

System Design for Sustainability
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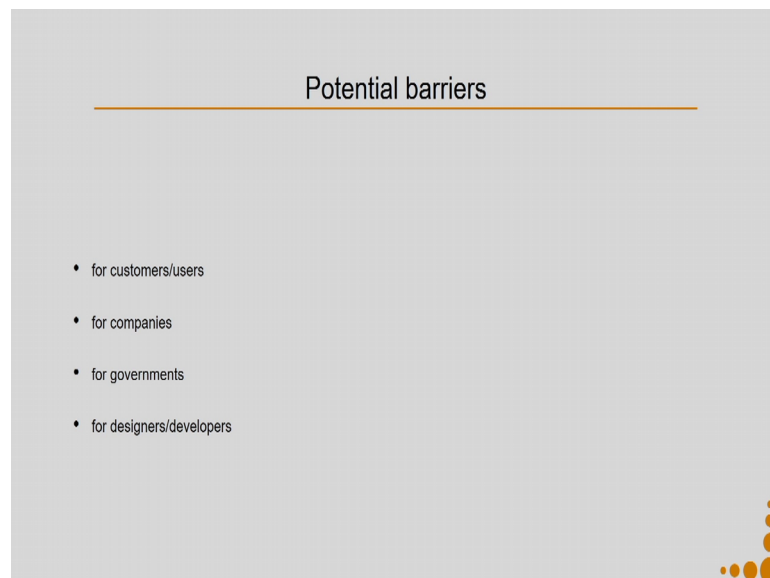
Week - 06

Lecture – 01

Sustainable Product-Service System Design – Transition Paths, Strategy and Challenges

Welcome to this week's lecture. Today, we will be talking about SPSS system design, the transition path strategies and the challenges. So, how to transition towards sustainability? So, we will be discussing it along with certain barrier that come in its path.

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So, the potential barriers can come from the customers or the users of the product; another one is from companies who was supposed to manufacture and sell these products and services. The third from government and fourth from designers or developers who are suppose to design and develop these solutions.

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So, Eco-efficient Product-Service System user acceptance barriers say for example, mobile phone. This is something which we all of us need today because, of the internet and the smart phone penetration, we require certain kind of mobile phone. It has become kind of a necessity. Also in order to be able to do the particular activities, we need certain RAM; certain features in that particular mobile phone. So, a particular mobile phone after years time or 2 years time because the demand from our way of consuming that mobile phone requires way much better system and the mobile phone better RAM and better system configuration.

So, we want to discard our phone and we want to get a new phone, that is kind of a individuals choice, other things can be social norms or social status. Say for example, we go to go on a travel or we go to a party, we need to drink water. It is not at all fashionable to carry your water when you are going to a say a party or going to a marriage celebration or say we are travelling, we need to drink safe water. We do not have the option at this moment in the current settings that we can carry a bottle and keep on filling it up.

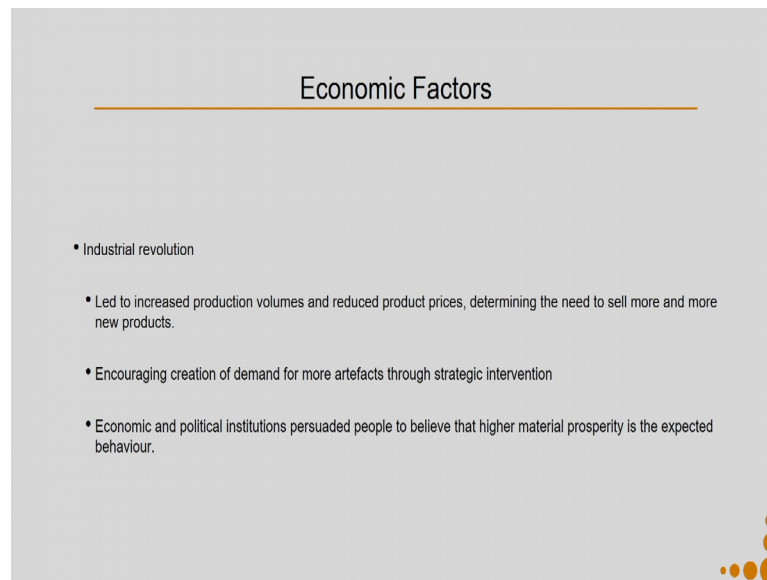
So, most likely the only available solution which is available at every nook and corner is by a plastic water bottle. So, the consumption perspective, it might be individual choices that I want to do it in a particular manner and which is influenced by social norms as well as institutional settings.

So, because say all railway stations might not have a water purifier and clean drinking water facility. They might have a drinking water facility from where you can collect water bottle, but that facility is not connected to a water purifier. So, you might not want to drink water from there or say for example, I am going on a road trip. There are not enough institutional facilities available; where, I can take my bottle of water and fill up my bottle of water.

So, the only institutional setting which is available to me is there are lots of shops which sell this bottled water. So, individual choice of drinking safe water which is also required for health reasons and institutional settings that you have to buy this bottle drinking waters and the social norms, which might be because of the social status or because the certain behavior at a particular moment requires you to do a certain thing. Say for example, during Diwali all of us together want to burn crackers that is the kind of a social norm and you would no, would not want to digress from that social norm because you want to belong to a particular community and all your friends are doing that particular activity.

So, in that particular case you are burning crackers which are environmentally not very great because of social norms. So, the first problem comes because of individual choice influenced by social norms and institutional settings. So, as designers we have to try to understand how we can in order to bring a more sustainable consumption, I have to actually influence somewhere on the individual choice by influencing the social norms or the institutional settings. Next comes the economic factors.

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The Industrial revolution; how the industrial revolution was organized? So, the Industrial revolution, led to increase production volumes and reduce product prices, determining the need to sell more and more new products. So, how can you maintain that level of production at an economical scale? In order to be economical, you have to have large scale production that is what the industrial revolution was all about. In order to maintain that large scale production, you want people to consume at a larger scale.

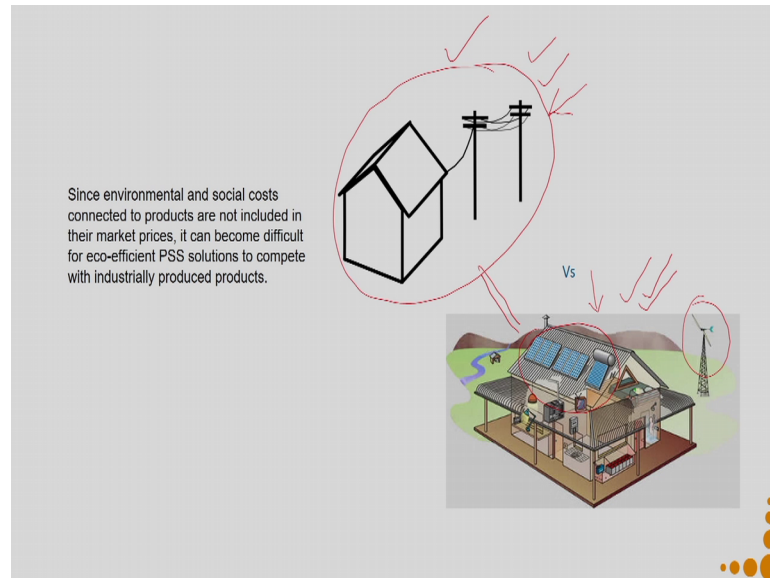
So, the problem of this industrial revolution was that it force people towards ownership driven consumption, it force people towards more and more consumption. So, the industrial revolution can survive. It encourage creation of demand for more artifacts through strategic intervention. Say for example, advertisement or say building in the product itself a particular lifespan.

So, you know that within 1 year the technology in this product will be absolute: which is the case with most of our electronic products like mobile phone these days and you need to buy a new one. Then, economic and political institutions also persuaded people to believe that higher material prosperity is the expected behavior.

Say for example, how is the countries developed measured? GDP: Gross Domestic Product which means how much you consume? The per capita consumption; so, the political institution persuaded people to consume more and more because your countries development is now measured in terms of GDP. When Bhutan came up with a very

interesting measure of measuring a country's success which is the Gross happiness index; so, rather than measuring development in terms of product, measure it in terms of how happy your people are.

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Another problem in the economic factor is say for example, consider the 2 options. The first option over here is electricity produced by grids; the second option is where I am although connected to the grid I may or may not be, but I am having some kind of solar energy generation or may be wind energy generation. So, in the first context where I am connected to the grid, me as a consumer I do not pay for setting up the grid; I only pay on per unit basis.

But, currently the system of renewable energy has been designed in a particular manner that I have to pay for the solar panels which makes it very expensive for me. There are very few PSS oriented solutions which do not ask you to pay for the solar panels. They give you those solar panels free of cost because they do not transfer the ownership to you. The ownership remains with the company, all you do is pay per unit of electricity.

Then, it can become equivalent to this particular system. So, since the environmental and social cost connected to products are not included in their market price. So, in this particular case, the grid electricity if I am producing the electricity through thermal power plant as you had seen in the life cycle assessment lectures, they have certain kind of ecological burden; they also have certain kind of social burden. Now, the cost of

nullifying that or reducing that burden is not included in my product which is electricity. Hence, the market price of it seems to be low.

So, since environmental and social costs connected to products are not included in their market prices, it can become difficult for eco-efficient PSS solutions to compete with industrially produced solutions. So, even in this particular context, the solar and the other renewable energy sources; even if a company wants to provide it to you at a by giving a PSS offering, for the company it becomes very much expensive. Because, what are they not getting a benefit is of reducing the eco burden; whereas, in this case they are causing the burden, but they are not paying for the burden.

So, there is a new system which has come into place which is about carbon trading; wherein, all those people who produce excessive carbon dioxide in order to be able to produce, they have to pay up certain price which is the offsetting price. And, this offsetting price can be actually used to sponsor activates like the renewable energy sources which actually offset that.

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PSS includes prices of a labour-intensive solutions.

Varies from context to context:

- Indian context - many a times cheaper
- Developed countries - labour is expensive



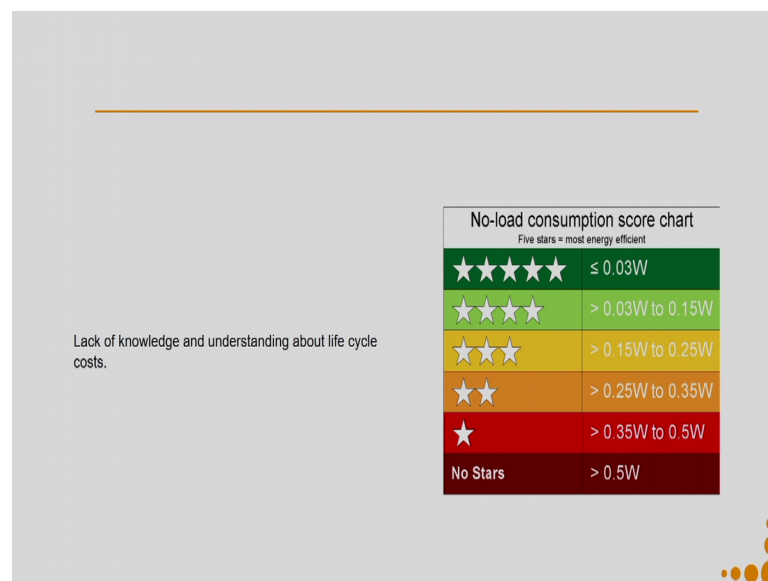
Another economic factor is pre a PSS because we are talking about product plus service. So, now, service requires human labor. So, it is a labour intensive solution. Now, there can be 2 kinds of context. So, you can see in this particular picture over here this is a kind of a context which we can see in say India or maybe some other developing

countries where labour is relatively cheap. Here getting here we do not bother so much about repairing our bicycle all by ourselves.

Because we can go to a bicycle repair shop, they are quite plenty full in number and we can get the work done at almost hardly any money being paid. We can get puncture repair done say for may be 20 rupees or 30 rupees which is almost nothing. So, they this PSS which is labour intensive solution the cost of offering a PSS will vary.

If it is in the context say for example, Indian context it might be cheaper because labour is cheaper over here. So, providing that product plus service combination in Indian context might be cheaper; whereas, in developed countries where labour is more expensive. It might be a very expensive solution. So, depending on the context we have to work out the solution.

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Another economic factor is the consumers do not have knowledge and understanding about the entire life cycle cost. Say for example, I go to buy an air conditioner. I will compare 5 different air conditioners. I am comparing them at that point of time on the basis of my initial cost that I will be spending in terms of ownership of that particular machine. I am not thinking about the lifetime cost because of the time cost is also distributed over a large period of time.

So, I think it is ok. So, if there are 2 products; one of them, one of the product is say consumes 50 watts lesser than the other product, but cost at the initial time some 20000 rupees more than the other product. And at that point of time, if I do not have that 20000 or if I am not willing to pay that 20000 or if I feel that it is not worth it because the life time lifecycle cost I am going to pay at much smaller amounts over a long period of time. I might make a wrong decision. So, which is because of my problem of understanding about the lifecycle; other thing is about knowledge. Say for example, in this chart I am trying to show if it is 5 star, it means this much amount of energy. If it is four star, then it means this much amount of energy.

So, most of the times products are also not giving us that knowledge or there is hardly any advertisement campaign which talks about such kind of a knowledge to the consumers. So, that can also be because it is not very easy to think in terms of life cycle for people. So, we might also make wrong decisions which are environmental damaging. Then, there are certain psychosocial factors.

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Psycho-social Factors

- consumption choices are dependent on prior consumption patterns

Hence, in relation to eco-efficient PSS, the problem is that if solutions based on sharing and access, contradict the dominant and well-established norm of ownership, making consumers hesitant to accept ownerless-based solutions.



So, consumption choices are dependent on your prior consumption patterns. Say for example, in this particular context this is a workstation, this is a an office area. It can also be a college setting, where one has a cubical. Now, if I am used to open office area where every day I come and I get a new locations, I first find out which location can I sit and

start my work and I get used to that kind of a consumption pattern, then sharing is for me, in this particular context only, in the work environment.

But say I am not used to that kind of a context. I am used to having my own personal workspace; my own personal computer which I have personalized and I start working in that particular computer. For me to shift to a open work area, it is very very difficult because it requires me to change my consumption pattern.

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- consumption choices are dependent on prior consumption patterns

Hence, in relation to eco-efficient PSS, the problem is that if solutions based on sharing and access, contradict the dominant and well-established norm of ownership, making consumers hesitant to accept ownerless-based solutions.



Say for this particular example this is the public transportation system ma running in or on our roads and because it is a public transportation, we are very much open to the idea of sharing this particular vehicle with unknown people.

So, in this context, we have our mental model is that sharing is ok. So, if you want to bring in another kind of a vehicle which is following the same particular model of sharing, then it is way much more easily acceptable. So, in relation to eco-efficient PSS, the problem is that if solutions based on sharing and access, contradict the dominant and well established norm of ownership making consumers hesitant to accept on a less based solutions. So, we have to consider whether this is a context where we what is peoples dominant way of behaving.

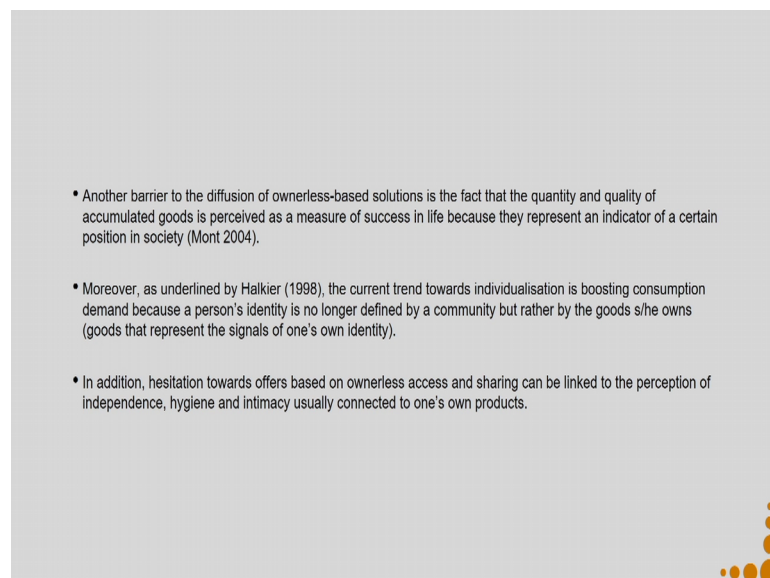
In case the dominant way of behaving is a PSS solution, then you do not have to do anything to change their way of consumption. But in case it is not, then it is a long

process to convince people that why should they change their way of consumption. Say for example, in Indian context it is very normal for all of us to own a washing machine at home. For us when if somebody says why do not you have a washing machine owned by the entire building, use that washing machine.

We might be concerned about issues like hygiene and whether it will be available to us at the time when we wanted. From the other hand, when we give our clothes to a washer man. So, a person who is washing clothes in a washing machine might also be giving some of the cloths to the washer man, that time the same considerations of hygiene and whether it will be available to me on time or not is not a concern.

Why? Because people have got used to washing machine being always available being a personal product and the washer man, there is a time frame in which things will happen. There might be also times when the washer man does not deliver on time. So, we are mentally prepared to accept that. So, in case you wanted to make them shift to building base washing machine solution, you have to work out a situation say for example, a campaign or something of that sort so that people can make that shift and you have to be always aware that it is very difficult for people to make that shift.

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So, another barrier to the diffusion of ownerless based solution is a fact that the quantity and quality of accumulated goods is pursued as a measure of success in life because they represent an indicator of a certain position in society.

So, we do not start trying to own products just because we need that product. Vacuum cleaners are classic examples in our country. When vacuum cleaners were introduced in the market, a lot of people bought vacuum cleaners. Anybody who could afford that because of the social status factor or the norm because they want to set that ok, we belong to a certain position in the society people bought a vacuum cleaner. But it is not a product which suited our kind of cleaning requirements. So, most of the vacuum cleaners which we have bought are hardly used, but everybody bought a vacuum cleaner.

So, products is not only about giving you a certain utility, but it is also about a certain it is an indicator of a certain position in society. Now, that becomes a barrier to ownerless based solutions. Another one the current trend towards individualization is boosting consumption demand because the person's identity is no longer defined by a community, but rather by the goods she or he owns. So, say for example, you want to buy a custom design laptop or you want to buy a customized piece of garment or you want to buy a product which you can personalize in certain manner.

So, the industrial revolution because they wanted to you to consume more and more, they try to bring in this whole concept of personalization that you personalize your product and then, it becomes a part of your identity. It differ your product that you carry defines who you are and you can make a statement through the products that you carry.

So, all these kind of campaigns led to a current trend towards individualization, which again means it has to be own. So, over that is another barrier towards ownerless based solution. So, we again have to do design, certain kind of campaigns or certain kind of products which brings people away from that personalization that it is not personalization through which personalization by increasing come consumption that you prove your identity.

Let us prove our identity by being less of a consumption free. There is also hesitation like in the case of the washing machine that we discussed. That is hesitation towards offers based on ownerless access and sharing because of the perceptions of independence, when I wanted I wanted. I should not be dependent on an app, I should not be dependent on the availability at that point of time; hygiene and intimacy because we always try to tend connected to get connected to a product

So, we also start feeling very so I love my mobile phone, I love my sofa set. That is the kind of an intimacy, you believe build up with your products also which you can do only with your own products. You cannot do products in with those products in which case they are ownerless based solution, where you are only consuming the result which is coming out of it. So, material consumption is not linked to happiness.

So, there has been lot of research which has been done. So, the material ownership the material wealth of our population has drastically increased since the industrial revolution has come into picture. The material prosperity although differs between developed countries and developing countries, but overall there has been a increase in material prosperity for each and every individual.

But the same study when it tries to find out our people more happy because of this greater increase of this increase in material prosperity that is not the case. So, which clearly shows that material consumption is not linked to happiness whenever people have been asked like what make you happy? Materials are have always taken a lower priority as compared to other aspects like the relations with their loved ones and so on. So now, how to bring transition to this sustainable product service system? So, I will demo show you some examples, certain experiments, certain perspectives of different sets of people.

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System Aesthetics

Wash bar - LG Electronics laundry, established in 2005 in Paris. Users have access to washing machines and dryers, but also to a bar and various recreational-cultural services, such as a Wi-Fi internet connection, short film showings, and participation in organised events. The interior spaces appear like a bar or a games room in which washing machines and dryers are integrated.



Source: Ceschin, Fabrizio, Carlo Vezzoli, and Salvatore Zingale. "An aesthetic for sustainable interactions in Product-Service Systems?." (2010).

One of the important aspects of why we would like to have something in our life is Aesthetics. Aesthetics is not necessarily only visual. Visually, you find something very

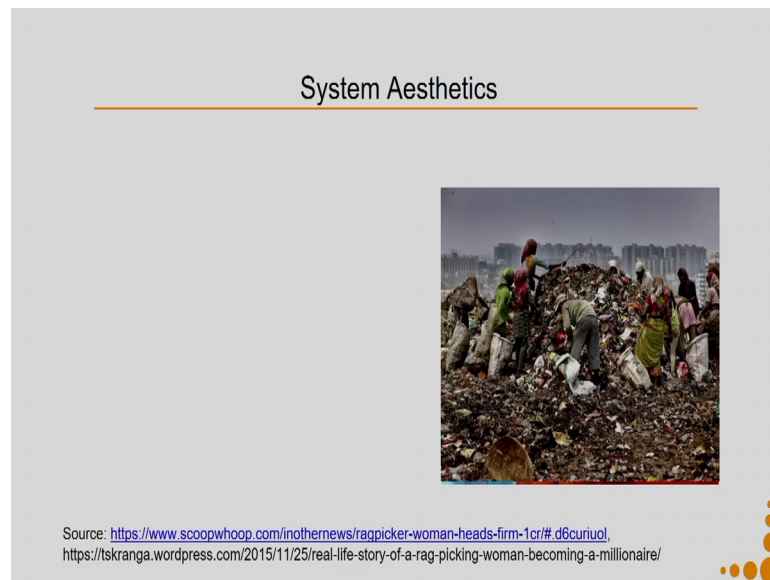
beautiful that is a very important part because our eyes play a very important part in determining whether something is beautiful or not. But aesthetics can be perceived through all our 5 senses which is vision, our ears which is hearing, our taste buds, our smell senses and our touch senses. So, say for example, you find a 4 beautiful maybe it also looks good and it also taste very good and it also smells very good. So, that is the Aesthetic of food. You find a piece of garment very beautiful of course, because the colors or the patterns are beautiful or the design of the dress is very beautiful and as well as when you touch it and it feels very soft and nice.

So, Aesthetics is perceived by all our 5 senses. So, when we talk about products aesthetics, it is only given by that particular product given to all our 5 senses; not all products will engage all our 5 senses whichever senses it is engaging. Now, similarly when we are talking about product service system, you are talking about a system. So, here in this cause in this case, we have to consider about the systems aesthetics. How does my system look beautiful; how does my system feel beautiful? For example, so in this picture you can see it is a wash bar by LG electronics laundry. It was established in 2005 in Paris.

Users have accessed to the washing machines and driers, but also to a bar and various recreational cultural services such as Wi-Fi internet connection, short film showings and participation in organized events. The interior spaces appear like a bar or a games room in which washing machines and driers are integrated. So, this is a PSS service, here you can it is a place where you can wash your clothes and dry your clothes. Now, because it is bar plus a washing area; so, you come over here. So, at the end of the day when you want to relax, you and you also want to clean your clothes. So, you come to this particular wash bar; bring your clothes, put your clothes in the washing machine.

They will do its job; then, you will put them into the drier, then it will do its job and in the this whole time, you can refresh yourself in the bath, with the various activities and various um activities and the community building that can happen. You can interact with interesting people over there who are also waiting for their clothes to get washed. Now, a very boring activity like washing clothes which is a necessity, but it is boring like anything and it is a waste of time it become such an interesting thing to do. It is a relaxing job; say you can see the beauty in this whole system. So, this is what I mean by systems aesthetics. Let us come to an example from Indian context.

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So, this is a dump yard, a landfill where the municipal wastes are dumped. This is how rag pickers look in our country, they will be picking up items which might have a resell value and then, go and sell it to the appropriate people. They are amongst the most marginalized part of our society. You can see they have nothing to protect themselves from all the um filth in that place.

They the risks of a fettle illness is very very high amongst them. Also because if you find them dirty because they work in such dirty conditions, we just do not want to have anything to do with them; we want them to be as far as away as possible from us. Their income levels are also extremely low. So, they are very very exploited on those levels also.

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System Aesthetics

However, in place of gunny bags, now they are equipped with modern cleaning tools like road and floor cleaners, vacuum cleaners, high-jet pressures, micro-fibre mops, carpet-shampooing machines, scrubbers and extractors.

Product. Service. Interactions.



Source: <https://www.scoopwhoop.com/inothernews/ragpicker-woman-heads-firm-1cr/#.d6curiuol>,
<https://tskranga.wordpress.com/2015/11/25/real-life-story-of-a-rag-picking-woman-becoming-a-millionaire/>

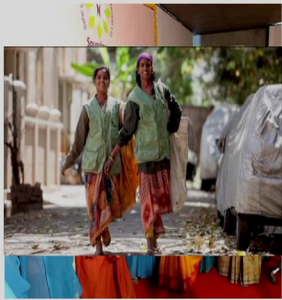
So, a particular organization in Gujarat called Seva, it is a self employed women's association, decided to change the fate of this and most rag pickers are women. There are most of them 80 percent around eighty percent of them are women. So, this organization decided that lets organize these people, give them proper training, give them proper equipment and then, employ them as a group in certain areas to do the waste picking; so, rather than being rag pickers, now they were trained to become professional in garbage collectors from homes; now, for them to be ad taken at homes.

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System Aesthetics

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So, this is how they look like right now. So, they in place of their gunny bags, they were equipped with modern cleaning tools like a road and floor cleaners, vacuum cleaners, high jet pressure cleaners, microfiber mops, carpet shampooing machines, scrubbers and extractors. They were trained in doing these. They were also given uniform, they were given protective gear or where they were trained in how to build interpersonal relationships because they have to go to households to collect their garbage as well.

Now, then they are going to a household and because garbage is value, if the garbage is mixed then it becomes a very difficult job to segregate them; your garbage also becomes. So, the dry garbage which is not contaminated say for example, plastic bottles if not contaminated, they can be much easily recycled. If they are contaminated, then they have to be cleaned. So, which is an additional process; so, they need to also go and persuade every household that you should do segregation of garbage.

Now, we do not consider the garbage collectors as people to whom we will listen to. That is how our society is organized. But when these people were trained, they were also given this interpersonal training. So, how are you suppose to go and approach people and convince them to do garbage segregation. It worked really great because now the people's perspective towards looking at them changed. Now, they were looked as professional garbage collectors who know what they are doing and who know what should be done properly.

So, this is another kind of an example of building in aesthetics in the system, where how did you build an aesthetic since in the system? You trained people in using modern equipment, you give them protective gear, you train them in communications case. You also brought an organizational change, you made them into a particular association and this association goes and gets contracts for garbage collection from societies, from institutional organizations rather than because the power over here lies in collectiveness.

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Designing for relative advantages and uncertainty reductions

While an overall idea may be beneficial to a wide range of people its final design needs to be compatible with values and habits of particular consumers.

Ola Share Ola Micro Ola Mini Ola Prime Ola Auto
Ola Rentals Ola Outstations Ola Lux Ola Byke
share

Ola Pedal - a dockless [bicycle-sharing system](#)
available at [IIT Kanpur](#) and other large university
campuses across India.

OLA Brahmaputra Boat Service, Guwahati Assam



Source: Rexfelt, Oskar, and Viktor Hjord af Ornäs. "Consumer acceptance of product-service systems: designing for relative advantages and uncertainty reductions." *Journal of Manufacturing Technology Management* 20.5 (2009): 674-699.

Another example, Designing for relative advantages and uncertainty reductions. So, while an overall idea may be beneficial to a wide range of people, it is final design needs to be compatible with values and habits of particular consumers. Say for example, Ola is a service using which you can book a on demand transportation service. Now why does it have to be always cars? In cars also at times I might need a share car which I can share with 3 or 4 people.

So, every day I want to come to office, I do not want to spend lot of money and I can get a car which can be shared by 3 or 4 people. There might be times when I am travelling with large number of peoples. So, I might need a larger car, there might be other times or may be my budget is smaller, I want a personal cab, but I want a smaller car which cost me lesser. In Indian roads, we also have auto rickshaws which have cheaper option. Why not auto rickshaws?

There are certain places like the place where I am from Guwahati, we have a Brahmaputra river and we can of course, cross it through the bridge, but it takes a much longer time our easier way is crossing it through the boat. So, why not have a Ola boat service. There is also Ola outstations. So, I want to travel from city a to city b, I take an Ola outstation. There is Ola bike share. So, there is something like Ola peddle, a dock less bicycles sharing system available at IIT Kanpur and other large university campuses across India.

So, what you see the overall idea is the same that I want to book a transport a a means of transporting myself by using an application. It is just like depending on different satiations, I am making it compatible with the values or habits of particular consumers. I am not making like 1 solution fits everybody.

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Technological Innovation complemented with Social Innovation

Technological innovations are assumed to be radical, aiming for technological paradigm shifts - target environmental problems and, are mainly pulled by governmental policies and pushed by emerging and enabling technologies.

Social innovations, either refer to those innovations aiming to solve social problems such as poverty and access to safe drinking water, or those targeting behavioural change and social well-being.



H.M. Dalaya's innovation of making skim milk powder from buffalo milk (for the first time in the world) and a little later, with Kurien's help, making it on a commercial scale, led to the first modern dairy of the cooperative at Anand, which would compete against established players in the market.

For information on Social Innovation, visit:
<https://www.youtube.com/watch?v=VnOG2uUeSUw>

Another one, Technological innovation complemented with social innovation. So, technological innovations are assumed to be radical aiming for technological paradigm shifts, target environmental problems and a mainly pulled by governmental policies and pushed by emerging and enabling technologies.

Social innovations, either refer to those innovations aiming to solve social problems such as poverty and access to safe drinking water or those targeting behavioral change and social well being. So, I will show you one example. This is not an example of a product service system design, but why I show you this example because it is a brilliant example how technological innovation when combined with social innovation brings in great results.

So, this example is from Amul. So, Amul all of know that Amul is a brand which makes milk and various milk products and it is a cooperative which does this particular activity. So, when the whole milk revolution was suppose the white revolution was suppose to start in India, in Gujarat the source of milk was buffalo milk.

Now, there was no machinery available at that point of time for making skimmed milk powder from buffalo milk. So, H M Dalia, he innovated a machine which for the first time could make skim milk from buffalo milk. So, that was a technological innovation. They also did a large number of technological you know innovations in order to collect the milk process the milk and so on

But, would that have succeeded; only there would that have succeeded? No, they also brought in social innovation. They created new systems; new social systems, new social organizations and together the social innovation and the technological together brought in the white revolution. So, I will show the you this video quickly. The longer video, I have put the link on this particular slide. This video is 19 minutes long. I will show you a shorter version of that particular video.

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The Milk delivered to your door (Refer Time: 32:33). This is finding faces of (Refer Time: 32:35) in it is a magical journey. This is taken India to the milestone of milk. The world's largest milk producer; each day here is a revolution of how the Amul milk set (Refer Time: 32:49) in a village (Refer Time: 32:50). This it travels many terrains across the country to reach your home. Thousands of automatic milk collection systems have member information's. Milk fat content and the amount payable to each farmer, transaction that ones to go almost a month is over in a matter of seconds.

From (Refer Time: 33:14) which one thing like (Refer Time: 33:16) closed forward and fresh milk continues to make its way over several journey of health and hygiene. The automatic (Refer Time: 33:27) happens to see every day with clock, clock procedure. The milk collected more than 2.6 million farmers across 13000 villages is tested, graded and transported over 1200 routes to more than 30 dairy plants. As processing plants, the milk is once again tested for quality processed and packaged.

The work reaches a frenzy pitch as milk pouches are sorted and loaded onto the milk to delivery vans. Thus begins the exciting, the tidiest journey across the length and breadth of the country into the hearts and homes with (Refer Time: 34:04). The vans travel through the night arriving in the 3 hours in the morning rise on time so that you can say where your morning cup of tea, blissfully unaware the amazing drama behind this packet of milk.

It is an awakening for India and a new call of freedom for the Indian farmer from the shekels of the middleman, while the rest of the nation was clearing up for industrialization. Dr. Verghese Kurien, the father of the white revolution; we stole his trust in the simple farmers.

(Refer Time: 34:45) to a (Refer Time: 34:46) here is a matter of faith. This is almost adventurous and almost give faith. So, the things cannot be done.

What started off as a humble farmers cooperative grew to become Amul. Amul is indeed, a brand with a difference; a brand whose history is synonymous with Indian independence, a brand that is transformed the lives of millions.

[FL].

Sir, [FL].

[FL] Anand [FL].

[FL] Elected representatives [FL]. [FL] professional manager [FL]. [FL] I should be thrown out. I will be without a job.

[FL]

Definitely, sir. [FL].

Mister Kurien, [FL].

Amul follows an innovative (Refer Time: 36:30) organization structure known as The Anand Pattern that manages the productive genius of farmers with professional managements and modern technology. The replication of the Anand Pattern across the country led to the success of operation plant. this (Refer Time: 36:59) what is known as the White Revolution. And India emerged as a world's largest milk producing nation.

Gujarat Cooperative Milk Marketing Federation, GCMMF runs on the binding principle that it is so (Refer Time: 37:17) because of farmers in future an executively less to their future. Here board room decisions are made between a social machine invite. The Amul girl with her (Refer Time: 37:29) observations, underlines this philosophy in a light hearted spirit. Amul is constantly reinventing a nourishing its brand dignity in a fashion that no marketing guru offer can ever change.

Millions today consume Amul. It is transcended, million experience product hopes and (Refer Time: 37:53) into the heart indeed. As Amul, every single drop of milk brought in by the villagers. It is used to create something exceptional for the consumer. It is not just about diversifying into new products. It is small about their (Refer Time: 38:10) lives and on the economic independence they bring to farmers.

Again, is to cater to the needs of the customer, the value added products without out fancy price tag. Here, quality is a way of life. At every level, it is massive collection, processing and distribution network. The highest standards of hygiene are maintained. The million liter per day mother dairy plant at Gandhinagar. India's most modern dairy has set the standards of excellence in processing and packaging. They easy to use convenience tetra pack was introduced to give the cooperative dairy a complete (Refer Time: 38:56).

Amul house is Asia's biggest power milk plant. It was a Amul that was the first time in the world buffalo milk was processed, a memorable landmark in the Amul movement. When Amul cross the seas, at first it first took as a loyal customers abroad go far away and craving for the familiar taste of the childhood. Gradually, the world started recognizing traditional taste of India. It is the heart warming site to see Amul making its presence (Refer Time: 39:30) in the largest modes of the world.

[FL].

Amul is the reason for bring smile, hundred percent the best of family life that translates educational imagination for these girls that objects them giving them the power to direct their destiny.

[FL] Amul [FL].

Say I have seen what can be achieved by one man in dedicate himself the task. We always say what can one man do? One man can create a noun.

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He had not enough knowledge or experience (Refer Time: 40:53), then he will know what he does known, then what do he do next is quite someone who knows (Refer Time: 41:06) From that region, (Refer Time: 41:08) Harishchandra, he Studied with me in America. He came for 2 days, he stayed for 35 years and it is he who build Amul dairy by nearly (Refer Time: 41:27).

So, what you must know is what to grow (Refer Time: 41:34) and when you realize, you do not know; then you will find someone who knows and then everything will happen. Thank you.

[FL].

So, this is an excellent example of how do you combine strategic partnership, strategic interactions which are part of social innovation and then, you bring in technological innovation and together they achieve the task.

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Designing transition paths for the diffusion of sustainable system innovations

The model can be defined as a *strategic orientation* and *adaptation* of the steps that, starting from an university research context and through a continuous and iterative multi-stakeholder learning process, brings to the experimentation, niche introduction and scaling-up/branching of sustainable system innovation concepts.

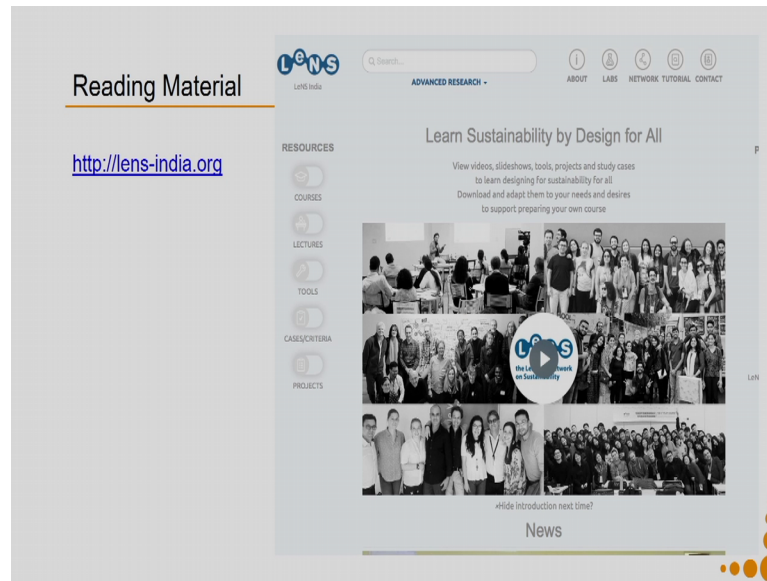
Vezzoli, Carlo, Fabrizio Ceschin, and René Kemp. "Designing transition paths for the diffusion of sustainable system innovations. A new potential role for design in transition management?." (2008).

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The next one is: Designing transition paths for the diffusion of sustainable system innovations. So, in this particular case, because sustainability always requires; so, our aim is we want to train people who can do this, who can create this who can diffuse sustainable system innovations in the market.

So, in order to do that, we have to train people in certain things. So, starting from an university research context and through a continuous and iterative multi stakeholder learning process which also involves like experimentation, niche market, niche introductions scaling or branching of sustainable system innovation concept that can also be a particular possibility.

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In order to explore this possibility Professor Carlo Vezzoli from Poli-technico Di Milano formed with some of his colleagues a network called as Lens network. So, its learning an education network in sustainability. Now, the network has grown up to include more than 150 universities all across the globe. So, you can see we also have a Lens India which is partnered by couple of universities from India. We, I also introduced this particular platform in our first lecture. So, you can go to this particular platform, the platform link that I gave here is of Lens India; but when you go into the platform, you can go to the all in individual, all the partner websites. So, they are web platforms on Brazil, China, South Africa, Europe and so on.

So, what we try to do is because each of our context are very different from each others. Say for example, the context in Brazil and context in India shares way much more similarities. There may the context in Europe. So, each country platform tries to do they because these platforms are located in universities. So, through university the professors and the students of the university together try to experiment, explore different ways and try to disseminate these knowledge.

So, all the knowledge that we are trying to explore is disseminated on this particular platform. It is open for everybody to use it in any particular manner that they want to use it. So, you can have resources like courses, lectures, tools, case, different case studies and criteria's that were developed and different projects that we do.

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Sustainable product service system and policy approaches. This is from what the governments can do. So, governments can play a crucial role in supporting the adoption and diffusion of SPSS by developing policy frameworks and stimulating proper conditions.

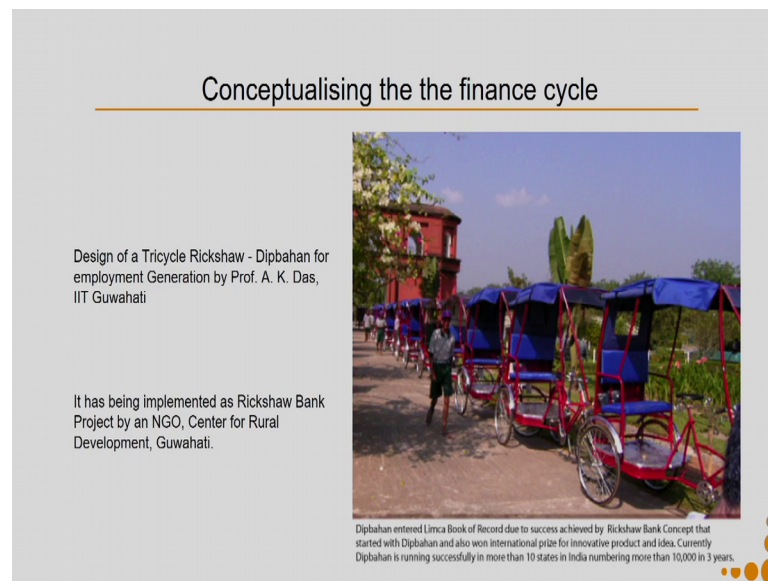
Say for example, in Indian agriculture because labour is very expensive and also say if everybody wants to harvest their fields at the same time which is the case, you will not find enough labour to do that. Now, all farmers cannot afford to buy their own tractors and it is also not advisable that you buy a your own tractor your own harvesters which are very expensive machines and which are going to be used for only couple of days in the whole year.

But in a PSS model, every farmer can get even the most expensive of machines because they only have to pay per use. So, in the XIIth 5 year plan there was a submission on agriculture mechanization which set the machine proposes to cater to adverse economies of scales by promoting custom hiring services through the rural entrepreneurship model.

So, the government through its policy wants to promote rural entrepreneurship in a villages, wherein some people in the villages can own these particular machinery through support from government agencies. And then, they will run these machines by in a PSS model giving services to everyone.

It is beneficial for all farmers because your harvesting can be done on time at a affordable cost as well as you can have more efficient machines because the more efficient machines might be more expensive. So, if you as an individual want to buy it, you may not be able to afford them. So, you might go for less efficient machines which are more affordable. So, governments can contribute by proper policy approaches.

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Another part is conceptualizing the finance cycle. So, this is one example from um this is a design by one of our professors at IIT Guwahati, Professor A. K. Das, he designed a tricycle rickshaw and it is called as Dipbhan. Now, the problem in this sector that he observed was people do not have the means to buy these rickshaws. So, as a result, the cycle rickshaws will be bought by somebody and the cycle rickshaw of drivers they are basically employed by these people. As a result, the major part of the earning that he does during the whole day goes to the owner of the cycle rickshaw. So, the cycle rickshaw drivers remains into a week cycle of poverty and he is not able to come out of it.

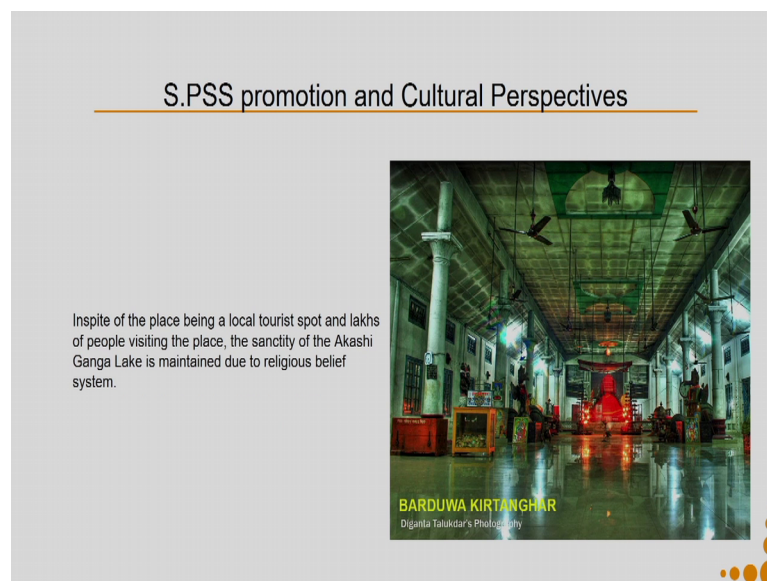
So, along with this particular tricycle rickshaw design, he along with other people created this rickshaw van project with the help of an NGO and the center for rural development at IIT Guwahati. What is Rickshaw Bank project does? It brings in microfinance into this sector. So, the rickshaw pullers, they can take a loan from these

this in a microfinance scheme and in this case at a very low rate of ret at which this person has to return back to the money.

This person can become the owner of the rickshaw and the money that he earns during the whole day remains with him. Dipbahan entered into the Limca Book of Records for the success that it achieved by Rickshaw Bank concept that started with the Dipbahan. It also won many international prizes for the innovation product service idea. Currently Dipbahan is running successfully in more than 10 states in India, numbering more than. So, within first year 3 years of its launch, it was more than 10000 in number now it has reached more than in a couple of lakhs.

So, here you can see is very important finance cycle. So, your product when it has to be introduced into the market, again this one is not an example of a PSS as we had defined PSS. But why I bring in this particular concept is because in order to show that a product a great product design to succeed in the market, it might also need some financing possibilities; specially in the BOP segment. So, this is also an area where the governments can contribute that let us develop a finance cycle. So, that eventually the rickshaw puller becomes a owner, but it also brings him out of the which is circle of poverty.

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Another aspect which we can which as designers we can consider is s PSS promotion through a cultural perspective. Say for example, Barduwa is a local tourist destination.

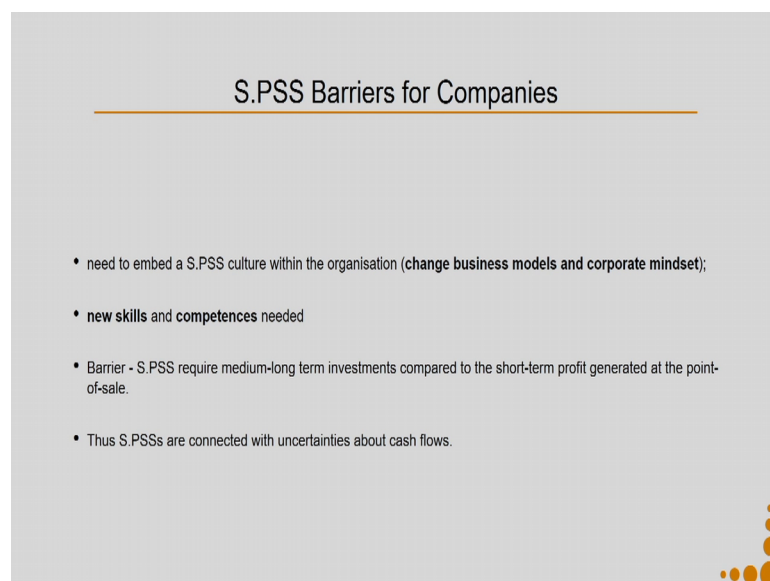
This particular place is in the Nagaon district of Assam. This is the birth place of Saint Shankar Dev, who established Vaishnavism in this particular region. So, during 2 festivals in the year lakhs of people visit this place, this is the rural area.

In spite of so many people visiting, this place has a huge lake it is called a Kashi Ganga lake. The lake is considered Payas; nobody is allowed to take a bath in that lake or to pollute that lake or to kill the fish in that particular lake. So, in spite of so many people visiting this particular place because of this cultural perspective that this lake is very very Payas; nobody goes and damages the sanctity of that particular lake.

So, cultural perspective is a very important aspect. The meaning of the cultural perspective may vary from region to region. So, as designers we can also think how we can use the cultural perspective of a particular group of people to design for spaces. Say for example, culturally our parents. So, at home our parents would always say wasting food is a big crime.

So, culturally we see wasting food as a big crime, but now the same crime is committed in abundance by people living in hostels or people dining in say company cafeteria. How as designers we can bring in the same cultural perspective may be so that people see to it that they do not waste food even in hostel messes or company cafeterias.

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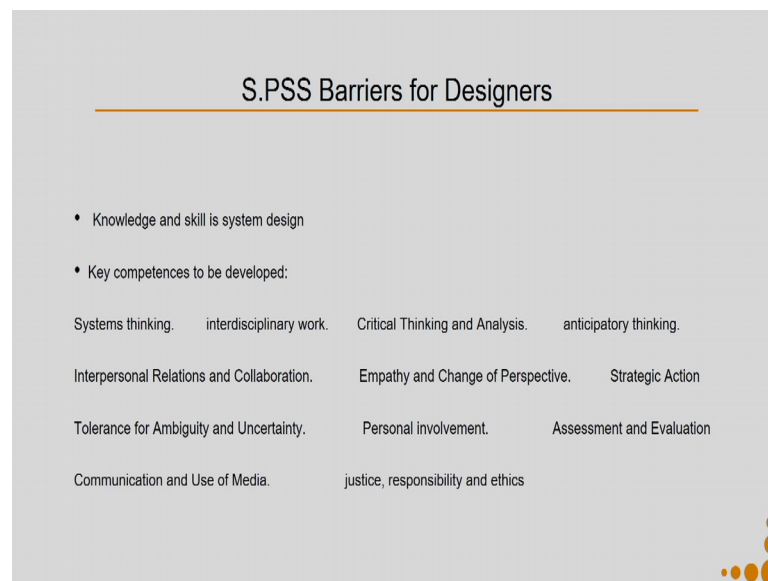


S.PSS Barriers for Companies

- need to embed a S.PSS culture within the organisation (**change business models and corporate mindset**);
- **new skills and competences** needed
- Barrier - S.PSS require medium-long term investments compared to the short-term profit generated at the point-of-sale.
- Thus S.PSSs are connected with uncertainties about cash flows.

A big barrier for s PSS implementation to companies is firstly, it needs to change your business model and the corporate mind set the way you operate. So, you need new skills and competences to do that. Another problem a very big barrier is whenever you want to do a PSS your initial investment is very high. So, you require medium and long term investments compared to short term profit generated at the point of sale which is a big barrier which is a big economic barrier for any company.

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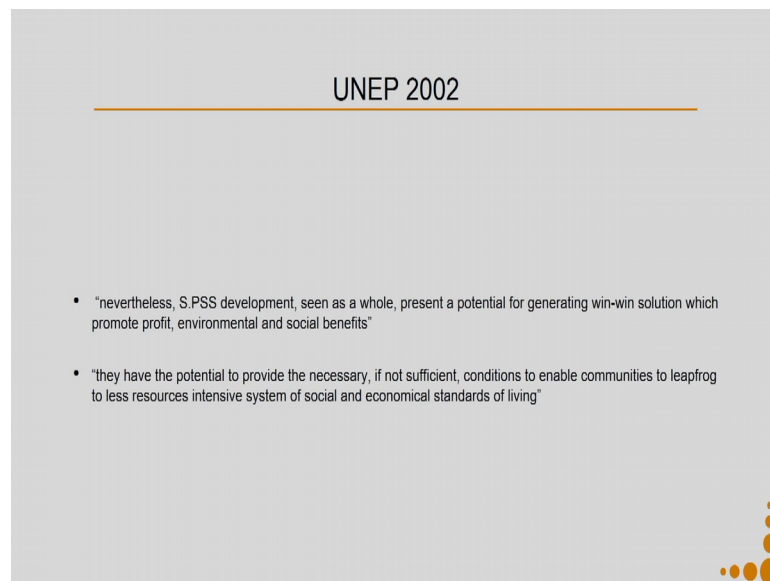
So, we have to figure out how do we resolve that particular issue as well. These as spaces are connected with uncertainties like in cash flows. So, these 2 become the economic barriers for companies S.PSS barriers for designers. The biggest challenge for an designer here is knowledge and skill in system design. So, there are certain that will competencies which a designer need to develop in order to the good at S.PSS um related design. These competences are systems thinking, ability to do interdisciplinary work or ability to work in interdisciplinary team.

Critical thinking and analysis, anticipatory thinking; you need to anticipate what will happen, what will be the result of your current decisions on future? Interpersonal relations and collaborations; so, how people relate to each other; how they interact with each other; how stakeholders interact with each other? Because, you alone cannot give it; it has to be a combination of stakeholders who give that. Empathy and change of

perspective; strategic action, there is lot of ambiguity and uncertainty in this particular field.

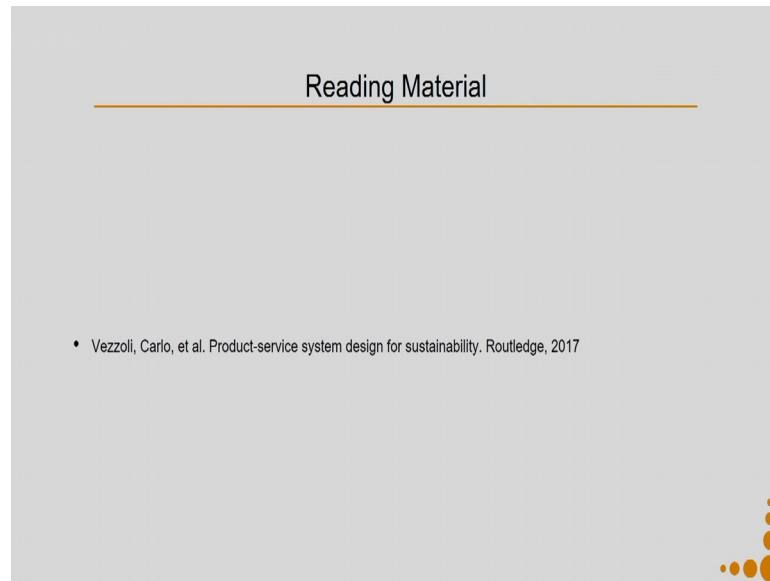
So, Tolerance for Ambiguity and Uncertainty; Personal involvement the skill to do assessment and evaluation of a various parameters into sustain ap to see their impact on sustainability; Communication and use of Media; Justice, responsibility and ethics.

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According to United Nations environmental program 2002, "nevertheless, S.PSS development is seen as a whole, present potential for generating win-win solution which promote profit, environmental and social benefits." "They have the potential to provide the necessary, if not sufficient, conditions to enable communities to leapfrog less resource intensive system of social and economical standards of living."

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So, the reading material remains the same for this entire S.PSS lecture.

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In the next lecture of the week, we will get into discussing about methods and tools for design for S.PSS.

Thank you.