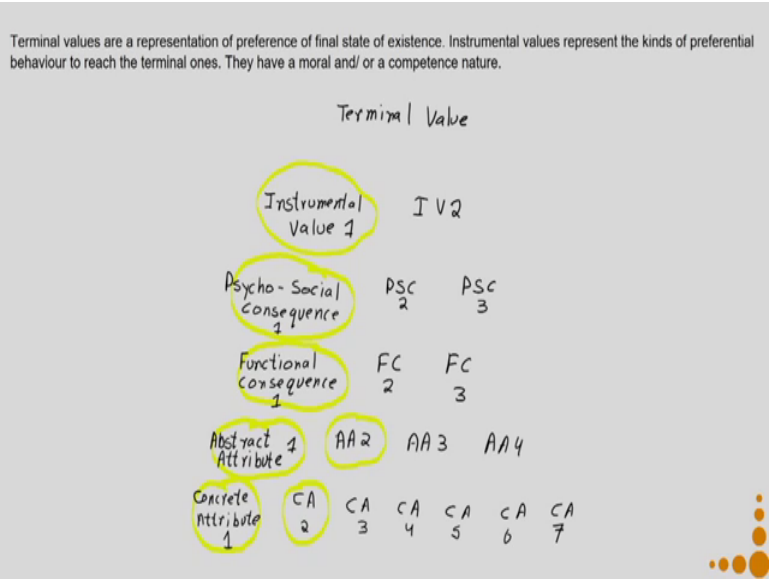

So, let us try to understand what are these. So, if I put them in organization chart my concrete Entribu attributes come at the first level. So, concrete attributes can be also understood as product specification. So, say for example, my water purifier delivers ten liters of water per hour that is a product specification and that is my concrete attribute concrete then comes my abstract attribute abstract attribute is. So, when I say a reliable product reliability is an abstract concept you can get in reliability by having certain concrete attributes.

Say for example, reliability might mean because it is a context where there is water all the time. So, if you use stainless steel fastness then they will not get rusted. So, you get a longer lasting product because of the concrete attribute of using stainless steel fastness, but my abstract attribute over there was a reliable product my abstract attribute can be a beautiful product. So, whenever you cannot actually be specific about the attribute, but they are in the more abstract that is my second level.

Then comes my third level which are functional consequences because of the attributes that I built into it I will have certain functional consequences because my product is a reliable product the functional consequence of it can be that it is meant for robust usage, it gives safe drinking water they as functional consequences.

As a result of the functional consequences, you get psychosocial consequences that it gives certain kind of a psychological feeling you trust that product. So, that is your psychological consequence because it is reliable because it is giving safe drinking water. These are the functional consequences your psychosocial consequence offered is that you trust that product.

As a result of the this consequence you gather certain instrumental value. So, let us see what are terminal values and instrumental values. So, instrumental values represent the kinds of preferential behavior to reach the terminal ones they have a moral and a competence kind of a nature. So, in my case the terminal value over here is I want to get safe drinking water or fresh drinking water.

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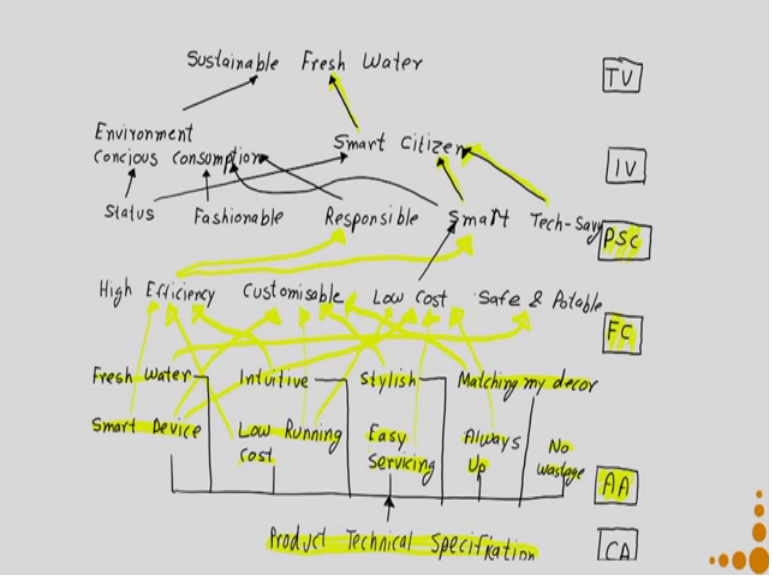

So, my terminal value is I want sustainable fresh water, what are my instrumental values environment conscious consumption smart citizen. So, you can see both of these environmental conscious consumption that is a moral values smart citizen is a competence related value. So, in instrumental values instrumental values help you to reach the terminal value instrumental values have a moral or a competence kind of a nature which is built because of the psychosocial consequences.

Terminal values are a representation of preference of final state of existence. So, in our context the final state of existence was sustainable fresh water. So, once you, build up all these in this 3 layers what you try to do is see the connections.

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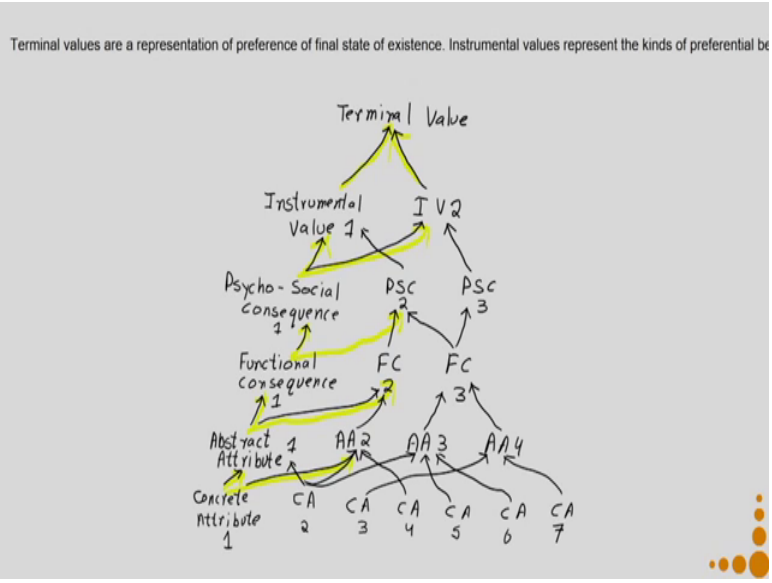

So, your concrete attribute one might be connected to many of these abstract attributes, why you trying to build the you will identify missing linkages that is when you keep on adding either your if you find that there is a concrete attribute which is missing you add over there or you find abstract attribute is missing you mention over there.

Similarly, each abstract attribute will be connected to one or more of the functional consequences those will be connected to one or more psychosocial consequences these should be connected to instrumental values and which finally, connect to the terminal value you always have one terminal value do not try to have too many terminal values for the PSS then your PSS lacks focus..

So, let us come back to the example of fresh. So, as I told you I have my lowest level which is my concrete attribute you can start from the concrete attributes in case it is known to you, you may also omit that particular part to begin with and start from your abstract attributes

Once I have my abstract attributes I can start building the product specification which is my concrete attributes that is the possibility. So, in case of my in case of thresh my first abstract attribute is I want to deliver fresh water second one is I want the product to be very intuitive or the product services to be very intuitive I want it to be very stylish, you can see all these are abstract words I do not know how to operationalize them which I will know when I define the product and specification out of them then I want to have the product in a manner that it matches my décor.

Say for example, what will be a product specification to satisfy that particular requirement it might be that I dev, developed a modular machine whose outer coverings, outer covering is a thing which is visible to people and which should match with your décor whose outer covering can be customized by people as per their requirement. So, I build this custom built outer coverings. So, I build my machine in a manner that a designer machine in a manner that that is possible.

I want to have a smart device again smart device over here is an abstract attribute because it does not say where its smartness lies that will come in the product specification then I want to have a low running cost easy servicing, it should be always up which means the product never goes down there is no down time for the product and there are no wastages. When I say no wastages in the product specification I define what

does that mean that might mean no wastage of water in Reve Ro based purifiers there is lot of water which is wasted.

So, do is it that what I mean, which I will add in the product specification or does it mean that when the product is no longer a useful product. I will have the company collects it back which means there is no wastage of. So, what this no wastage means I will define in the product specification.

Now, let us go to the functional consequence in functional consequence I said high efficiency Custo. So, these are my brainstorming results I still not made the connections I have to make the connections high efficiency customizable all these are functions low cost safe and portable let us try to make connections between the abstract attributes and the functional consequences.

So, when I say fresh water I want connect it to safe and portable I cannot connect this to customizable low cost or high efficiency, I see intuitive I do not know over here the only thing because if it is intuitive that also implies high efficiency I can connect to it here I shows that I did not have a functional consequence of that may be I will have to think of functional consequence which is arising out of intuitivity..

So, let us go and let us see stylish which because. So, now, it comes how I am they are going to define stylish, stylish. If I connect it to customizable it means the stylization is being achieved the because of the possibility that I can customize it.

But if I want to mean something different I will have to add another attributed functional consequence matching my décor that also connects to custom misable smart device smart device can imply that it is.

Next to customizable smart device smart device can imply that it is highly efficient it can also imply that it is low cost as soon as I connect my smart device to low cost in my product specification I will have to have things with that because of the smartness cost reduces I can also smart device to say customizability because it is smart that is why it is customizable, then it has certain other implications on the product specification.

Low running cost leads to low cost low running cost can be also related to customizable which means depending on the families requirement my low running cost can be in

different things. I can also combine low cost to high efficiency because the product is very high efficient. So, it is low cost easy servicing can be again connected to low cost because it is easy to service.

So, I have low cost and I can also relate it high efficiency always up can E again related to low cost. So, as soon as you relate it to a functional consequence you have to be aware because now it defines it that always up means the cost is low. So, you have to define it in terms of protocols it is in the now you can see the implication of doing this whole process it requires quite considerable amount of time to do this particular activity and its very iterative. Now let us try to connect the functional consequences the psycho social consequences.

So, if I take high efficiency is high efficiency connected to smartness see I say high efficiency is connected to smartness. Now I go back I connected high efficient to smart device that works with smartness, good. I have combined high efficiency with low running cost. So, low running cost high efficiency and smart do they make sense or low running cost which leads to high efficiency make sense to connect it to responsible behavior or is it low running cost high efficiency is it connected to status no it is not connected to status, ok. I have connected my high efficiency to intuitiveness also.

So, which also can get connected to smart it might also get connected to. So, not in this case to any other point. So, then let us come to customizable. So, you can see that each time you go to the next layer you have to again go back to the entire chain and see whether the linkages could be created or not or whether you need to add on new attributes new consequences or need to change the product specification itself.

See now my smart device is related to smart citizen take savy is related to smart citizen so then. So, now, when I created this relationship sustainable fresh water related to smart citizenship smart citizenship is related to smart product and takes suaveness in the smart, I go back to be connected to my low cost and the smart is also connected to high efficiency it is connected to say smart device low cost intuitive and style, which means in my product technical definition I have to rework it again. So, this is how we complete the whole process.

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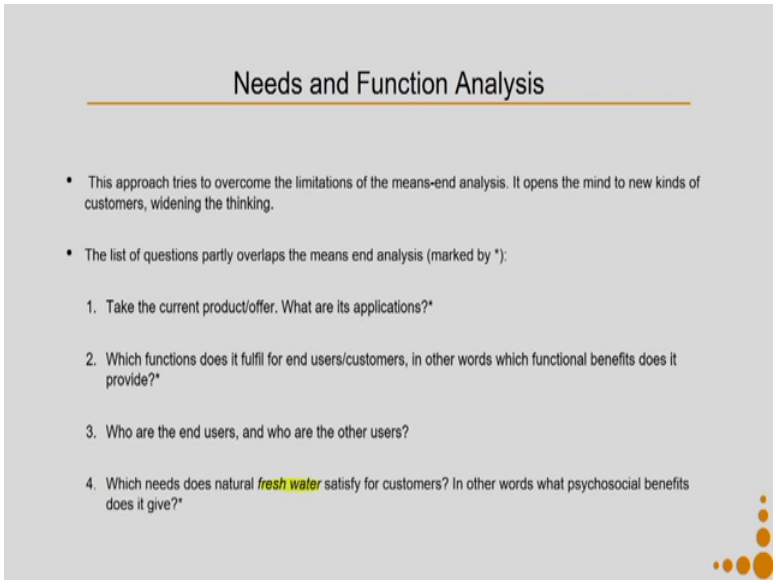

Now, ne lets go to needs and functional analysis. So, needs and function analysis where it tries to overcome the limitations of the means and analysis. So, in case time permits. So, a means and analysis might take you a day or two to complete, but in case you have a little bit more time then that it is way much better that you go for a needs and functional analysis. There are many, limitations of the means and analysis, which will be overcome by this in because in needs and function, I start with needs and then I get into the functions which can be provided to achieve that.

So, it opens the mind to new kinds of customers widening the thinking rather than the previous one which is with the same kind of customers as you have currently. So, the list of questions partly overlaps the means and end analysis the ones which are same among west astirc. So, take the current product or offer and see what are its applications.

So, this is similar to your previous one which functions does it fulfill for end users of customer in other words which functional benefits does it provide again same who are the end users and who are the other users this is the point where you divert. So, I knew that my end users, I have decided they are going to be domestic users, but now I start thinking can same product be used by other users also say for example, shop small shop owners small office own officers and so on.

Which needs does, so, in this case because I have fresh water. So, you will put whatever your project is in that particular location. So, which needs does natural fresh water satisfy for customers in other words what psychosocial benefits does it give.

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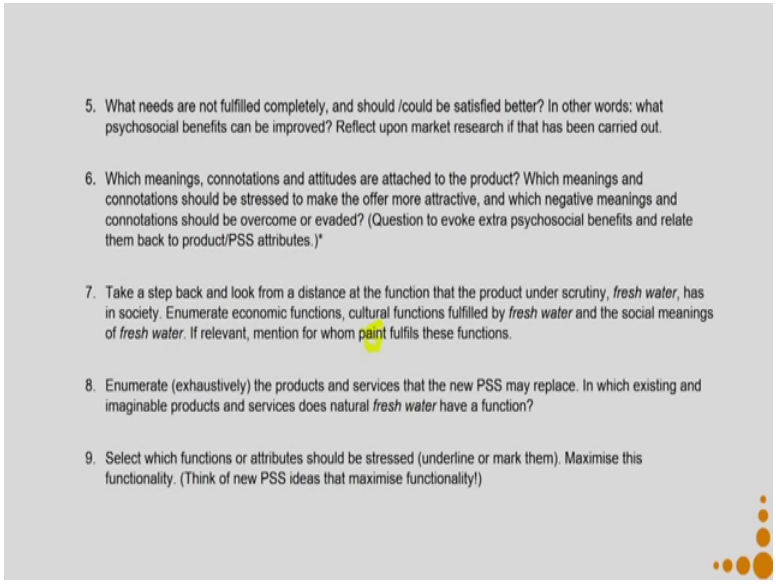

What needs are not fulfilled completely and should or could be satisfied better. So, this is the new question this is asked you to think of all those things which are not done already. So, in other words what psychosocial benefits can be improved live left upon market research, if that has not been carried out already which means so, sorry which meanings connotations and attitudes are attached to the product, which meanings and connotations should be stressed to make the offer more attractive and which negative meanings and connotations should be overcome or evaded.

Question to evoke extra psychosocial benefits and relating them back to the product or PSS attributes are part of this, take a step back and look from a distance at the function that the product and the scrutiny which is fresh water has in society. Enumerate economic functions cultural functions fulfilled by fresh water and the social meanings of fresh water if relevant mention for whom fresh water.

So, this is a mistake over here it should be. So, if relevant mention for whom fresh water fulfills those functions. Enumerate exhaustively the products and services that the new PSS may replace in which existing and imaginable products and services does natural fresh water have a function002E

So, now you are widening your scope; after you have done this select which functions are attribute should be stressed maximize those functionalities, think of new PSS ideas that maximize those functionalities.

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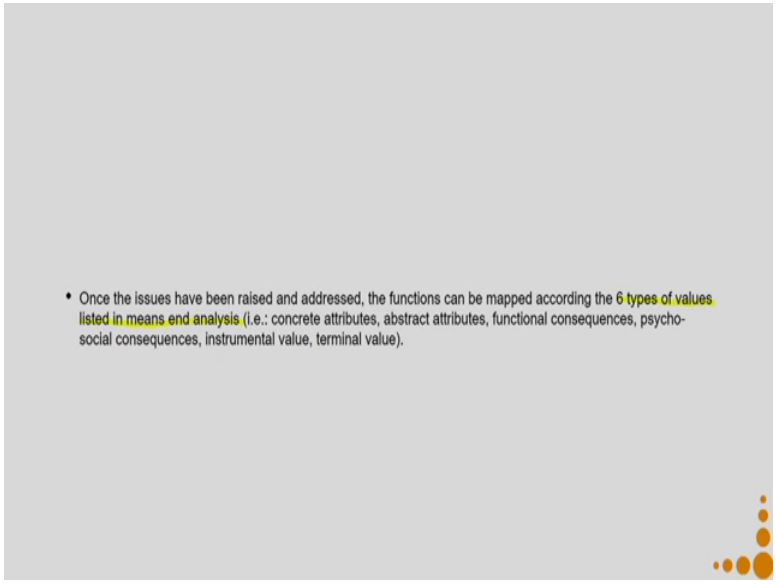

Once all once that brainstorming is done following the needs and functional you brainstorm on each and every question, then you again go back to your 6 type values listed in means and end analysis. So, with all those keywords so, you generate way much more keywords than what you generated in the means and analysis you think your scope of thinking widens and you again do the same process.

But of course, this will take way much longer time than the means and analysis.

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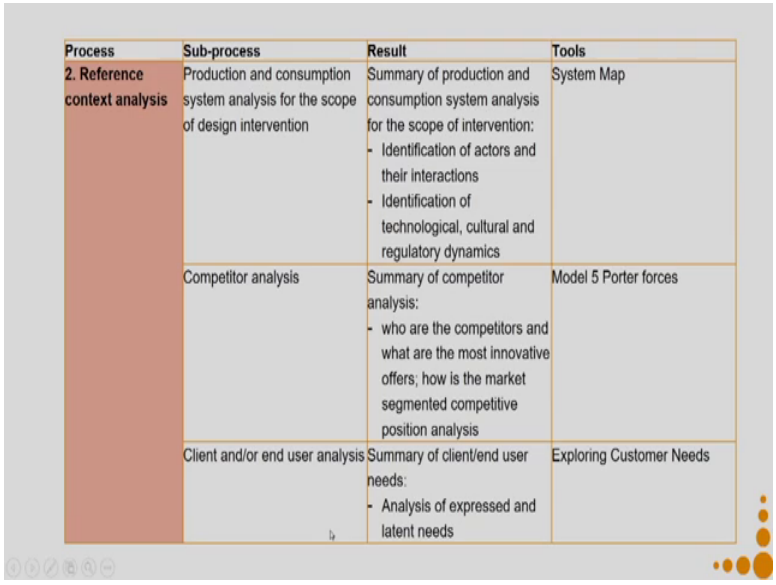

Process	Sub-process	Result	Tools
2. Reference context analysis	Production and consumption system analysis for the scope of design intervention	Summary of production and consumption system analysis for the scope of intervention: - Identification of actors and their interactions - Identification of technological, cultural and regulatory dynamics	System Map
	Competitor analysis	Summary of competitor analysis: - who are the competitors and what are the most innovative offers; how is the market segmented competitive position analysis	Model 5 Porter forces
	Client and/or end user analysis	Summary of client/end user needs: - Analysis of expressed and latent needs	Exploring Customer Needs

So, once this is done, you are complete with the reference context analysis. As there result of the reference context analysis, you can do modifications of the scope of design intervention that you came up earlier with. You can if there are major modifications, you will also need to modify the systems map and in case you need more competitors coming into you might have to do this model 5 porter forces analysis again for those new competitors coming into picture.

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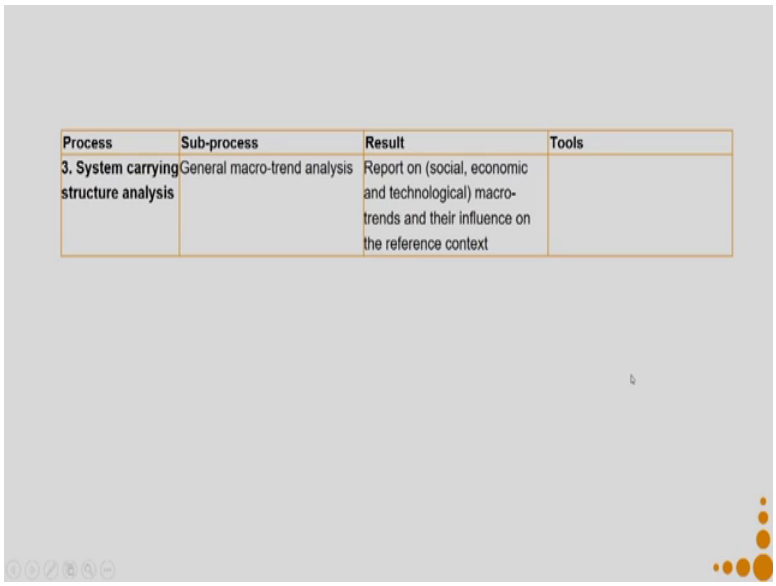

The next part is sys is called as system carrying structure analysis. What we do over here is a macro trend analysis. So, we try to identify the social economic and technological macro trends and their influence on the reference context, what it means is, say in the context of safe drinking water. What are the social trends at this point of time? say for example, in certain markets the social trend is about drinking water without purification because there is some movement of people who is saying that natural water without any kind of purification gone through is way much more better than all the purification technique.

Mainly they are not it is not about whether they are right or wrong it is about the particular social trend which is being followed in certain section there might be other social norm say for example, they might be certain sections of the society who believe that water should be drinking water should be kept at a height then comes economic kal

trends. So, say more and more companies are moving towards PSS that can be a economic trend technological trend.

So, there is some other machine they are purifying water say we discussed about vortex purification. So, system in which you have vortex purification then you have a UV purification happening or say vortex purification followed by a ultraviolet purification or some other newer technologies which might be coming up in the particular field.

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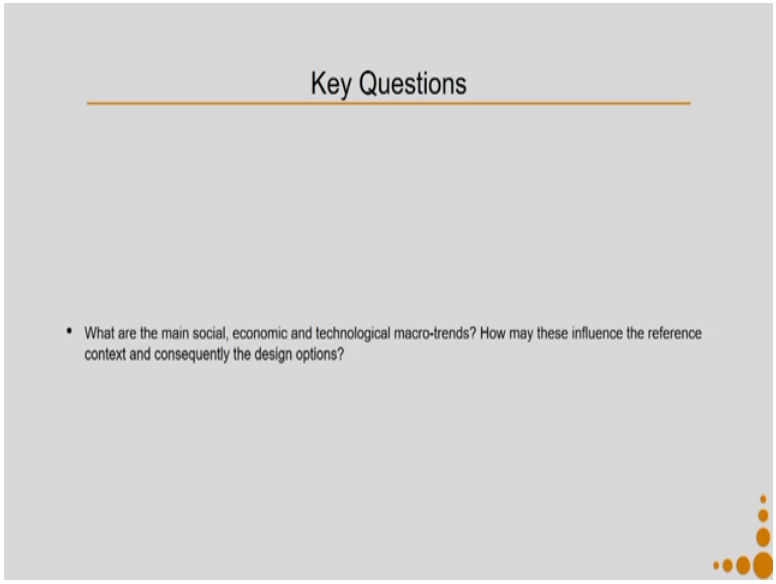

So, the key question over here is what are the main social economic and technological macro trends. How may these influence the reference context and consequently the design options? So, we basically prepare a report to which reports all these particular aspects and we inform our design directions eventually when we get into design process.

The fourth process in strategic analysis is analysis of cases of excellence for sustainability.

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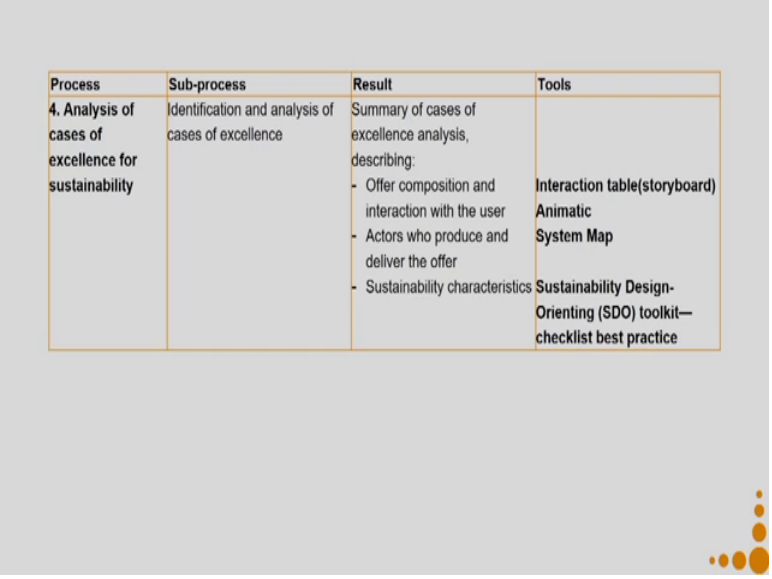

Say for example, in the context of providing safe drinking water there are certain examples which are which can be called as cases of excellence, why? Because they are excellence in terms of sustainability. So, they might be PSS solution they might be only product oriented solution they might be result oriented PSS also any of those which you think are in that particular domain are and are examples of cases of excellence.

So, I pickup those cases first I will try to identify what is the offer composition and it is and the interaction with the uses of that particular offer actors who produce and deliver the offer and then we try to understand the sustainability characteristics. So, how we try to understand the first one which is offered composition and interaction with the user we make something called as interaction stab. So, table or story board or animated in animatic, what we try to do is we try to create a audiovisual clip of the particular interaction or the particular offering which explains that.

In case that is not a possibility you can create an interaction story board. We will see an interaction story board is to understand the actors who produce and deliver the offer and how do they do it, they create a systems map in order to understand the sustainability characteristic, we will go through a tool which is called as sustainability design orienting tool kit.

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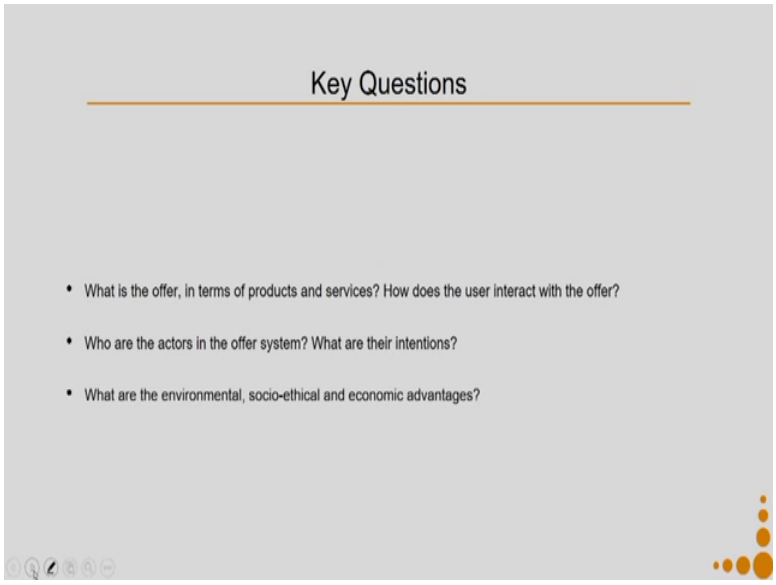

So, the key questions in this particular step is what is the offer in terms of product and services of these cases of excellence, how does the user interact with the offer who are the actors in the offer system, what are their intentions, what are the environmental socio ethical and economic advantages.

So, how do we? So, making an animatic all of us know that we are going to capture a video, how do we make a interaction table?

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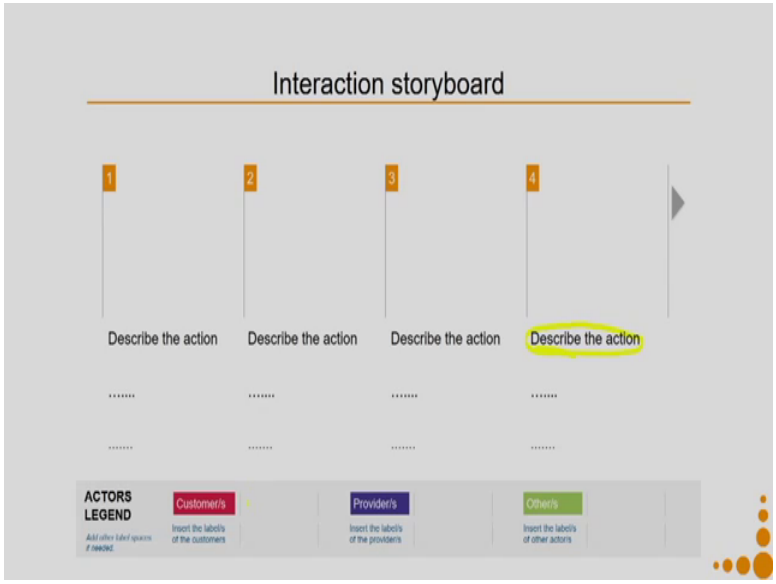

So, it is a very simple thing.

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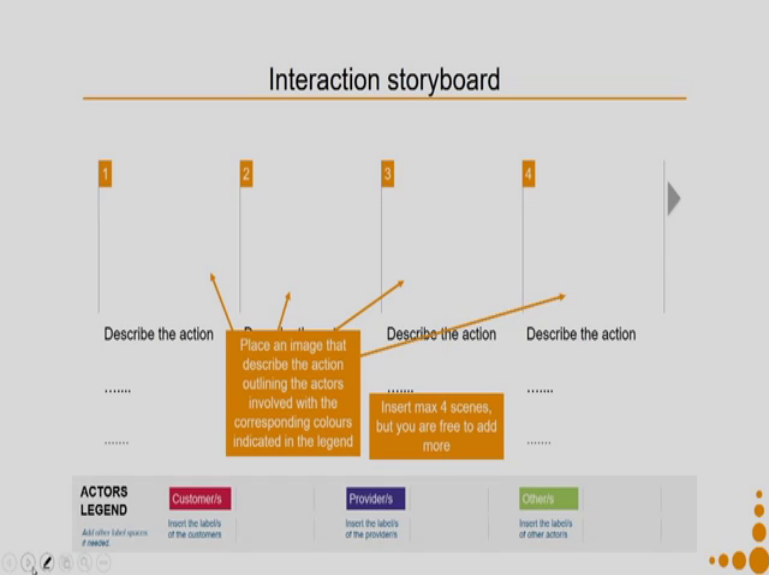

I will create these boxes each of these boxes; I will place an e means that describes the action outlining the actors involved with the corresponding colors indicated in the legends. I can insert maximum four scenes, but in case you need more than that to describe your, particular interaction you can use more also.

And below each of those I describe the action which is being perform here in this case I will write who the customer is who the provider is who others, others, other stakeholders, if they are not a customer, if they are not a provider then they are others and I will put the labels or the legends or the icons that we have developed further in this particular chart. I will not discuss about the systems map because you already discussed how to make a systems map. Let us, we will discuss about sustainability design orienting tool kit before we get into understanding what this tool kit is lets go to the process five, which is the last process of this particular strategic analysis stage because that process also uses this SDO tool kit

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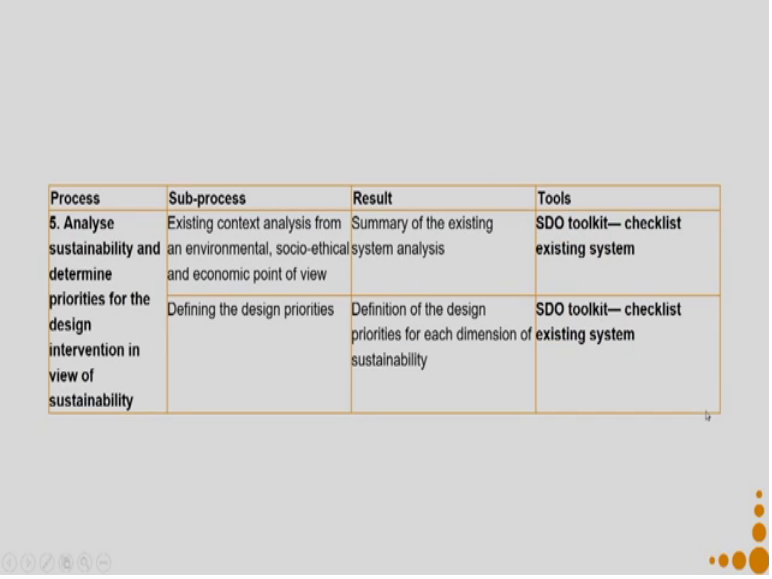

So, this process says analyze sustainability and determine priorities for the design intervention in view of sustainability, how do we do? This is do a existing context analysis from an environmental socioethical and economic point of view and define the design priorities.

This is of the existing why do I do it after going through the cases of excellence because it helps me in understanding what makes a case of excellence and then I can do this process little better. You can also do this process 5 before process 4 there are also times when you might not find cases of excellence, in that cases the process 4 can also be not done. So, even to do this particular process I use the same toolkit which is called as the SDO toolkit checklist existing system.

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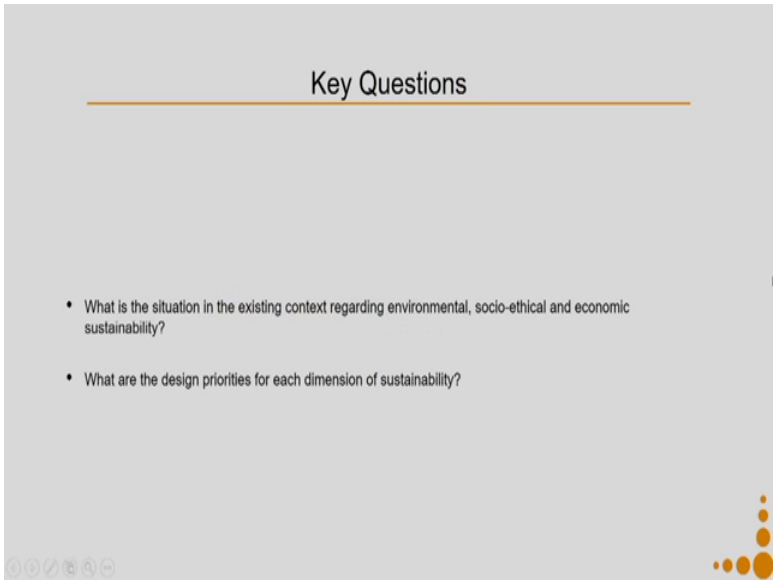

The key questions over here is what is the situation in the existing context regarding environmental socio ethical and economic sustainability, what are the design priorities for each dimension of sustainability, if this process is one of the most important processes, because this is the process which initiates into the sustainability direction.

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So, this is the link to the SDO tool kit is a free to use toolkit it is a flash based toolkit.

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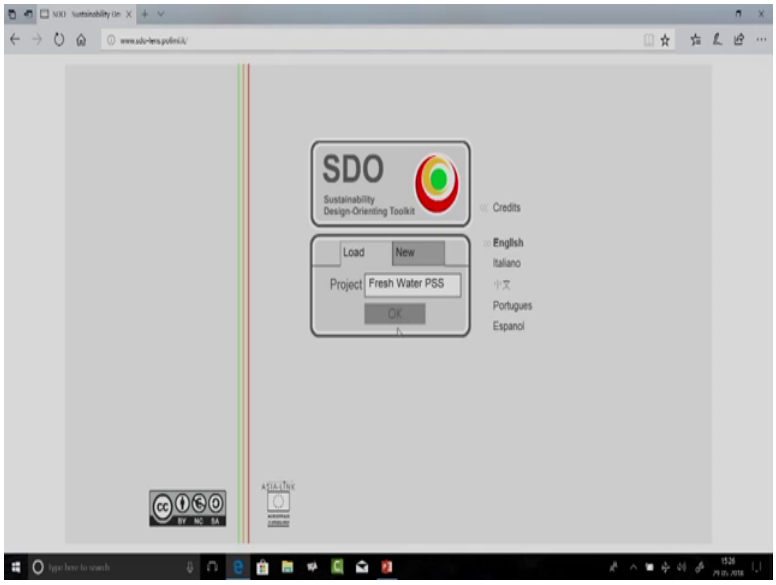

So, this is the SDO toolkit it is a flash based software. So, you have to allow flash to work on your computer to use this particular tool. In this tool first you have to create a new project, let us name our project as fresh water PSS, it is very important to remember the name of the project that you kept with the exact combination of, the whether it is caps or whether it is small because in order to load the same project again you will need that particular name. So, once I say new . So, I can load the project.

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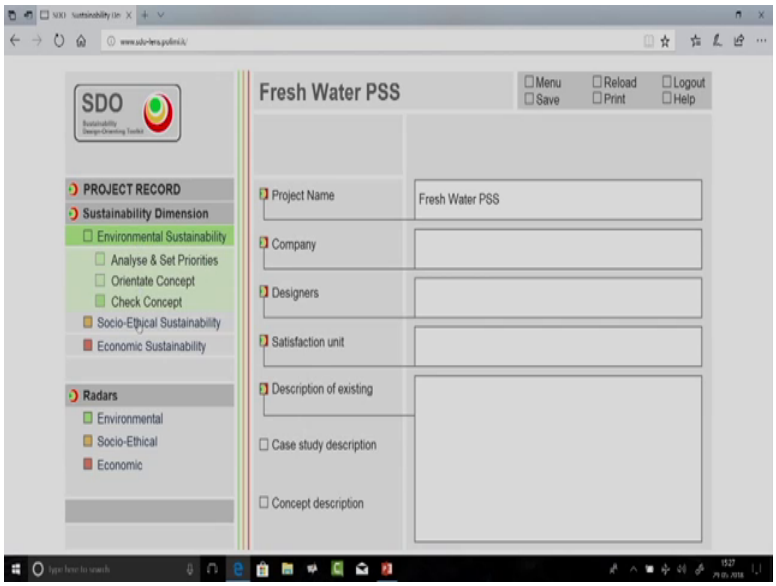

So, this is how the software looks like it has menu reload logout help print and save. When you press print it will print the page which is on you are at that moment on every page you need to press print to get a print of that particular page. After you have done

your work you should save the work, it does not get saved automatically the left hand corner that you see over here is the menu bar in when I go into certain aspect.

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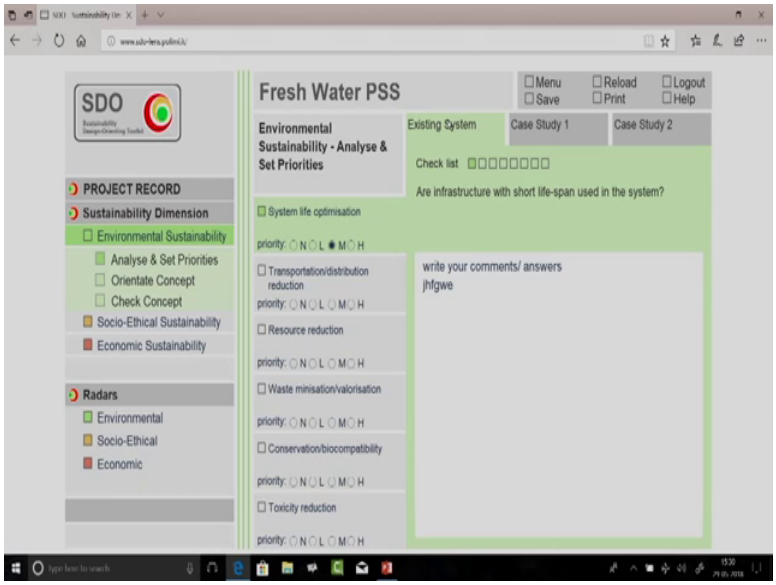

Say for example, I go to this particular aspect and I start working onto it and if the menu goes away I can click it to get back the menu.

So, what this how do I start with is there is no sequence exact sequence in which you need to work you can come back and fill these details later also does not matter. So, you put the project name, the company name the designers the satisfaction unit that you are trying to satisfy you describe the existing system you do a case study description and you do conserve description.

Once I am done with it, I go to the each of these dimensions. So, I clicked on environmental sustainability. My first point is analyze and set the priority. So, that was what was spoken about in this particular slide that we were on we wanted to do an analysis of the best cases; cases of excellence as well of the current scenario. So, in the analyze and set priorities we do that particular activity a particular dimension say for example, system like optimization in that particular context might have no priority might have low might have medium or high priority.

So, I have 6 6, sub dimensions in environmental sustainability system life optimization transportation distribution, resource reduction waste minimization, valorization conservation biocompatibility and toxicity reduction, how do we determine the, priority level.

So, when I clicked on system life optimization, you see a checklist which appears over here you go and click on each of these they have various questions that are asked to you. So, do parts of the system tend to be technologically obsolete or to be culturally or aesthetically obsolete. So, you are supposed to write down your comments answers and whatever you want to write over here and then again go to the next block although I the question changes over here this particular block remains the same.

So, whatever you write over here will remain the same and you keep on answering this. After you have answered all the questions either you as a designer can decide the priority or maybe the decision ken can be taken along with your client or in other STO stakeholders involved in this.

So, I said the priority at each level then you can see I have this one for existing system that is my step 5, my step 4 was of 2 cases of excellence. So, I pickup my case of excellence and do the same activity for my case of excellence one and for case of excellence 2 after this part is done; in the next step which in the next stages of the MSDS methodology where we will do we will explore opportunities, we will validate the opportunities we will go the next levels.

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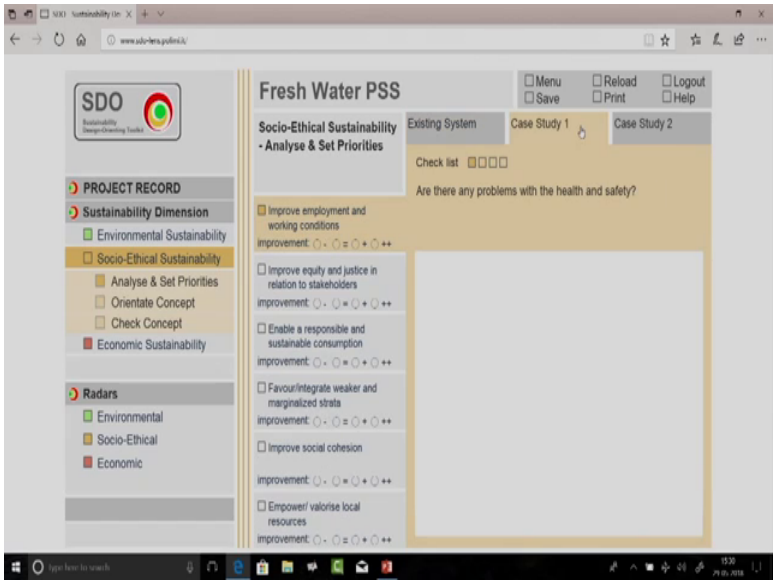

Same is the case with the socio ethical dimension when I go to analyze over, there I will see same kind of a checklist copying up over here as a and I can again start giving my priorities writing my comments by answering the questions.

And here is for the case study 1 and case study 2 same for the economic sustainability. Once this is done I will save it and then I will logout from this system. So, I will discuss all other modules of SDO tool kit in the subsequent lectures, when we are on those parts of using the SDO toolkit. So, the key questions over. So, we already discussed the key questions. So, this brings us to an end of this strategic analysis for a context where we have a project promoter.

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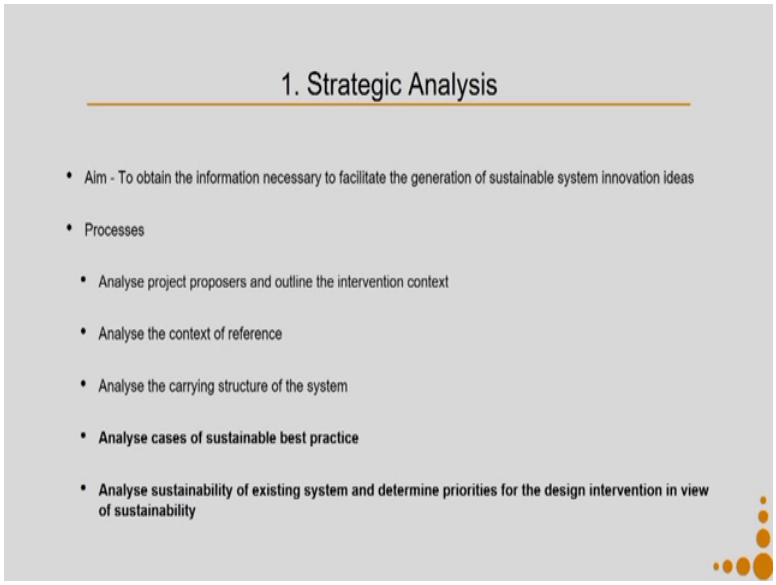

So, the aim was to obtain information necessary to facilitate the generation of sustainable system innovation ideas, we had a process one which was analyze the project proposers and outline the intervention context, then analyze the context of reference analyze the carrying structure of the system analyze cases of sustainable best practices analyze sustainability of existing system and determine priorities for the design interventions in view of sustainability.

In case I do not have anything for this particular step analyze, cases of sustainable best practice say nobody have done anything in that particular field, which is also a possibility then I can also avoid that particular step.

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In the reading material continues to be the same for you.

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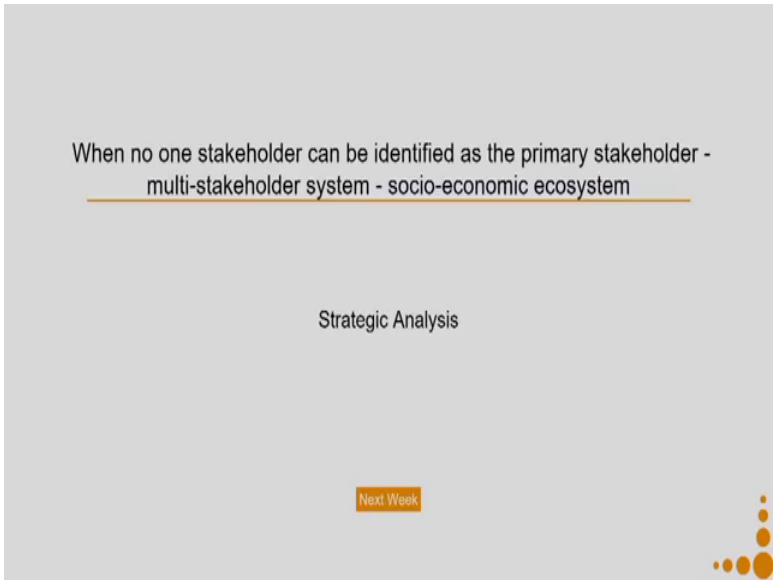

In the next lecture, in next week we will be discussing about how to do strategic analysis when one stakeholder can be identified as the primary stakeholder that is in the multi stakeholder system, which is something called as a socioeconomic ecosystem.

Thank you.