

## Lecture - 19 : Role of Technology in Sustainability

Hello viewers, welcome back to this NPTEL course on Sustainable Happiness. In the last class we are talking about sustainable organizations, how the organization should make effort to make their organization more sustainable. So, in this context today we will discuss about the role of sustainability. So, you know we are facing nowadays the problems you know like the you know how to reduce the carbon footprint of the organizations, how to combat with the climate change and how to enhance out what to practice the sustainable practices within the organizations. how to how to satisfy the needs of all the stakeholders. So, in this way because it affects the brand name of the company.

So, how to enhance the company's reputation, how to foster the goodwill ah among the consumers, stakeholders, investor ok. So, that in increasingly making the choice based ah choice based ah you know services choice based products ah ah for the environmental impact. So, in this way sustainable organization is you know now nowadays they are adhering to they are applying new technology. Nowadays more of more of it is now it is more of green technology.

So, how to that means, how to identify which technology can actually help us in mitigating all these ah climate change challenges are or they develop also new some business models where The logistics will be there, the supply chain will be more robust and sustainable practices will be there. So, which can benefit not just the company, but also the stakeholders. So, they are either they are developing the new technology, new softwares or or identity or procuring it after identifying these right kind of things and or procure it from different sources. However, nowadays then you know AI also plays a very important role in enhancing this sustainability impact etcetera. So, for example, the companies they are seeking the solutions for the renewable energy like solar energy, hydro energy and wind energy.

So, if they are planning to install this kind of plants and this infrastructure in the company in the organizations. So, therefore, thereby they have to identify how the technology can help us help them in enhancing this energy solutions, what sort of software, what sort of plant design should be there. So, it not just address the renewable energy solutions, but also it also reduces the cost, it should be cost effective and it should be sustainable in the long run. So, in this way how to mitigate the risk associated with the climate change, resource depletion and how to you know how to satisfy the customers, consumers. So, the minimum social unrest, minimum complaint, minimum negative feedback will be there.

So, in this way they are not just trying to adhere to the sustainability practices, but

enhancing their effectiveness, the logistics, the technologies, enhancing the all kinds of the functions and operations. So, in this way nowadays organizations there are you know they are also maintaining the operational continuity like primarily related to the logistics and supply chain activities, marketing activities for safeguarding the long term viability. You know suppose for example, the company being very over enthusiastic. So, they spent they invest the money in marketing in publicity that we are the sustainable organization so and so etcetera. So, making publicity is very easy and you know and giving the big advertisement in marketing and these are very easy, but to actually achieve it to practice it is very very difficult task.

So, they have to you know they have to develop a model. And, they have to look into every aspect production, marketing, research, operations, then supply chain, then consumer behavior, consumer satisfaction, consumer services and investors you know investors motivation in investors commitment or you know in investing commitment in investing more money funding for this development. So, all these aspects also be properly balanced this would be properly balanced operation balanced approach to move ahead in the direction of sustainability with green technology with AI AI of course, AI is there with AI sustainable AI approach green technology and you know very logistic approach and very you know sustainable approach in supply chain as well as the marketing. So, in a very planned way they have to not just they have to develop a business plan, but also execute it monitor it regularly ah. If it is if needed then they have to modify it revise it update it and and they must have the forward thinking approach and how to embed these kind of forward thinking and resilience approach how and ah.

looking into the feedback or you know working on the feedback all these are the these are should be the action plans those are this would be the strategies they must adopt to move ahead towards the sustainability and sustainability to deal with the any kind of uncertainty and also to be a sustainable future in this world. So, now role of technology as we can say technology underpins the ability to track, manage, improve upon the sustainable practices. So, why technology, why do we need the technology? Because you know technology you know enhances not just efficacy, but also quality of services, quality of products and technology also helps us to get the quick feedback about about the consumer data about the about any kind of difficulty in the in the processing. So, to have to track to manage and to improve any kind of loopholes if it is there then technology can help us in quickly identifying it and dealing with this and sorting out the issues. So, it helps technology primarily acts as a facilitator or accelerator of sustainability goals.

So, energy efficient technology nowadays you know are the green technology are in the forefront for this technical revolution. AI is there and IOT is there internet of things there, AI is there all kinds of softwares are you know there. So, for you know for bringing the

advancement in building design, business plan, how to minimize the energy cost you know energy cost not just in lighting and etcetera, but also switching over to sustainable by switching over to sustainable energy clean energy. So, all these things it through technology process improvements in manufacturing, in service, in logistics, in reducing the So, in this way technology plays a very vital role. So, AI algorithm can also helps in predicting the maintenance needs, what actually technical needs are there, manufacture needs are there, customer needs are that AI can predict it.

So, AI can predict the maintenance needs reducing the you know even the reducing the you know cost effectiveness, the lifetime or maintenance cost of the equipments. Similarly, data analysis can also track the sustainability metrics, you know like nowadays sustainability metrics, ESG metrics. SDG matrix all the companies they are following this matrix format. So, that they can monitor closely what is the degree of their progress what is the rate of their progress. So, now, the green tech innovations applications and you know and how to how to use the renewable energy for the biodegradable biodegradable materials that is waste management.

And for example, advancement now it is an EV mode EV mode EV battery EV battery electrical vehicles, chargeable battery storage, these are also being used. So, how extensively it is can this EV batteries can be used in the plants also in the organizational setup also. So, with the solar and wind energy becoming more sustainable viable and chargeable cost also, what would be the chargeable battery charges cost. So, that we can adhere to the environmental sustainability that is by reducing the environmental impact. So, the integration of these technology, but in a very you know very sophisticated very you know very strategic way.

So, many technologies are available, but which organization is going to apply adopt which type of technology. So, it again it also requires a kind of planning. Because, technology use of technology is there, but technology is to be fit into the framework organizational framework which moves or which can maintain a balance in social or social sustainability, environmental sustainability and economic sustainability. So, how to balance it? So, sustainability objectives can be more efficiently and effectively addressed. So, nowadays also the real time monitoring system, the online real time monitoring systems and some of the kind of you know adjustment practices are also there which enable the organizations to ensure that the environmental impact.

Quickly you can assess, organization can assess what would be the environmental impact, what would be the cost of the resources, how it can be minimized, how the resources can be can be duplicated, can be replicated or can be recovered and they are recovered so, restored. So, how sustainable you can use the resources and responsibly create a create a

product to produce the goods and services that is also an important factor. So, now we can see the role of technology as the picture says that it has primarily these are the broader areas of the activities and functions as you can see. First is that energy efficient techs it helps in building designs, process improvements, planning etcetera and data analytics and AI helps in making the sense of the data like when If suppose big organizations they are having the many customers in across the countries ok, millions and trillions customers across the countries in with hundreds and thousands of branches etcetera. So, in that context they must need they must have then overview of what is going on, what type of needs are emerging, what is the variations, what is the what is how do they differ, what is the range of diversity.

So, all this now see here data analytics and AI can help us in making sense of the large data. And the I mean also category wise how to divide device it how to divide it in categories, sustainability Then predict the maintenance cost and how it varies from one country to another country or one product to another country where the AI can help us in identifying that you know the differences. So, here data analytics and AI that is another thing for closely monitoring, assessing and you know revising the strategies. And the green technology innovations that is for primarily used for renewable energy, biodegradable materials that is for the waste management and battery storage that is creating the solar battery or the you know wind batteries can chargeable battery system. So, now the key challenges are even if we are using the technology there are also many challenges.

First thing is challenges is that balancing the cost with sustainability is like yes every organizations primary need is to maintain the sustainability equally balancing the environmental social and the economic sustainability. But at the same time how to balance the cost, they will go for the technology it is ok, they will go for strategic business plan, they will look for more investor, they will try to provide the better services, but again all the cost should be the cost effectiveness should be there. So, while how to balance this cost with sustainability, it is because sustainability requires a lot of things to be done, to be practiced, but how whether it compensate whether whether it is affordable, whether it is it can be balanced and cost effectiveness all these issues are also challenging. Sustainable practices are often expensive like for example, when you go for the renewable energy for the solar installation of solar panels, wind energy plant, hydro energy plant. So, initial infrastructure installment is very very expensive, where at this moment whether the organization is ready to afford to that kind of investment or not.

Similarly, sustainable technology and processes can also lead to significant cost saving in the long run one, but it is the initial stage the installation charges in the installation cost is very high. So, in the long run it can definitely improve the efficiency and reduce the resource consumption etcetera, it can make the whole process very smooth and sustainable.

But anyway you have initial stage you have to seek you have to look for the government grants or the subsidies available or investing in the cost saving sustainable technologies or in the initial stage you can also hire and the hiring basis you can also try it out you know which are and you have to seek the practical solutions to you know to in the to to to to avoid the such a such a big amount of money such a big amount of investment if you are not being able to afford it at the moment. Big companies as they can do they have they can do they can afford to do it they can afford to install new plants etcetera. Because they have kept separately some amount of money for the new ventures technology innovation they have separate fund, but the beginners all the MSMEs or the small time organizations.

So, the initial stage it is very difficult, but once it is run means now it is profit making. So, resistance to even within the organization also again human that means, now technology The best example is that in the banking sector when the technology was invited was made was made mandatory to be to be used by the all the staffs banking staff. So, initially the traditional employees of the bank employees they they used to resist it, because they were not acquainted it they think that it is a threat to their job. jobs that is where they the you know they start resisting it. So, how to how to address this resistance, resistance to change in you know is another significant challenge because some staff may be the senior staffs they are not ready to accept it quickly, but to mentally prepare them to train them to you know to make them understand through training again to orient them towards its that means, towards its operations towards its functionality.

Because even if that board that means, organizational boards senior boards they have taken the decision to install so and so technologies. Before actual installation operation they have to educate the people their staff through training, through practice, through orientation etcetera. Then only they can embrace with the technology. Similarly, similarly the sustainable. So, again another is the new business plan this would be they should you know they should bring that transformation that they should transit that they should adopt to the new sustainable business model that requires a lot of fundamental shift in the company's cultures, operations, supply chain.

and the preparedness that my preparedness or you can see the employees readiness to accept it and then and then employees knowledge and understanding then management to to bear the cost cost. So, all these things it requires a lot of homework you can say lot of homework. So, it so, it is that kind is again the buffer period is there for all these kind of before you launching actually the technology solutions etcetera you have to train all these people they have to do the homework. do the cost analysis all thing through the through ah through ah through different analysis taking the opinion feedback all kinds of the. So, there must be every organization before starting any new venture in sustainability ah endeavours.

So, they must do some kind of homework and need a buffer period to operationalize it to practice it. The you can say they must have a pilot phase So, comprehensive education and training is also is very much required to mitigate this resistance from the employee side. And communication, most importantly communication is that all kinds of communication, circular communication, top to bottom, top down communication, bottom up communication. So, all across the communication is all again it facilitates it benefits sustainability in the sense that empowering the employees there should be that means, all the all the from the grass root level to top management all every employee knows everything in detail. So, communication should be very robust because through communications not just empowers the employees, but also it builds confidence among the employees and the board members and the you know to work together to work together.

So, to bring that changes to accept that to embed their sustainability in their platform. So, supply chain also chain complexity also poses a challenge you know supply chain is know it is a very very crucial thing in the production operation management and marketing etcetera. So, supply chain how to make the now so, many strategies are being introduced in management also you know. sigma or all any kinds of strategies to apply it for the supply chain. So, similarly how to make the supply chain is a whole sort of you know sustainable supply chain system.

So, that is why for that you know again in the supply chain sustainable supply chain also you have to ensure about the ethical standards, the rules, regulation, environmental standards, upheld by the by the government laws and suppliers etcetera. So, because now it particularly it is very difficult when dealing with the large number of suppliers. And, different countries having different regulation, different needs, customer needs, different you know different valuation of the resources, different you know value of this different kinds of commodities etcetera, demand also varies. So, in this these poses actually the challenge. So, in the business model all these things would be addressed properly with proper monitoring, evaluation, market research etcetera.

So, developing a stringent sustainability standard and performing the regular supplier audit. So, here audit feedback and audit process is very important. Audit process for everything for suppliers audit, for consumers satisfaction audit, for you know for customer audit, for investors audit everything audit should be there and how and feedback how feedback should be should be taken into account. So, suppliers audit can also ensure the compliance, compliance and how much you have been successful in complying the needs requirements and standards standards. So, one is that to ensure the compliance.

So, for constant monitoring evaluation suppliers I mean all kinds of audits and the feedbacks that means, voluntary feedback should be practiced to promote the quality of

supply chain to promote the customer satisfaction all kinds of things. So, now, the key challenges as we have already discussed challenges in balancing the cost with the sustainability. Another thing challenges with resistance to change to the sustainable solutions and challenges with the supply chain complexity. Supply chain process itself is very complex then how to develop the stringent sustainability standard and how to practices that is again biggest challenge. So, these are the very key challenges and how to find out the solutions and initial stage and in the pilot phase in the trial phase organization should So, here there is a trade off between there is a trade off between sustainable what you are investing what you are trying to make bring the sustainability in the organizations and other hand what you are doing you are performing at the end of the day.

So, whether it is eco friendly or not how it is being because so many things are integrated. So, it is not a there is no direct customer and the direct one to one kind of things were relationships or the connections. So, continuous innovation, commitment to research, market research is also it is a very important factor. So, you know market research, continuous innovation, customers feedback, stakeholders all kinds of the feedback, suppliers feedback, customers feedback, employee feedback, investors feedback. So, on the basis of that feedback again you have to develop the audit report.

Now, it is ESG report is now is very important environment society and governance. So, the part all this kind of you know all this kind of feedback mechanism and reports and the analysis will definitely help to bring the continuous improvement in the continuous improvement in the organizations. So, sustainability is not a very fixed and permanent kind of thing. Every day if you keep on doing keep on doing the same keep on practicing the new things keep on modifying and innovating some bringing some innovations definitely is move towards a sustainable Starting from your material to process to practice to mechanism to research to everything. So, then slowly and steadily every day your performance will be improving.

So, that so, to bring that quality change quality improvement in the organizations and making it more sustainable slowly and steadily and futuristic then every day you have to make it on the day basis that you cannot think that we are we are already sustainable we are already established as sustainable branded organizations we need not have to do no. It is a continuous activity, it is a continuous learning process, it is a continuous practice. Now, sustainable again another important other resources technology is a resource your finance is a resource and your other kinds of resources are also there, but I am almost above all the employee, employee or the human resource is the most important because they are dynamic, they are you know they are flexible, they are dynamic, you cannot control, you cannot control all other resources you can control, regulate, monitor etcetera, but the human resource you can never control and regulate. Only thing is that you can motivate them to

do something to accepting to bring the changes. So, how that is that improving the well being of the employees.

So, now, United Nation also focuses on these thing on sustainable HRM practices and sustainable HRM as a very it is a very vibrant. is a very vibrant topic nowadays and as a variant of the people management. Every organizations you know employees are different that work nature of the jobs are different their skills and are different their work culture context different work culture different. So, people are that means, even if employee also across the organizations are diverse.

So, how to manage the people. So, and sustainable HRM actually says that people management approach should be should be you know it should be immersed as a. as an progressive having immense potential to be very creative, to be committed, to be very innovative and to bring the better organizational to bring the you know improvement in the organization in the continuous process. It is not just one night, one day or one month kind of affair, it is a how to bring the continuous continuous improvement. So, it is a continuous affairs set of practices to make the better organizational and societal outcomes. So, when the organization is effective, organization is sustainable its impact on the environment will be sustainable.

When the people are happy, employees are happy, so customers and stakeholders will be happy And when all the all the organizations and people are doing the sustainable practices definitely its impact on the environment is positive. And in this analysis also audit all kinds of audits also ensure us yes it is cost effective and again finance economical perspective it is also affordable and cost effective practices. So, now, the sustainable HRM as you know sustainable HRM has been you know it is a very broad area, but it has been defined as sustainable HR foster the organizational practices which are beyond profit maximizer. Now, organization every business house every organizations every MSME every startup they have some definitely some economical goals and prospects and the prospective goals and objectives are there definitely, but that is not the only goal. So, sustainable HRM fosters on the practices which goes beyond.

Even though even though you are you are you are you have started an organization, you have started a started an you know startup etcetera, its goal is definitely to run the business to make the profit, but that is not the ultimate goal or the only goal. So, the similarly HRM means human resource practices must be beyond the profit maximization. Because, profit margin profit is required is otherwise you cannot thrive in the market, but your sustainable HRM practices will be beyond profit maximization it is it will be more future oriented. Here all the issues comes in like how to identify and retain the talent, how to may motivate the people to be. committed to the organizations, how to sustain and sustaining the human



social and environmental resources.

Once you sustain your human resource, you can also procure the you can also secure your social resources, your environmental resources, thus it is enduring a long term survival of the organization. posters, posters all kinds of practices which is and which is which goes beyond the profit maximization and which ensures that ensures the human resource sustainability, talent retention, social sustainability and effective effective use of environmental resources and giving back to the community and so, for the long term survival of the organization. So, it is a kind of you know sustainable HRM brings a kind of human phase. human face of the organization that is yes it is pro people, it is people friendly, it is environmental friendly kind of organizations. So, sustainable a similarly sustainable employee well being is also means focusing more on flourishing employees, their development because they ultimately they are the human beings, you know commodities or things.

So, flourishing employees means not just not just only addressing their needs, satisfying their needs, gratifying their needs, but also make them or help them in growing up, help them in flourishing in their life. So, to take care of their needs, their hopes, their ambitions, their aspirations. So, so that the employees feel can have a better feeling of his job experiences work experiences. So, Florence is employees means experiences better well being.

So, once they it is beyond just job satisfaction. So, how that means, they will enjoy the workplace, they will enjoy the work. So, the it is kind it can it brings a kind of positive transformation in their ex working ex work experience. So, that can be that can be moved towards the well being. So, who reach the full potential in this well for example, what they are they have been working here in same organization for 15, 20, 25 years. Now, over the periods they have evolved their development have taken place their full aspirations and needs ambitions have been achieved have been achieved.

So, in this way they just grow they grow to the from one limit to another limit beyond their expectations. So, that kind of quality improvement. So, quality improvement not just in the products and services, but in the quality improvement in the employee. Employee needs need gratification their development, their nurturance, their ambitions and goals which can bring that benefit that because that the indirect benefit their employee development that brings the indirect benefit to the organizations. So, which can help the organization to be more sustainable and futuristic.

So, in this way the training is also very important part. So, to capture the economic benefit of the you know because you know quality this is a kind of qualitative impact quality

improvement quality qualitative you know impact positive impact. So, employee sustainable HRM means economic benefits of the good health if the employees will be having the good health definitely your compensation everything will be cost will be reduced. So, helping the employees to achieve more optimal health giving them space time etcetera for to you know to satisfy their needs. to gratify their personal needs to to relax to you know to rejuvenate their energies etcetera. So, helping the employees to achieve more optimal health once they are happy having mentally and physically having and maintain their own positive health definitely they can contribute more Similarly, from time to time employers should change the norms, strategies, policies for catalyzing the innovation around the employee health, well-being by introducing new policies, new interventions and engaging other stakeholders like you know local governments or medical functionaries etcetera.

So, policy decisions that because policy decision also deals with the varieties of the ways to protect and promote the employee health. New policies are emerging in the across the organizational sector. It is not just about diversity, it is not just about the mental health, but it is also equal pay, inclusiveness, inclusive policies, equal pay then you know and even nowadays for policies for you know for recruiting the you know differently abled persons for them and how to promote the and nurture the different kinds of skills. So, total so, and starting from the total working hours, health coverage, you know access to therapy and employee counseling centers, you know employee. skill development center, psychological resources available, you know starting from the yoga, meditation to gym to hospital, dispenses to marketplace.

So, for example, the thing is a basic purpose is that whenever the employees enter entering into the venue into the campus in the organization. So, then we are providing all kinds of facilities. So, at the end of the day when they are leaving for the home they are giving their maximum time to the workplace. So, when they are leaving for the home so, at least they can take care of their household goods needs requirements etcetera. So, shopping malls and you know even for the health check up all kinds of facilities are there.

So, end of the day they can get the things you know they can collect the things they can buy the purchase the things. procure the things and go back to the home. So, that they can leave a very peaceful and satellite. So, enhancing the standard standards and the transparency of your employee you know practices employee trainings practices also to make a informed choice. Like for introducing any kind of new policy new strategy everything they should be well this would be well informed all the employees would be well trained well informed to make an informed choice after giving the right kind of all kind of information etcetera.

you are employing the organizations they are empowering the employees to make an informed choice informed choices. So, and at the same time. Allowing the policy makers also to suppose they are introducing a new policy. So, allow not just to make the allow the employees to make the informed choice also at the end of the session or a few after quarter of the quarter of the working working you know working days etcetera. So, they can also make an audit of audit make an to make an make an audit and evaluation of all the people in the wider scale whether this policy is very effective or not or we need to bring some change.

Because, whatever they introduce it has to cater to the all types all categories of employee categories of people involved in they may be the stakeholders, customers, investors, suppliers as well as your employees because ultimately it is a sustainable HRM human resources involved either directly or indirectly. So, you must make from the organization must make the audits from time to time sustainable for to enhance the sustainability.