System Design for Sustainability
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Lecture - 03
Sustainable Product-Service System Design – Definition, types & Examples

Welcome to today's lecture so, we will continue with our examples on Sustainable Product Service System Design. What we will today see is about the social dimension.

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So, let us do a quick recap of the definition again before we get into the example of sustainable product service system is an offer model. Providing an integrated mix of products and services that are together able to fulfill a particular demand of the customer that is a satisfaction. Based on innovative interactions between the stakeholders of the value production system, where the economic and the comparative interest of the providers continuously seeks both environmentally and socially socio ethically beneficial new solutions. So when is a PSS can be called as socio ethical PSS?

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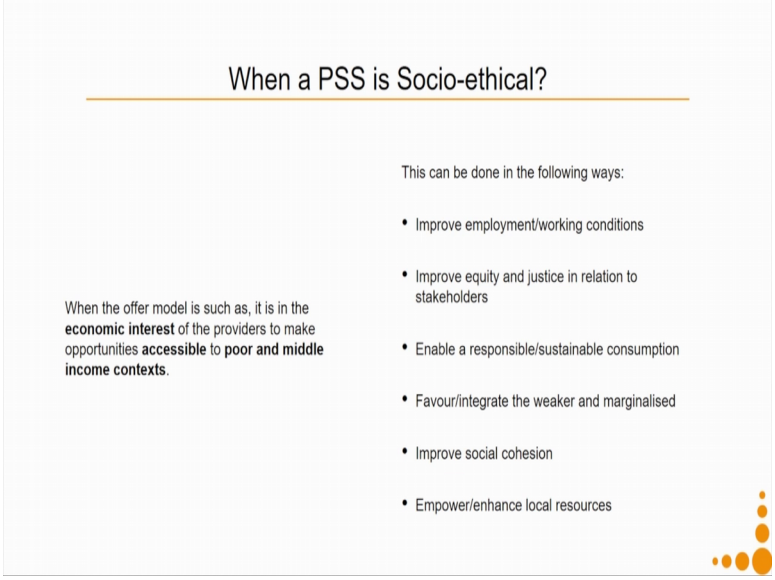

So, when the offer model is such as it is in the economic interest of the providers to make opportunities accessible to poor and middle income contexts. So, that is one important aspect of a PSS becoming socio ethical and which can be in achieving that designers can play a pivotal role.

There are many other aspects which also can be built in, but maybe these are not too much under the control of a designer. But still we will go through all the these and it is knowledge is pivotal if you know about these can be achieved or these are the problems then as a designer you can try to solve them.

So, some of these ways are improve employment and working conditions, improve equality and justice in relation to stakeholders, enable a responsible or sustainable consumption, favour integrate the weaker and marginalized, improve social cohesion and empower or enhance local resources. Let us see how to do the same with some examples.

So, the first example that we will talk about is about a company which produces units comprising of a solar power solar power generator, bulbs and a mobile charging naked. Their business model is the offer model that they offer to the customers is per unit of electricity consume you will pay for your consumption.

So, you do not own the neither the bulb nor the charging point nor the solar cells. All that is still owned by the company empower and the customer can pay per unit of car on the

basis of per unit of consumption. Why does it make it accessible to poor and middle income contexts?

So, there are two reasons for that; firstly, because the initial cost of purchasing the solar cells along with the electric fixtures, the lights, the mobile charging unit the expenditure is quite high making it inaccessible to the poor people. Now because the company still owns these basic infrastructure and the person has to be only per unit of consumption.

So, the cost of consumption goes down so; solutions becomes accessible to the poor. Another reason now, since the company empower still owns all those infrastructural elements which are providing the service maintenance is responsibility of empower. Hence, the poor customers they do not have to worry for the maintenance, manlier times it has been observed that many companies under their corporate social responsibility give up do give away all these infrastructure elements free of cost or at a very very nominal cost to the poor communities.

But once the system breaks down since, the people cannot afford to get the systems maintained know there is enough maintenance infrastructure easily available. So, the whole unit just remains like that it is no longer useful. So, let us see what this video has got to tell us.

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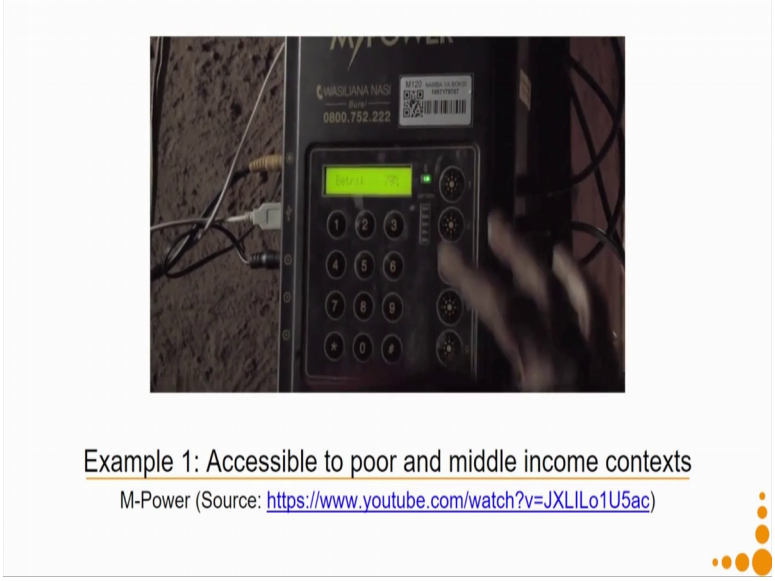

Example 1: Accessible to poor and middle income contexts

M-Power (Source: https://www.youtube.com/watch?v=JXLILo1U5ac)

It has been very difficult and expensive for customers in remote areas in Tanzania to be connected to their national grid. The best part of my work is to say how happy the customers become when the lights goes on for the first time in their homes.

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[FL].

Of bridge mission it is to light of Africa and to provide solar energy that it is clean, renewable and sustainable and it is also cost effective comparing to their analysis of energies like kerosene and candles. For the rural customers and power has been above to reach the places that the national grid has to need about to go through.

[FL].

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Example 1: Accessible to poor and middle income contexts

M-Power (Source: https://www.youtube.com/watch?v=JXLILo1U5ac)

We as thought the systems in customers homes and shops also. So, in shops they cool stay longer hours and some of their products, anyone in their homes some of them they serve choco so, that they can even serve the choco as at night because they have the light.

Their payment mode we use with our empower systems, if the mobile money much involves putting money in your mobile account and directly purchasing through your mobile. And after wards you will be sent the digits to feed into your meter box, we are planning to be able to light a million homes in Africa.

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Example 1: Accessible to poor and middle income contexts

M-Power (Source: https://www.youtube.com/watch?v=JXLILo1U5ac)

It is exciting seeing the company growing because; that means, we are providing energy to the remote areas and to their poor people who are need most. So, the company empower what it does is does it offers to the people of rural Tanzania a Solar Home System, which they call as SHS which includes the hardware to gen generate solar energy; which is the solar panel the storage units and the wires plus energy using products two lights and a phone charger.

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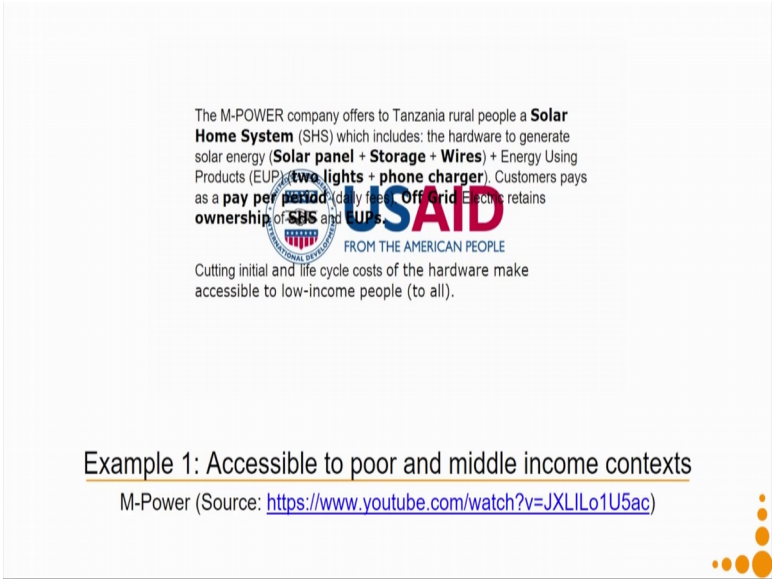

Customer pays as a pay per period of usage. If the customer does not have to pay for the solar home storage system neither the customer has to pay for the two lights and the phone charger. So, let us see what this SPSS offer model offers us.

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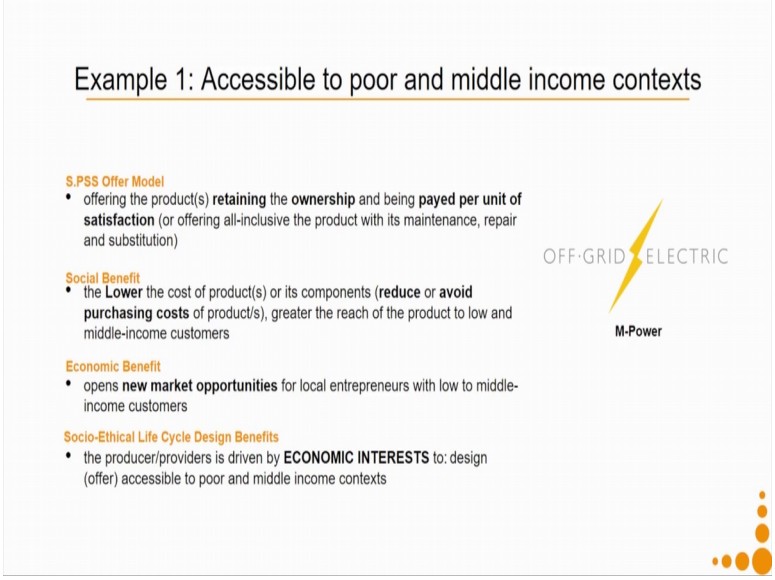

So, the first thing that it offers is offering the products retaining the ownership and being paid per unit of satisfaction. So, the customer pays per unit of satisfaction which is per period of consumption of electricity. Even to make the payment it has been made very easy because, the whole system is connected to your mobile phone, it can payment can be done through mobile payment.

So, the customer does not have to go to a far away location to make payments for this particular system. So, the social benefit that it brings in is, in this case there is no cost of ownership of the product. So, the lower the cost of ownership of a product or reduced cost or avoided cost of purchasing the product better is it is accessibility to lower and middle income group people.

The economic benefit is this so, this particular product the solar energy based lighting and charging product, this could not reach this particular market.

If it would not have been a component with this kind of a payment modality of the PSS modality so, it opens up new market opportunities for local entrepreneurs with low to middle income customers. Why are we calling local entrepreneurs? In our previous examples we had been always talking about providers. So, in our next week when we start discussing about methods and tools for design for sustainable PSS, we will start trying to draw a systems map.

When we draw the a systems map, we come to know that the manufacturer is not the only provider. Of course the manufacturer can be the only provider, but in that particular case that person might be limited because of infrastructural facilities to a particular geography. Also beyond a particular geography transportation might come out to be way much more expensive.

So, it is not necessarily that the provider is supposed to be a manufacturer, depending on the context providers can be a set of people. So, in this particular context, this particular facility can be made available to the customer by building local entrepreneurs.

These local entrepreneurs can own the product or co own the product along with the manufacturer and provide the PSS. So, the benefit of this kind of an approach is it opens up new market opportunities. The socio ethical life cycle design benefits here is the producer or the providers is driven by economic interest to design an offer which is accessible to poor and middle income context. Because, they will be able to tap that particular market otherwise which was not tap able.

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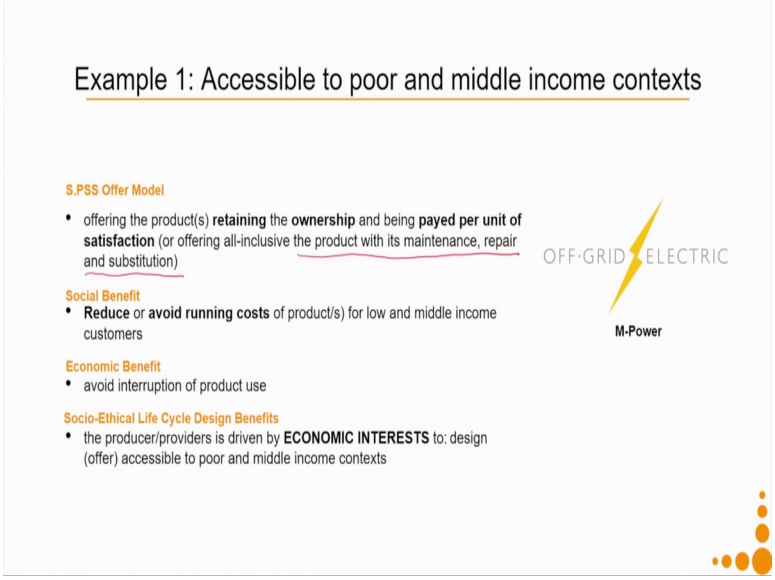

Another advantage of this particular model of doing business is in the offer is all inclusive in the product with it is maintenance repair and substitution. Now as I told you when people get these kind of products free of cost as part of some companies corporate social responsibility, the product starts getting used. And once the product breaks down

because, the poor people do not have the means to get them repair the product remains un used.

So, because in our particular model, we are talking about the maintenance also been taken care of by the provider itself. So, what it brings in the social benefit is it reduces or avoids running cost of product for low middle income people. So, they will be more ready to accept the product because they know they are not responsible for the maintenance cost. The economic benefit for the providers is it avoids interruption of product use; if the product uses an interrupted then of course, it interruption in the money flow.

So, the socio ethical life cycle design benefits over here is the producer or provider is driven by economic interest to design in this particular manner that, the product is owned by me maintenance repair and substitution will be taken care of by me because, it is in their economic interest.

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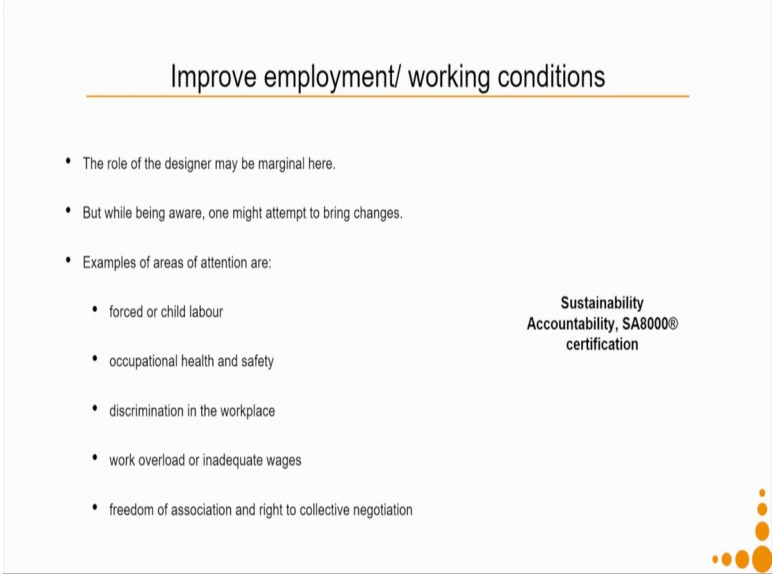

Now, let us go to the other ways to approach socio ethical dimension in PSS. So, the first one is about improve employment or working conditions. The role of the designer may be marginal over here, but while being aware one might attempt to bring changes.

So, examples of areas of attention which can be brought under this particular domain is whether there is any forced or child labor happening. Can design intervention in some

way prevent that from happening occupational health and safety? Of course, occupational health and safety a designer can contribute in a big way because, it is through design and of the system or design of a product or it is components occupational health and safety can be ensure.

Discrimination in the workplace if any if possible if the designer can pay attention to this aspect, work overload or inadequate wages there is also freedom of association and right to collective negotiation. There is a certification program it is called sustainability account ability SA 8000 certification. So, this particular certification targets to improve employment of working conditions. So, if your product or service is produced in a manner that you meet the requirements of this particular certification, that is you have good employment and working conditions. Your product or service can come with the certification which is an additional material for promotion of your product a service.

Say how a designer can help in all these as you can see in all these crate the sub criteria all those example areas of attention, mostly it is the role of the entrepreneurs the business owners who can ensure these things are happening. How say for example, a designer can contribute? Say for example, I know that I designed the a particular machinery which is going into the agricultural field and there is a possibility that child labor might be used.

I might design the machine in a manner, that it in the machine does not suit the dimensions of a child. So, in that case indirectly through design I am somehow deterring child labor to be encouraged while my particular machine is being in used. The next one talks about improve equity and justice in relation to stakeholders.

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Again the role of designer may be marginal over here, but for knowledge we are trying to see what it can be so, the examples of areas of attention are stakeholders criticizing the supply system. Say for example, I know that I a company x buys it is raw materials or employees in some of it is component production child labor.

So, we already know that there are certain industries, like the cracker industry or the garment industry where there is a this kind of a problem either child labor or improper working conditions. In case I know there is a problem the stakeholders might criticize the supply system. So, then I know there is a chance for improving equity and just in relation to the stakeholders.

Client or final user is criticizing the supply system, there is an unjust relationship between the partnership. So, the company x is very big so, has a much more monetary power way much more power to deny accepting certain products and the other partners involved might be weaker. Unjust relations with supplier subcontractors and sub suppliers, an example of an alternate way of looking at it of course, fair trade cannot solve all these problems, but fair trade was an alternate which came up into place to ensure equity and justice in the supply chain in the context of handmade products handicrafts and so on.

So, the fair never a company has a fair trade certification, it ensures that the company engages with it is suppliers subcontractors and suppliers in an equitable relationship. The

third one this is the one where a designer can play a crucial role it is about enable role responsible or sustainable consumption.

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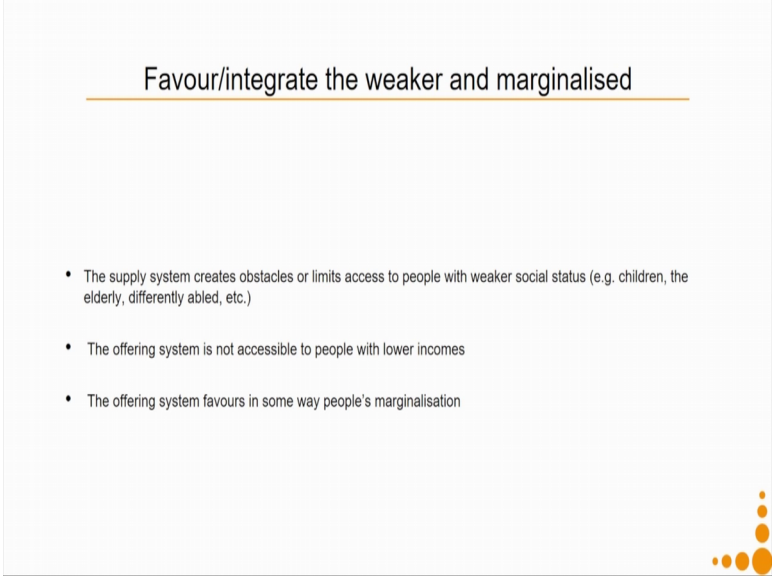

Where this can come into picture? So, say the client or the final user is not able to acknowledge clearly and easily the social un sustainability along the whole value production chain. What we are talking about over here is the social and sustainability because we are in the social domain. We need to do similar enabling of responsible sustainable consumption on the economic as well as the ecological dimension, but here right now we have focusing on the social sustainability dimension.

So, say for example, you want to put agricultural machinery in a PSS ecosystem. So, which means the farmers they do not have to own the machine there will be some local service providers who will own the machine. And as for demand from different farmers they will go and do the agricultural activities, which can be done by that particular machinery.

Now, if my client or final user knowledgeable enough to look at the or his aware of the social un sustainability. Say for example, in one of the agricultural machineries that I saw the whole ecosystem was designed in a manner, the whole machine was designed in a manner that the operator of the machinery would require a helper.

Now the payment structure was so, that that the helper does not get pay in case the helper has to be paid then, the amount of money which is being made by doing the work was not enough to cover up all other costs.

So, what the operator were do is always bring his or her sister wife or daughter and that person will work as a helper. Now this person is an unpaid labor we can talk about this as a social un sustainability, which we can make the client and my final users aware and either I can do an intervention on the machine level so, that only one person is good enough to operate the machine or we can work on the payment structure of the PSS.

So, that we can have payment for the helper as well, another aspect the client or the final user is not able to understand responsible or sustainable behavior by the supply system. Say for example, in this particular context itself the design of the machinery was being made with so, the concerned was we have to make as low cost as a machine as possible. So, now, the machine would keep on breaking down again and again.

So, what is not being understood over here is? In order to do a sustainable behavior which is in order to keep on using that machine and even not incur too much of cost during the maintenance. I might have to revoke on my supply system which is providing me not that very good quality of scrap or maybe I have to switch from building from scrap to building from virgin material.

So, that I can ensure better safety, I can ensure longer lasting product and as a result I can also bring in responsible and sustainable behavior with the product. The next one is favor or integrate the weaker and the marginalized. So, if the supply system creates obstacles or limits access to people with weaker social status, these can be children, elderly, disabled people, etcetera or the offering system is not accessible to people with lower incomes or the offering system favors in some way peoples marginalization. Again you will think that this is an area which is very difficult for a designer to integrate.

So, I will show you one example; where through design of the whole system the example that I show you is from Alwar Aravind eye hospital, all though the model of the Aravind eye hospital does not perfectly fit into the product service system model. But we will still discuss it will be why because it is a very good example of how to integrate the weaker and the marginalized in a manner that it is not so, it is not like you fund all these things through charity. You build in other economic ways to sponsor this particular activity.

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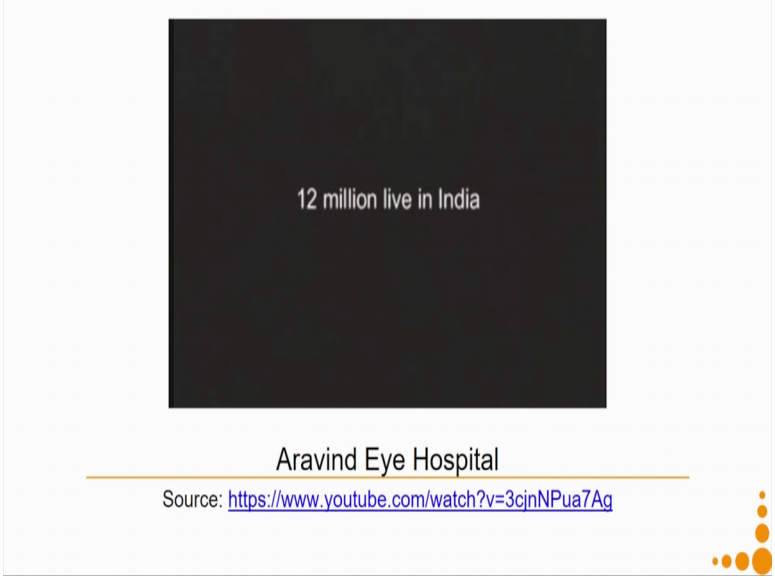

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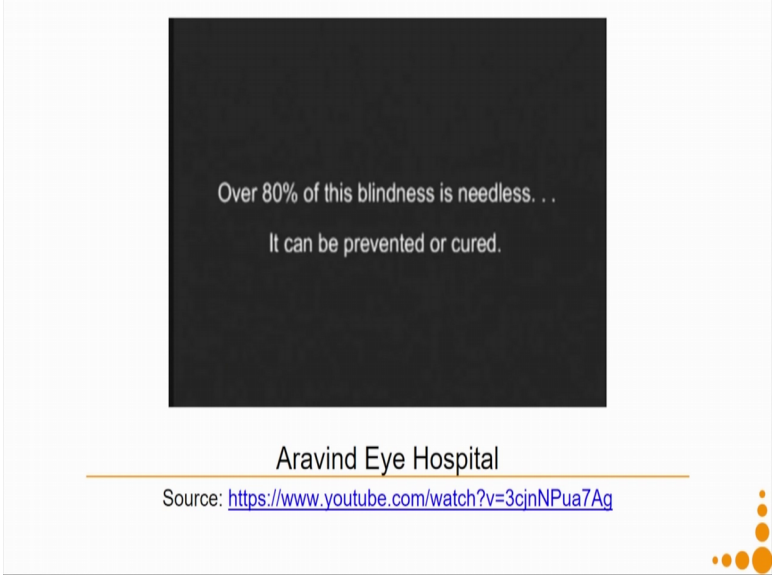

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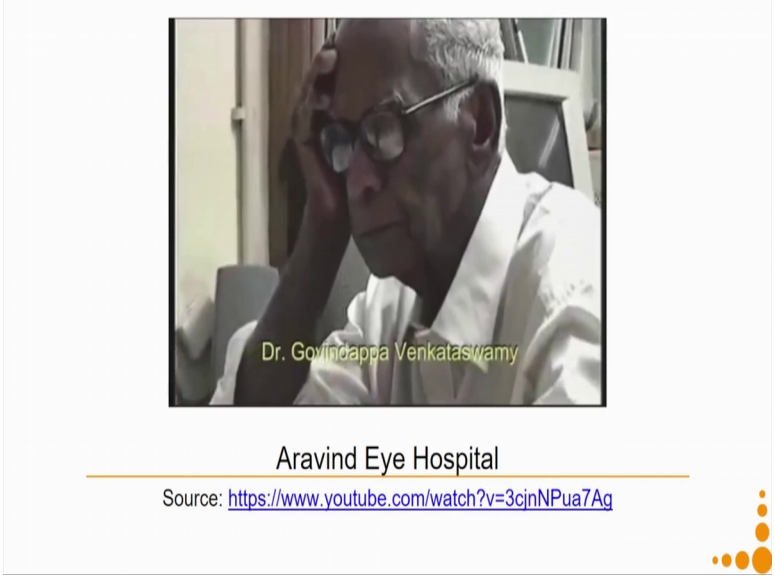

Doctor Govindappa Venkataswamy who is 59 when he founded Aravind, when it first started the hospital had he lead in beds, it is mission whose eradication of need less blindness. Today it is the largest and most productive eye care facility in the world.

See McDonalds concept is simple they feel they can train people all over the world irrespective of different religions, different cultures and all those things to produce a product in the same way and deliver in the same manner in hundreds of places. He kept talking about McDonald's (Refer Time: 23:44) he sensed was he wanted to fed a franchise say, he make it easy delivery of eye care with efficiency of McDonalds.

There now five Aravind eye hospitals in south India, they are all self sustaining and together they say over 1.1 million patients and perform over 200000 psychiatrists doing surgeries in year. To debit services are free at Aravind every patient who can pay covers cost per too cannot because, they have high numbers revenue from paying patients not only covers cost for Aravinds free services.

But also generates a selfless that once all growth and expansion. All the hospitals send medical teams into the villages patients requiring surgery are brought back to the base hospital where they serve food, lodging treatment and return transport completely free of charge. First 50 percent of all the patients Aravind treats are sort out and brought back to the hospital through this cleaning eye camps.

And I do not insist about that that man was pay me before I do anything for him I say I will give you the sight man. Let him give whatever he can give if he cannot afford does not matter he can give later so, priorities for human welfare.

The free medical team in Aravind founds the back bone of the system, these young women are recruited from the religious around mother ray and are trained interaction testing warden (Refer Time: 25:35) counseling and housekeeping.

They had so much of respect to the patients you know and they were willing to give a.

[FL].

Very type of work for patient.

[FL].

And they were also willing to share with ours in the dream of the hospital that is our program started. So, from 1976 onwards till today every year we take about 100 girls from the village.

[FL].

For highly trained paramedics assist each doctor, thus optimizing the surgeons time in the skill. In this way a doctorate Aravind eye which is over 2000 surgeries in a year against a national average of 220.

Doctors are not paid extra because, they are doing more operations, but in another way it helps ours is a teaching institution the more patients are there the better the training can be.

So, we all know ophthalmologists are premium in this country; we are only 10000 to 11000 of ophthalmologists for a billion population. So, we have to be much more productive to meet the demands of the people. So, and Aravind has pioneer the system that helps us to do high volume work and I think it is a work in progress we have reached probably 40 50 percent of what one could do.

This is the intraoral lens production facility which we started in 1992 with support from sera foundation in US.

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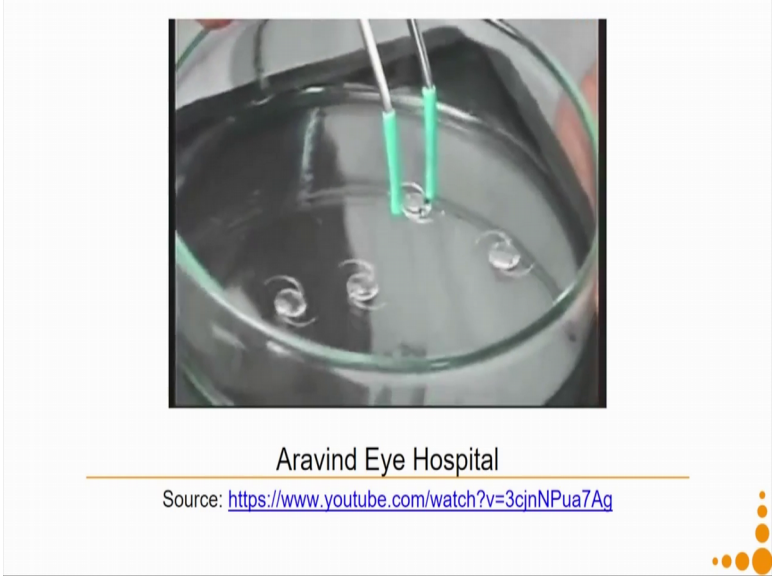

This is the intracorneal lens we produce here and this lens serves us as substitute lens once we remove the natural cat rag lens from the eye in the early 90s there were no eye well manufacturers in India.

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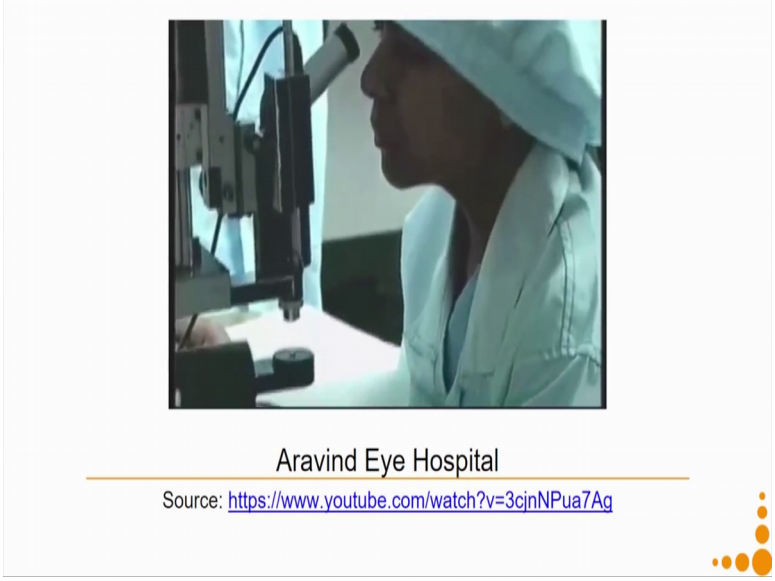

We had to import lenses from the west, at that time each lens was costing around 200 dollars there were not affordable in most developing countries. So, we deviced our own methods of making lenses up to international standards and we were able to sell that at about 5 dollars a piece.

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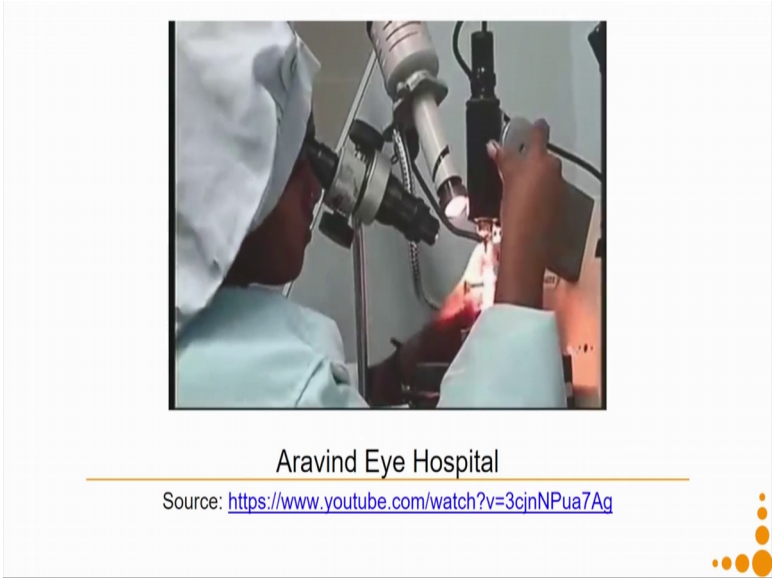

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Today we manufacture a wide range of (Refer Time: 27:57).

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And we are exporting them to over 85 countries around the world. Supposing I am able to produce the eye care the Greeks and make it available every modern world the problem of blindness is solved.

So, if we go back to our previous slide favour integrate the weaker and the marginalized. So, this is a although this is not a product service model per se this is a brilliant example of system design where the high quality healthcare could be reached to the weaker and the marginalized at no cost why? Because, they built in various other aspects in the system which would generate the revenue, which could fund this particular activity; one of the major revenue generators from them is the eye lenses.

Because now the eye lenses could be produced within the country and it use can be used by them as well as by all other eye hospitals in the country and across 85 countries as the video said that is a big revenue generator for them. So, we can actually in a creative manner; workout systems which are profitable, which are revenue generating, which are in our economic interest to integrate the weaker and the marginalized. Doctors would love to join that particular institute because of the fabulous training opportunity that they get over there.

So, it is in the interest of the stakeholders to join that particular place so, they have no dearth of good man power also coming to the whole system. You might be wondering that as designers, as a single person how much one can achieve. So, this is a very

interesting question at this juncture so, all the content that it is being delivered it does not mean that you as one person have to do everything.

Of course, you can get very skilled and start doing many of these things all by yourself. But the whole point is that we should be all aware that in real life design happens in teams. So, even when we are building our team we should know what all different kinds of expertise do we need to bring into our team.

So, we need to bring in social scientist maybe and we need to bring in different kinds of engineers depending on the problem, we need to bring people with an expertise and management and business modeling and together, we achieve this kind of a system design. So, let us go ahead.

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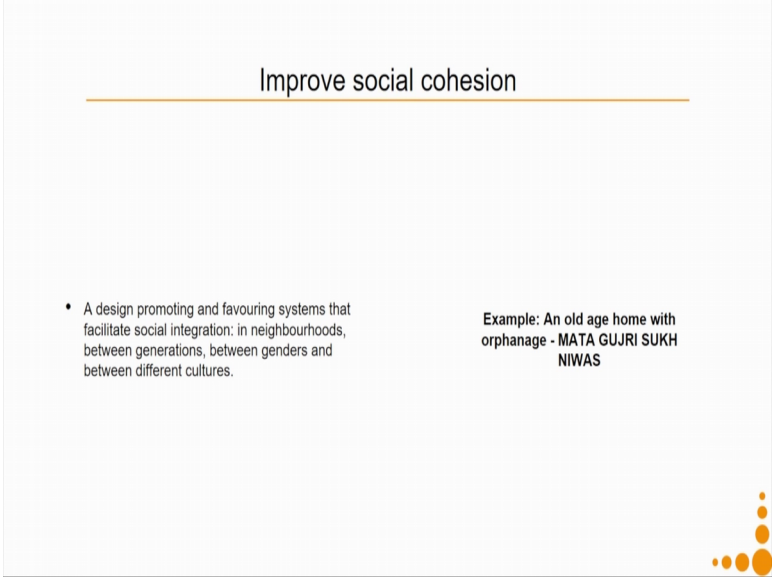

The next one is improve social cohesion so, a design promoting and favoring systems that facilitate social integration. This social integration can be facilitated in any in any diff different kinds of scales say for example, neighborhood braces it can be also done in different areas.

Wherever there is a lack of integration say between generations, between genders, between different cultures, say for example, there has been some atoms. So, this is one of the organizations Mata Gujri Sukh Niwas there are other organizations who have experimented with setting up an old age home along with an orphanage

So, that small kids they get the care of elderly, as well as the elderly who have huge years of experience in their life they can and they are also lonely at this point of time, when they are old they can get good company, share their knowledge, share their experience with the kids.

So, the kids can get a good environment to grow up because they are orphan so, not much of an opportunity for them to have such kind of an experience or family experience. So, this particular aspect talks about bringing in or facilitating through design some kind of social integration.

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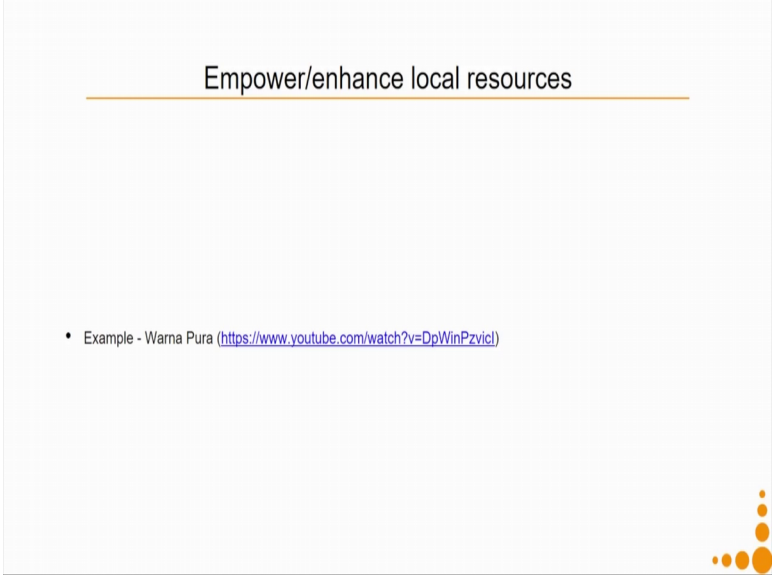

The next one is empower or enhance local resources. I will not play this video again we have already played this video in our previous lectures; I have kept the link over here. So, if you are interested you can again visit back the, this particular video, it is Bandula Warnapura. So, if we can recall what happened in that particular video.

So, we saw that Warna versions area which was the major crop of that area was sugar cane. The farmers would convert that sugar cane into jiggery because, jiggery has small shelf life, as a result their income was much more lower and it has to be sold at a before it is get damaged. So, you cannot get so, much of price.

So, they farmers under able leadership formulated a corporative started a sugar came factory. Which a sugar making a factory which would convert this sugar cane into sugar

which has longer shelf life and it also fetches higher value. This increase the income of the people, they for the venture then to integrating the landless communities of the region.

By giving them cattle, then dairy forming, started dairy processing industries were setup and entire value chain for that was set up, then because you need to train your local resources.

So, educational institutions were started and so, on. So, here you can see the empowerment was done by enhancing or empowering local resources both in terms of human resources as well as exploiting the natural resources or the natural capabilities of that particular region. So, this particular lecture also our reading material will remains the same.

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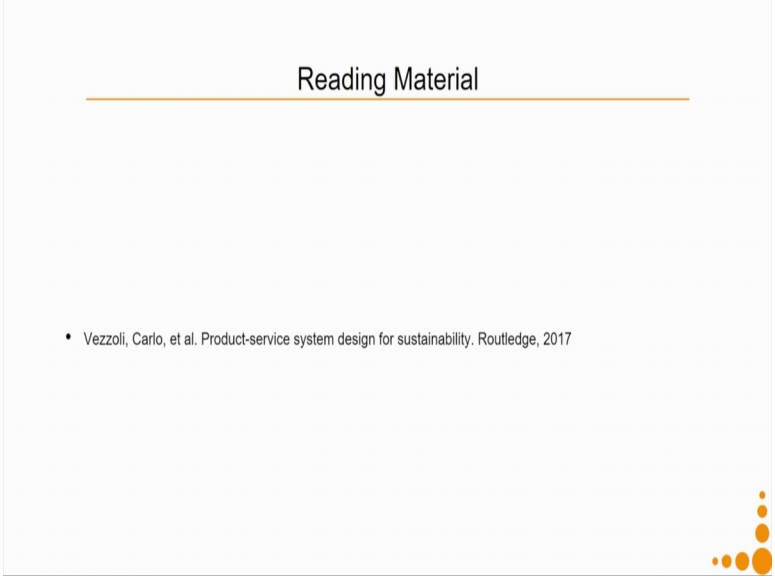

This is ah; interesting book and we will be using it also to understand what how to design for product service system design?

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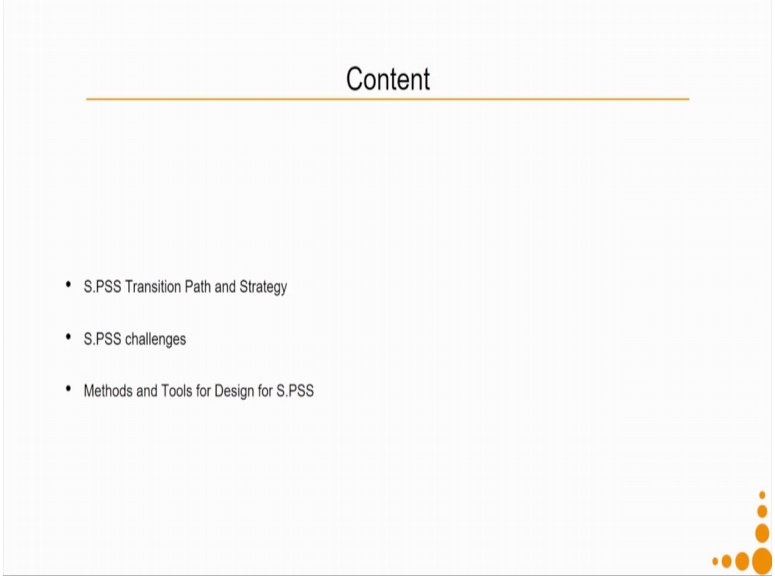

So, next week we will talk about S, PSS transition path and strategy it is not very so, our society has already moved towards individual consumption, individual ownership based consumption. So, if I want to have use a mouse, I buy the mouse.

And now I own the mouse and now I consume the mouse. So, our society has moved towards ownership based consumption. Now if we want to propose that in order to become more sustainable. Let us go back to not ownership based consumption which is a more sustainable way of consumption I require a transition path and strategy to do that.

Achieving it in one go is very very difficult because of the several psychological barriers, social barriers, political barriers, cultural barriers, economic barriers and so on. So, we will discuss about those as transition path strategies and challenges. Then we will go into methods and tools for design for S, PSS.

Thank you.