

**Designing Work Organization**  
**Prof. (Dr.) Santosh Rangnekar**  
**Department of Management Studies**  
**Indian Institute of Technology, Roorkee**

**Lecture-23**  
**Managing Technology Change**

In this particular session, we will talk about the managing the technology change. Under this session, we will have these ambidextrous organizations, techniques for the encouraging the technology change, new products and services in which new product services rate, reasons for the new product success and the horizontal coordination model. Then Ely's conditions of change in the technological transitions. People process technology that is a PPT framework, break-down change management into small steps and as usual the book recommendations and the differences will be there. As I mentioned that is these external environmental factors which we have talked in the previous sessions that is social, political, economical, legal and technological. These changes are keenly observed by the organizations and whenever there is a technological change, the number of the manpower that also changes because you replace the manpower with the technology and in today's business world, any company that is not continually developing or acquiring or adopting the new technology will likely be out of business in a few years.

So, managers can create the conditions to encourage the technological changes are there. An innovative organization and when we are talking about the industry 4.0 organization, this is totally based on the artificial intelligence, machine learning and all. So, an innovative organization is characterized by flexibility and empowered employees and the absence of the rigid work rules are there.

The challenge for managers is to create both organic and mechanistic conditions within the organization to achieve both innovation and efficiency is there. Technological change in the technological process, where the more and the better technology is coming. Now, we are seeing that is new and new generations of the technology are evolving and therefore, in the manufacturing process, we have to adopt those particular technology is changed. So, this is a subset of the technological change technique and the know how is there. Now, that this technological progress, which is the further development of existing product services and the process technology is there.

So, it is the emergence of the new technologies which is making the technological progress. So, these technological changes and technological change progress, are inter-relevant and whenever there is a technological change is there, so it is going to be the in

the progress steps for the new skills adaptations. The ambidextrous organizations are those organizations, decentralization and employees freedom are excellent for these initiating the ideas. But these same conditions often make it hard to implement a change because employees are less likely to comply is there. Now, here when we see the one side, there is a evolution, then the corporate, then the control and monitor, the scales, the causes and effect optimize and the cost is there.

While in the case of the other side, we find it is a revolution, the startups, the trial and error, the speed, cause and effect, create and the breakthrough is there. Now, one remedy is for the organization to use an ambidextrous approach to incorporate structure and management processes that are appropriate to both the creation and the implementation of evolution. So, therefore, exploration means encouraging the creativity and developing new ideas, whereas exploitation means the implementing those ideas to produce the routine products are there. So, here it becomes very important that is organizations are to be exploratory. More and more they explore and like in the water cooler talks, they are developing the new ideas, they get the new concepts and whereas, you will find that is these are leading to these the organizations are there.

Now, the general manager is in the ambidextrous organization, it is one is a creative department and other is the using department is there. So, when we talk about the creative department, it expand the capabilities because they are coming out with the help of new ideas to the new technology or they are coming out with the new production system, process systems, or technological systems. So, they explore and develop the always the new ideas and create an organic structure is there. But whenever they are using this idea and here is the role of the organization structure is there because those ideas that has to be implemented, implemented through the organization process and this organization process involves the organization structure. So, these they exploit the capabilities and the routine application of the new ideas is implemented by the employees and this is the mechanistic structure of these organization is there.

Techniques for encouraging the technological change, some of the techniques used by the companies to maintain an ambidextrous approach are switching structures. So, switching structures means an organization creates an organic structure when such a structure is needed for the initiation of the new ideas is there. So, always it is better that is the we are creating a such a organic structure. So, whenever needed we can make the changes into that structure is there. For example, Philips Corporation, a building material producer based in Ohio, each year creates up to the 150 the transient teams made up of the members from various departments to develop the ideas for improving the Philips products and the work methods are there.

So therefore, there is a separate structure has been organic structure has been created and where the Philips Corporation building material producers develop these ideas 150 transient teams have ideas which have been developed. After 5 days of the organic brainstorming and the problem solving, the company reverts to a more mechanistic basis to implement the changes are there. So, therefore, in this case, you will find that is these organic brainstormings are a problem solving are there which are reverting from the organic structure to the mechanistic structure is there because these organic brainstorming and problem solving that has to be implemented and how you will implement through your established the organization structure is there. So, therefore, that is called the mechanistic structure. So, this organic structure is to be more creative, more dynamic and they will giving these ideas and similarly, this mechanistic structure, there should be enough capabilities to implement those ideas.

So, one side is the ideas and other side is the implementation of ideas, then only we will say that is the ambidextrous structure has been become successful. Now, the creative departments are there. Now, in many large organizations, the initiation of innovation is assigned to a separate creative departments are there and the staff departments such as research and development, engineering, design, systems, analysis, create changes for adoption in other departments are there. So, one is that you bring the changes into the your own mechanistic department structure, but other is there is a separate department and that separate department is the that is giving you the more and more creative ideas and the job for that particular department is only to create the new ideas. Idea incubator, a type of creative department is an increasingly popular way of facilitate the development of the new ideas within the organizations are there.

An idea incubator provides a safe harbor where ideas from employees throughout the organization can be developed without interference from the company bureaucracy other politics are there. Now, here, if there is another beauty of these particular creative departments are there, whenever there is a creative department, so, they are away from the routine administration. So, as a result of which they will be no without it there will be no interference without any interference by the company bureaucracy because they are not part of that bureaucracy and therefore, they are independent and they can create or facilitate the new and new ideas which some of them will be implemented some of them are not. Like I would like to mention about this Apple and in Apple there was an incidence of this the iPod, that iPod should have the flash media or not and then the management decided that is the iPod should not have the flash media and it will be only the listening the music. So, therefore, in that case, it has been becomes a very successful and popular.

Now, this idea generation, and which has been a totally different aspect in case of this

the your regular concepts and therefore, in that case, this type of the creation of ideas that that has been kept separate apart from all your routine departments, sections, bureaucracy and all is there. There are the venture teams are there. So, venture teams are a technique used to give free into the creativity within organizations. So, therefore, in that case, these venture teams are they will be always often gives a separate location and the facilities so, they are not constrained by the organizational procedures are there. So, here these venture teams are working totally at the different locations and as a result of which they will not be giving the any constraint of the influence of the existing culture existing practices.

Numerous organizations have used the venture team concept to free creative people from the bureaucracy of a large corporation and one type of the venture team is called as S-Convox. S-Convox is a separate small informal highly autonomous and often secretive groups that focuses on breakthrough ideas for the business is there. Now, this particular scan work you will find that is the this is becoming a very, very popular practices and in which that is the you are having a total separate and autonomous team and often secretive group that focuses on the and it is not well structured of the part of the mechanistic your organization procedure and rather than it is having the secretive plan and that is focuses on group through the ideas and this type of the venture teams and they are located also at the different places. Next technique for the encouraging the technological change is the corporate entrepreneurship. So, corporate entrepreneurship attempts to develop an internal entrepreneurial spirit, philosophy and structure and that will produce a higher than the average number of innovations are there.

So, this corporate entrepreneurship it is becoming the entrepreneurial spirit and this philosophy and structure that will produce a very higher than the average number of the innovations are there. So, ultimately what is objective? Objective is to create the new and new innovations, objective is to make the technological changes and improve the productivity, objective is to create the best practices and very much key practices in the organization. So, here higher than average number of the innovations are will be produced by the organization and organization which is more innovative that will be more successful. An important outcome of the corporate entrepreneurship is and facilitate idea champions, idea champions provide the time and energy to make the things happen and they fight to overcome natural resistance to change and to convince others for the merit of a new idea is there. So, therefore, it is the always important that is corporate entrepreneurship is the practice so that they can create the idea champions in the organizations and new and new innovation will be developed by the organizations.

They fight to overcome natural resistance to change and to convince the others of the merit of the new idea. So, collaborative teams are there although many individuals have

creative ideas most innovations are created through the groups of people working together and the smart companies find ways to get people to communicate and collaborate across boundaries are there. So, here it becomes very very important that is the most whatever these many individuals when they are creating these type of the ideas and they come out with these creative work groups then definitely in that case it is expected organization will develop the many new innovations. Smart companies find ways to the get people to communicate and collaborate across boundaries are there. So, therefore, in that case the smart companies they develop the relationship with and communicate with the relationship with the other organizations other stakeholders across the boundaries.

So, in many ways the new products and services are a special case of innovation because they are used by the customers outside the organization. Since new products are designed for sale in the environment uncertainty about the suitability and success of an innovation is very high. So, therefore, in that case this is the when you are developing the new products and services then definitely the suitability and success of innovation is becoming very high because you have gone very systematically. To understand what is uncertainty can means the organizations consider example of US food companies for example, that introduced approximately 5000 new products into the supermarkets each year but the failure rate of the new product food products is a 70 to 80 percent is there. But still there is a 20 percent success which will be bringing to the cover the 80 percent failures.

Still organizations take the risk because the product innovation is one of the most important ways companies adapt to change in the markets and the technologies and the competition is there. So, therefore, in that case here it will becoming the very important way where they have to design the markets technology and the competitions are there. Now here we find that is the normally there are the 100 ideas are supposed to be developed by the organization 33 developed by the projects 28 pass all testing and the 24 fully commercialized and 14 becomes a successful in the marketplace. So, success rate becomes the 14 percent according to this source based on the M Adams in the product development and management association comparative performance assessment study 2004 is there. So, therefore, here you will find that is the so many ideas are there have been proposed by the separate team or the venture team are there and the out of which only the 14 has become the successful in the marketplace is there.

Message is make a free department make a free section in your organization. So, that they can come out with the numerous number of the many ideas and out naturally out of which certain will be the consider for the projects certain will be the screen out certain will be the introduces certain will be success and failures. So, successful new product

services seems to be technologically sound and also carefully tailored to customer needs and the following reasons often draw the deciding line between the success and the failure of products and services are there. Successful innovation companies had a much better understanding of the customer needs and the paid much more attention to marketing. So, successful innovating companies had a much better understanding of the customers needs and paid much more attention to the marketing is there.

So, the management support in a successful innovation companies was from people who were more senior and had the greater authority is there. Technological change impacts of technological change. So, employees issue employment issues are there business alliances, e-recruitment jobs become the intellectual is there and management strategy is decided the corporate restructuring planning for change well in advance and the participation of the employees are there. Trade union responses are there, the fear of losing jobs, fear of losing comfort in an organization is there and which is bringing the technological change. So, here we see that is for the technological change issues we have to consider the employment issues and the trade union responses are there.

When employment issues are there we are considering the all technological issues related to the e-recruitment jobs become intellectual and all. While the trade unions will be that is the their concern will be that because of the adaptation of the technological change there should not be a loss of jobs are there. And therefore, fear of losing jobs is there which make the organization can make them comfortable. Management strategy corporate restructuring planning for change well in advance, participation of the employees will be there. So, always the management will like to see that is there have been the change in the advance and the participations of the employees are there.

Ely's conditions of change. So, Daryl P. Ely was the first to emphasize the environment conditions that promote the change. Research suggests that the environment for innovation is equally important in the change success. The goal is to attain each of these eight conditions during the implementation is there. The first one is the dissatisfaction with the status quo, knowledge and skill exist, resources are available, time is available, rewards or incentives exist for the participants, participation is expected and encouraged, a commitment by those who are involved, and leadership is evident.

So, therefore, now we will see one by one. So, dissatisfaction with the status quo, participants must perceive the status quo to be less than the comfortable. And therefore, in that case, you will find that is they are not feeling the comfortable as they are having these if they perceive that is the current status quo is okay. So, therefore, in that case, if you bring the change, so they will not perceive it in a positive way because they are used to live in a particular standard way of working. So, there are the wide range of possible

causes for the dissatisfaction will be there amongst the employees.

So, diagnostic perspective will be more than a number, bad textbooks, test scores, who is dissatisfied and therefore, marketing perspective has to be seen understanding and dissatisfaction can help innovation is there. So, here it is becoming very important, there is a dissatisfaction with the status quo is very much necessary. If there is no dissatisfaction with the status quo, people will be in the comfortable zone and they will not like to bring any particular change. Knowledge and skills exist, people may believe that the changes are in order but without the specific knowledge and skills to bring about the change the individual is helpless. So, undertake the change to ensure that effective training is provided is there.

Whenever the resources are available, resources are broadly defined as I always mentioned that is the main machine material, money, method and minutes are there. So, these 6 M's whenever we are talking that is the whenever organizations go for the innovation, then he has to see that is the how we are going to be use these resources are there and if you are coming out with the technology, then definitely in that case, you have to consider that is the how you will be able to apply these your 6 M's are there, main machine material, money, method and minutes are there. And are these tools and other relevant materials that are accessible to assist learner to acquire learning objectives, are these resources are available? If these as your resources are available, then in that case, definitely the organization will be able to come out with the new changes and will be able to adopt also the new changes because it will be a flexible organization. Now, the time is available and the implements must have time to learn, adopt, integrate and reflect on what they are doing. So, here it is becoming very, very important that is the as I mentioned, this is the minutes are there.

So, whenever talking about the minutes that is the though you are having the resources, do you have that particular time to make the changes are there. In the competition what happens that is if you are not in able to make the competition or timely, then you will be lagged behind and if you will be lagged behind, then even if you come out with the new product development, then that will be less acceptable normally. However, there are a number of examples where those who are the late entrants, they have become the more successful that is also true. But in general, it is the early bird catch the worm that the data philosophy is to be followed. So, it has a time to learn, adopt, integrate and reflect on what they are doing.

Some employees may resist change if they believe they will not be compensated for the additional time or may refuse to invest time resulting in a poor change is there. So, here we have to see that is the we have to believe that is what has been compensated maybe

the additional time was there. So, we may refuse to invest the time resulting in a poor change is there. The rewards and incentives exist for the participants, regardless of whether the reward is intrinsic or extrinsic or whether it is seen as the result of the cause of the innovations used, it should be there in some form. So here it will become very important that is the whatever the rewards are there and they are not making that the consideration for the intrinsic moments are there.

So, therefore, here the employees they are innovation they are having innovations from their inside, then definitely they will become the more successful. While the in the case of then we are talking about the extrinsic rewards that is the materialistic rewards will be there and then that is to be pushed on. So therefore, we have to understand what type of the employees do you have? Are your employees are having the intrinsic motivation? Are your employees are having that extrinsic motivation? So therefore, in that case it becomes important that is the how you are going to be the implement this particular aspect of your the intrinsic motivation practices or the extrinsic motivation practices. Participation is expected and encouraged is there. This means shared decision making, communication among all parties involved and representation where individual participation is difficult.

So buy into the process with time, effort and ideas contributes to a sense of ownership in the innovation is there. So what is required that is you involve and encourage your employees. So here when you are increasing your employees and they are making their representation, then definitely they feel that is they are also involved with the part of that particular change. And when they become the stakeholders of that particular change, they make sure that is the change becomes successful. Buy into the process with time, efforts and ideas contributes to a sense of ownership in the innovation is there.

So whenever they are involved into this particular process, ideas, then definitely then they are having that ownership of this particular innovations are there. Recognize the leaders formally and informally and they recognize the leaders whether the as if of because of that motivation has been created maybe formally or maybe for informally is there. Commitment by those who are involved. So naturally those who are involved into the bringing that particular change, unqualified go ahead and the vocal support for the innovation by the key players and other stakeholders is necessary. So therefore unless and until there is not vocal support for the innovation by the key players and other stakeholders, so then they definitely in that case they will not be successful.

Expectation and encouragement all familiar with the flavor of the month. The innovation is it occurs even every few years, change requires effort, endorsement at all levels is a master and therefore those all employees those involved in bringing this



particular change, their commitment of the 100 percent is very much necessary. Leadership is evident. The very impact of the leadership have an effective influences, whether they are officially supervisors, role models, mentors or advisors, they are supposed to make this leadership very influential. They provide individuals with the inspiration and encouragement throughout the change process.

So therefore in that case this particular inspiration and encouragement is to be there with the throughout the process and change is a process and not an event is there. So therefore in that case it becomes important that is the always this particular change which you are planning that is required throughout the change process is required. So arrival of the technological change. So after this all considerations your committed team, your the organization structure change and now you arrive at the technological change is there.

So technological change is a strategic between actors. So therefore there are the different actors are there, relationship dynamics, position roles are there and the inter-firm resource mobilization and organization is able to mobilize their internal resources and inter-departmental coordination is becoming very strong. So here is the interaction history is there in the arrival of the technological change. So whenever there are the ideas and those ideas they are becoming the strategic between the actors are there and that relationship is developed among these all actors are there. Once relationship is developed their commitment is also increased. When the commitment is increased the resource mobilization that become faster and very timely you will get the inter-departmental coordination is there.

Now here the technological change determines of the technological change are there is a inventive activity is there, the state of the scientific knowledge is very much necessary. Research findings are there on the basis of your research and your analysis, the research findings are there, exempted the profitability from the interventions and assessed availability of these technological technical skills. So therefore in that case whenever you are having this type of these the resources dimensions then these dimensions are to be taken care of. Now when ability of technical skills are also there and then the inventions and innovations you are going for then expected gross profitability from the invention is supposed to hire. Now expected cost of the inventions will be there and when you are making that expected cost of the inventions it becomes more and more successful.

Here we have to also understand that is the determinants of the technological change in every aspect whether the state of the scientific knowledge is there of the employees or there is expected cost of the interventions are there. So then in that case you are

supposed to come out with your team which will be very strong collaborative and very flexible in nature. So it is a technological change is inevitable in current scenario, technology has to change you cannot avoid it. Generally ongoing activity but can be one time also, so innovation should be the continuous process and it should not be only one time. Occurs in all organizations at varying rate and the pervasive activity is there influenced by the internal and the external factors and leads to the changes in the products, services, tools, equipments, process, systems and the technologies are there.

Technology transition describes how the technological innovations occur and how they are incorporated into social economic system and the structures are there. And the technological transition also involves a change in technologies, restructuring and interventions, industrial networks is there, infrastructure is there and the culture is to be developed. So technological transition is having the two perspectives, boom and bust cycles and multilevel perspectives are there. When we talk about the boom and bust cycles, industrial revolutions, Victorian prosperity, the age of the steel, oil, mass production and the consumer society and the information age is there. So common in these cycles techno-economic, paradigm for experts and influence on technological change.

So there will be pervasive technologies, production structures and the economic structures will be there. Now MLP multilevel perspective will be there, there is a niche, regimen, landscape will be there and in the PPT framework, people, process and technological framework, it becomes very important all about how the three elements interact. The people do the work, processes make this work more efficient, technology has people to do their task and also has to automate the process are there. So the people refers to the human resources available at the firm's disposal. The firms are the person who do the task described in the process sometimes by leveraging the technology.

The one of the main task is to onboard the right people. Business need to identify their key employees with the right skills, experience and attitude for the job at hand is there. Now by Jeff Kavanagh's and the Refried Trafeder HBR article, new research from leaders and infosys indicates that across a variety of industries, the lasting long term change is most effective when it occurs over a series of the smaller micro changes and authors identify these changes for successful micro change management. So it deconstructs the big change into small steps, changing behaviour through the small modifications to habits and routines and continuously measure, learn, and evolve is there. In the case of this, Jeff Kavanaugh and Rafree Tarafdar break down change management into small steps, deconstruct the big change into small steps, large-scale enterprises transformation takes a long time and the value realization typically takes even longer. However, thinking micro allows an organization to deconstruct larger transformation into a number

of smaller initiatives that is have a very well defined objective and outcome is there.

Change behaviour through small modifications to habits and routines are there, each microphone should derive a small modification in a habit of routine. We call this "routine plus 1" and a small but the positive steps that eventually leads to the ultimate behaviour shift with the minimum resistance and the risk along the way is there. Whenever we are talking about the third one is a continuously measure, learn and evolve is there. So, whatever changes have been made to suggest that you need to frequently assess these initiatives to ensure the accomplished desired outcomes are there. When the deviate analyze the data rethink and course the character to throw interaction, embedded change measurement into the existing tools and evaluate for convenience adoption is there.

Break down change management into small steps is there. So, these two-dimensional evaluation framework can help measure a micro change adoption especially for software and that is a driven experience and the features are there. The fully adopted is 100 percent assimilated standard significant are there are some little percentage as per as the significant and prototype is having the lowest percentage into this particular era. This is the book which is recommended managing technological innovation, competitive advantage from the change. I am sure this book will help you that by John Willy and Sons is published for your the further detailing study on the managing the technological innovations are there. These are the references for your further detail studies you can go through these references. Thank you.