Innovation, Business Models and Enterpreneurship

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Lecture - 24
Technological Innovation Management Strategies

Welcome friends, in last few sessions we are discussing about the technological innovation process. And in our last session we discussed about the planning for technological innovation and in the planning process, as we know that planning is done for the future period. Planning is taking decisions in advance, that what we need to do in the future, and therefore, in literature planning is known as future course of action.

Now, with respect to planning, the other important term is strategy, when we talk of long term planning, the strategy is related to that long term planning. The genesis of this word strategy is from military science; where we see that how we are going to position, our army or our resources with respect to enemy's army in the battlefield so that we can achieve the target.

Now, this word is more popular in business environment, and therefore, in this session we are going to discuss about various strategies related to technological innovation management. And now to discuss this process of strategies or the different types of strategies which are applicable in technological innovation management program, let us go back to the discussion of popular S curve of technology lifecycle.

Now, as we have already discussed about product lifecycle in one of our previous session, and in our last session we discussed about S curve of technology lifecycle. Almost both these curves, both these cycles are similar to some extent, because these are similar in the phases of their lives. In product lifecycle also, we have 4 phases, and in this S curve also we have 4 phases.

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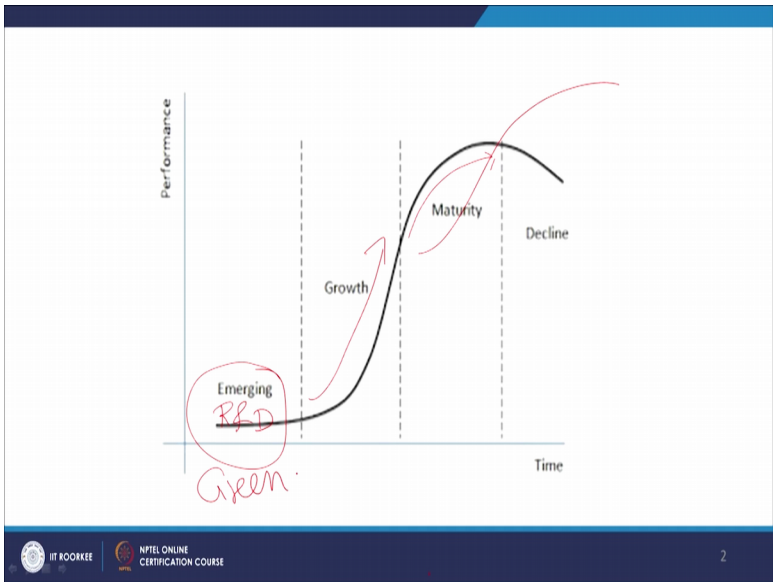

Now, as this diagram shows, that you have emerging technology that is the first phase, where the performance of that technology is very, very low; he performance index, the capability of the technology is not very high, and the technology is in very initial stage, where lot of R and D is also going on. Lot of iteration with respect to that technology is going on.

Then when the R and D is successful, we are able to develop good capabilities, we are able to get higher performance from that technology, then technology goes into this growth stage, where with less efforts with considerable less time with less investment, you get a rapid adoption of the technological. So, the performance index also increases and people also start adopting the technology, and then after some time technology goes for the maturity.

The meaning is that the performance of the technology or performance of the products, based on that technology cannot go beyond a particular benchmark, beyond a particular level of capabilities. And that is the meaning of maturity of technology, that you are achieving the maximum possible performance from that technology. And further increase in performance is not possible, however efforts, however investment, however ah cost you put into that technology. And because of that the next stage is the techlime.

Because at this time, some new technology will start emerging, and then that new technology will take the space created by this previous technology, and it is always

understood and we will discuss in our further sessions also that the new technologies are always considered to be superior technologies, only those technologies are going to survive, if a new technology is not superior, then that technology will not survive, that technology will not exist that technology will not create innovation.

So, for creating impact the new technology the successive technologies need to have superior performance. And that way from our wired communication, the telephone of graham bell to this mobile phone, the technology has moved in this superiority direction. And therefore, the concept of technology innovation management strategy becomes important, that how are you going to manage the innovation through technological innovation and what are the different types of the strategy.

So, the first important thing that we understood, that there are these different stages in a technology lifecycle, where you get very little improvement in performance, then you get very good result in the performance very good capability of those products which are based on that technology. For an example, if I talk of renewable energy so, all around the world, we are so much concerned about energy solutions, and when we talk of energy solutions, we are continuously thinking that we need to move from fossil fuel based energy solutions to renewal renewable sources of energy. At therefore, other terms like green energy, sustainable energy, environmental friendly energy, these terms are also coming into picture.

Now, initially when we are talking of green solutions, green products, people were not very interested to buy those green products why the performance of the green products who was not up to the standard.

The products like your normal car which is running on gasoline; the mileage is a different phenomena, but the speed the capacity which it provides, that was not possible with the car which is running on battery, electric car. So, the adoption of electric car was initially low because of the low performance of those products, but with more and more efforts we are trying to improve the performance of those types of products and therefore, now we are seeing rapid adoption of electric cars. People are thinking that they should have electric cars which are considered, now with better performance with better capabilities, and these are the case of electric vehicles.

Similarly, you will see that in many other products when you have initially some kind of hitch, then the adoption then the performance because adoption is directly related to performance. So, if performance is not up to the mark adoption will also be low. And when performance improves the adoption will automatically be increased; so, that is about the technology lifecycle

Now, based on these things we have these different types of technologies.

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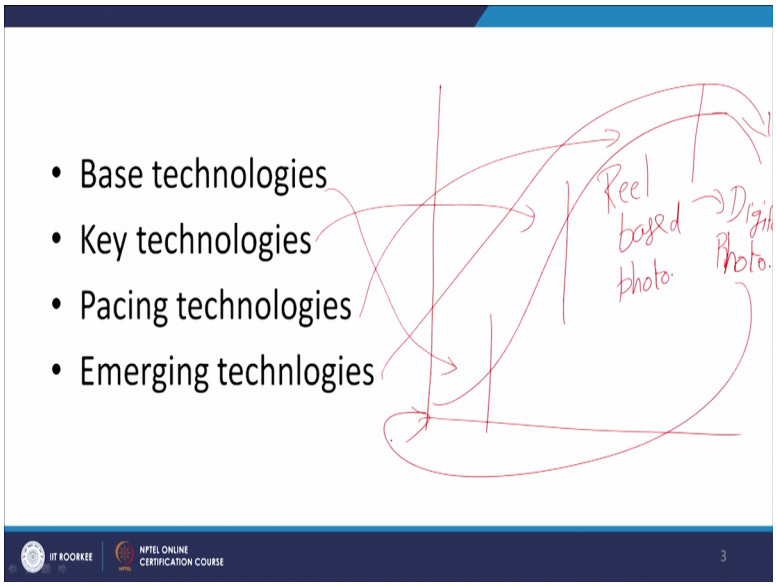

Base technologies, key technologies, pacing technologies and emerging technologies now for understanding, that what are these different types of technologies, we can take the help of the previous diagram, where we have these 4 different phases and then slightly decline.

Now, the base technologies are normally related to this part of S curve, these are base technologies. Now base technologies are those technologies which are in the emerging area, which are now you need to see that information technology; that is, a base technology because around that base technology you are having so many other applications, so many other products which are coming around that base technology.

Then you have key technologies. In key technologies those technologies which are going to be the future like, take an example of artificial intelligence so, there is going to be a very rapid increase in the field of artificial intelligence. Everywhere whether it is medical

science, whether it is your classroom studies, whether it is your communication, whether it is your energy solutions everywhere, we find use of artificial intelligence. IoT that is again going to be a key technology for future.

So, some of these technologies, which are going to be the important source for our future development, these are labeled as key technology where we find that growth is going to be there in future. The pacing technology where we find that yes, these technologies are achieving a level of maturity, and these technologies are going to help you, because most of these technologies are relatively stable.

They are achieved a level of saturation; these technologies have achieved the maximum possible level of performance output. So, these are the pacing technology, and you will find that some of the pacing technologies right you have achieved in some cases, where you are not finding any new innovation in that particular area, and those are the examples of a pacing technologies. Where things are relatively stable and those things are the part of pacing technology.

Earlier we used to have like a earlier, we used to think that new inventions are not possible, and if you know the story that around 1900 times, after some of the initial discoveries in USA. There was a proposal to close the patent office. Because people thought that now we have discovered everything and new discoveries are not possible. But there were other views also, those who believed that new discoveries are never ending process. Because you will have new challenges and new challenges will result into new solutions.

So, pacing technologies what you want to say, that these are temporary type of maturity periods in the life of any technology, there will come a relatively stable period where further improvement is not possible. But then we have already discussed in our previous session, that you have micro radical type of innovations, where you move or generational improvements, where you move from 2G To 3G To 3G To 4G where you move from iPhone 4 to iPhone 5 to iPhone 6 or iPhone 7, and these type of changes keep happening

So, pacing technology is relatively that technology where for some time, we do not find new innovations. Like for an example, for more than 100 years, if you go to the story of Kodak, for more than 100 years, they were the king of photography business. But when

the digital photography came into market, they because they were ruling the market of a film based real based photography.

But when digital photography came as a new era in the photographic business so, Kodak lost that kingdom. Kodak was dethroned by companies like Sony, canon and Nikon, because of their non-ability to move into emerging technology from the pacing technology. Because emerging technology comes after the decline when your pacing technology is reaching, the decline phase then you need to think that how to start a new technology.

So, the photography based on photography films or real based photography to digital photography, at that time this digital photography used to be a emerging technology area, rather if you read the story of Kodak, you will realize that Kodak was one of the first company, which invented digital SLR. But they thought that we have invested so much in the real based photography. So, let us not bring this product of digital camera, and we work on this real base photography.

But they did not realize that this digital photography is the emerging technology. And then you need to see that you need to bring this emerging technology back into the base technology, and then this whole cycle will start again, emerging technology will become the base technology digital photography the optical imaging, electronic optical imaging, and then based on that electronic optical imaging, you will have key technology and then you go for the pacing technology.

So, these are 4 different types of technologies classification based on our S curve. Now when we are looking for strategy, what type of strategy is suitable, for me with respect to technological innovation. We need to see very classical approach whenever we go for a planning class or a strategy class that is the SWOT analysis.

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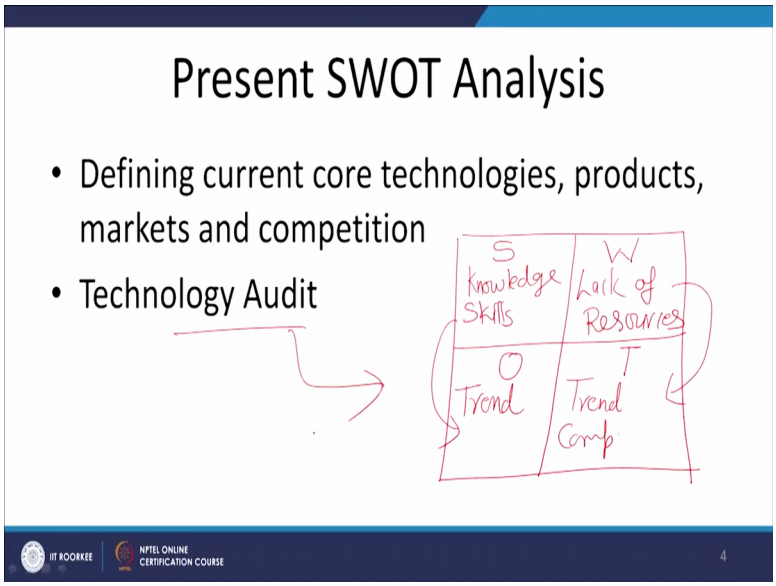

It's strength weakness opportunity and threat, and in the dictionary of technology management, we call this as technology audit

So, we are going to discuss that strength weakness opportunity threat, you have strength you have weakness opportunities and threats. So, because of your competence, because of your special skills, your knowledge, your skills, these things give you strength. Non position of knowledge, non-position of skills, lack of resources that is the reason of your weakness. Opportunities you see some kind of trend which is favoring your knowledge and skills so, those are opportunities for you.

You see some trend which is not matching, your resources trend is something, but you do not possess that resource, then that trend is threat to you, your competitors they are threat to you. Because competitors may possess some better knowledge, some better skills, some better expertise, some better tools, techniques, human resource, but you are not so, therefore, these things become your threat.

So, you need to see what is your current code technologies, products, market and competition, when you see that all 4 elements in a holistic manner, then it becomes your SWOT analysis, and which we also say as technology audit. So, before we start to know that which strategy is suitable to me, we need to go for this type of SWOT analysis. And then we also need to do a sort analysis for future, same thing we do for future that if we develop these strength so, if I convert my weaknesses into strengths.

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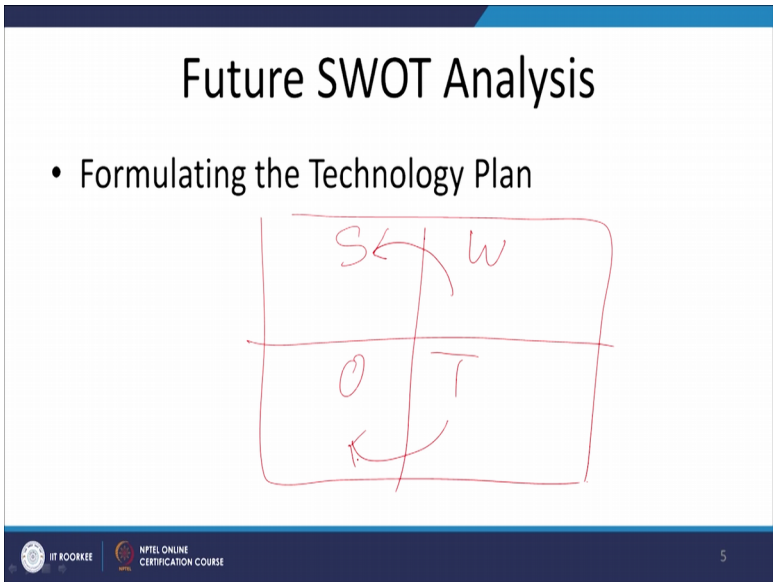

So, can these threats will become my opportunity? That is the future SWOT analysis, because once I do my present SWOT analysis, what I possess today ? And on the basis of that I know that these are the potential threats.

Now, I will like to overcome those weaknesses, threats are there because of weaknesses. So, I will like to overcome my weaknesses by a very systematic planning activity. I will take help of mentors, I will take help of other seniors, in my field and with those abilities, which I will develop systematically over a period of time, I will like to convert my weaknesses into my strengths. And I expect that this conversion should help me in making my threats, opportunities. So, this way I will look for a future SWOT analysis also, that if I convert these weaknesses into strengths, whether my threats will be converted into opportunities or not.

Now, on the basis of this discussion, you have one, first important characteristic of technology strategies which is on the basis of timing.

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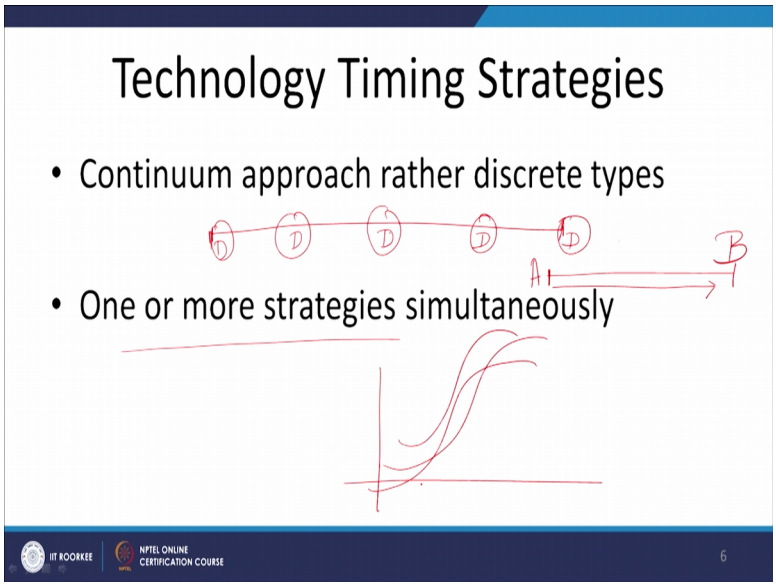

So now, what is it on the basis of timing, you have 2 things; one is continuum approach and another is discrete approach. You can have technology strategy, which is not like discrete approaches, these are the different strategies taken over a period of time rather discreet approaches which are done at different points of time. So, these are the discrete type of strategies. And then you have this that your strategy execution starts, and this itself is an it is strategy, as you are moving from period A to period B.

So, this is the continuum approach so, technology strategies are normally the continuum base strategies, rather discrete strategies. Because you follow S curve, and it is initially the base strategy, then it becomes the key strategy, then it becomes the pacing strategy, same strategy and therefore, it is like a continuum approach. And it is also possible that at the same time at the same time in the organization, you have at the same time you have 2 3 strategies running at different stages, one strategy is in the key role, another strategy in the emerging role, another strategy in the pacing role.

So, more than one strategy may be available simultaneously in your organization. So, that is also because the strategy of technology is normally with respect to products. So, your organization may be offering different types of products. So, when you are offering different types of products. So, different products may have different type of strategy. So, at the same time, you may have more than one technology strategy.

Now, let us quickly see some of the possible strategies, which we follow in the technology management.

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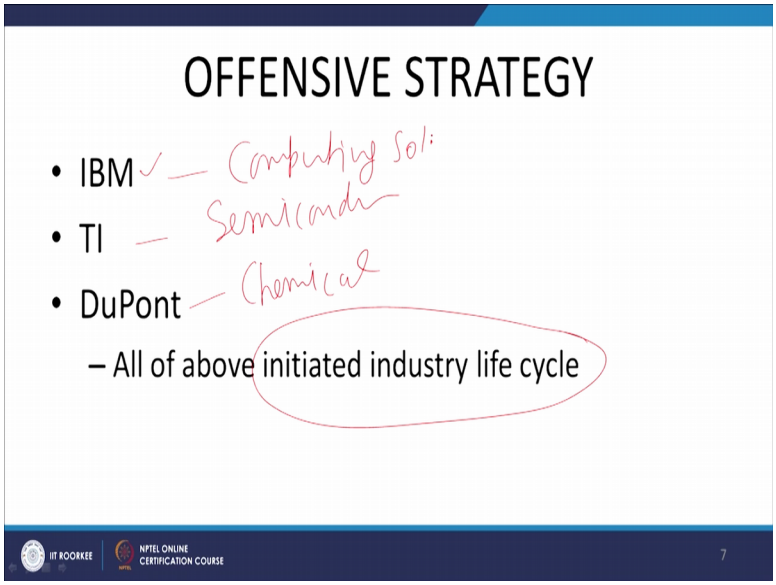

One is the offensive strategy; offensive strategy is like first mover strategy, the leadership strategy. And it is very important to note, that the offensive strategy is normally initiates a new industry life cycle. It is not limited to your company; it is not limited to your organization rather it starts an entirely new industry. And some of the example of these offensive strategy which companies have followed like, IBM, Texas Instruments, DuPont in the chemical engineering, in the area of semiconductors, in the area of computing solutions.

So, these are those companies which have initiated an entirely new industry life cycle. And if I want to add, Indian example into this list so, I can say that Patanjali to some extent, is an example of offensive strategy. Because of our mindset, we were shifting from Ayurvedic system or indigenious system of treatment to allopathic system of treatment. We were moving from naturopathic system of treatment to allopathic system of treatment. So, the industry related to naturopathy industry, related to Ayurvedic medicines were indeed dying this stage.

But because of offensive strategy of Patanjali, which is less technology and more marketing related strategy, the revival of entire naturopathic and Ayurvedic medicine industry took place. So, that is to some extent an example of offensive strategy. So, you

become the not only the leader in your company, but you start one entirely new industry life cycle. Then, obviously, this one is the leader so, rest all are followers, and that is defensive strategy.

So, you have the first mover they are the leaders, and rest all are follower. So, when you are not very sure that should I be torch bearer, should I be the flag bearer; in that case, we go with the follower strategy, where we follow the leader. And once a company is established, then you find that large number of followers also a start acting like the leader.

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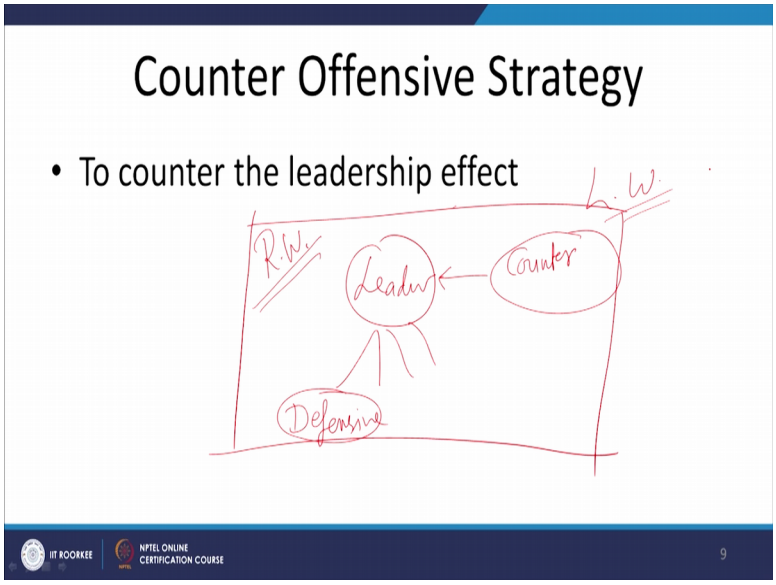

So, that is relatively safer strategy, then you have counter offensive strategy, this is also very interesting.

Now, you have, one leader, this leader is offering offensive strategy, and there are large number of followers, they all are following the defensive strategy. Now to counter this leader, another firm comes with a new kind of technological innovation. So, we require them also, and that is counter offensive strategy, which deals with this offensive strategy. So, to have a different type of leadership that is known as counter offensive strategy.

So, if in the governance structure, we take some example which is not related to technology. If in the governance structure, you have like in India, we say that there are right wing people and there are left wing people. And there are many followers of right

wing people and there are many followers of left wing people. Now we can understand that 2 counter the right wing leader there is counter offensive strategy offered by left wing leaders. So, that is the meaning of counter the leadership effect.

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Then another is imitative strategy; now the imitative strategy is not very research intensive this R stands for research. So, this imitative strategy is not very researches. Intensive and what we do in this case, these companies are development design production and service engineering intensive.

So, somebody else does the research, and they use that research in developing the design production and service activities, those who know about ISO systems, they know that what is the scope of such companies to get an ISO certificate and in our forum we can discuss this aspect because this will take somewhere else our discussion. So, we will not discuss this here, but certainly we can have large number of companies which are not a research oriented. But they develop products they develop different types of service activities they perform service activities. So, they have a limited scope these are imitative strategy.

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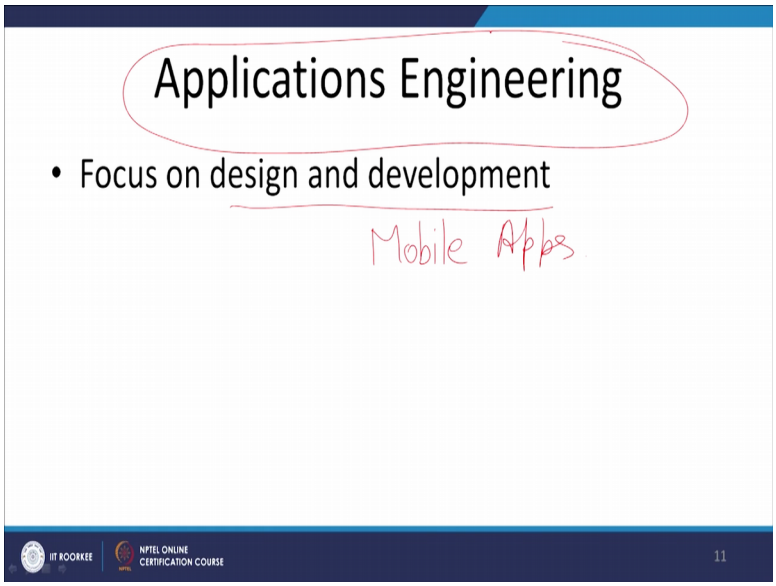

Then applications engineering; there are large number of companies with respect to technology strategy, they focus on design and development only. So, you have large number of examples, which are particularly related to mobile apps.

So, these companies focus on you have on your smart phone, large number of applications in play stores, and these companies who develop those applications different types of applications, may be related to your exercise may be related to entertainment, may be related to education, may be related to fashion, may be related to games so, these companies focus only on design and development.

So, they are not into the code technology development. They only the technology of coding, the android coding, that is already developed. So, they develop the application based on those platforms. So, that is one type of technology, and you see the use of this type of application engineering is continuously on rise, and large number of companies are coming up which are developing products based on some technology.

So, this is very, very important for new startups that how you can use it is not necessary always to develop a technology from scratch. You have some technology developed, and now as an entrepreneur I am focusing only on design and development I am using that technology for specific applications.

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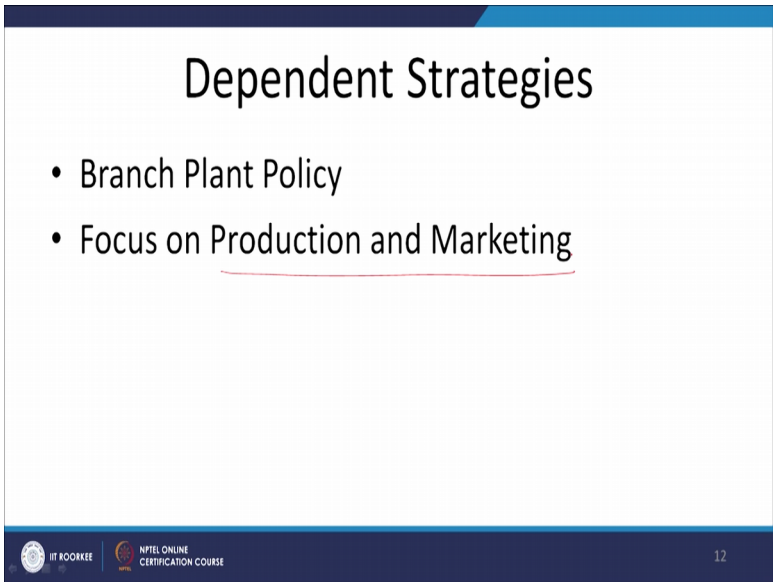

Then we have dependent strategies, which is known as branch plant policy, and it focuses only on production and marketing. Like you see many Japanese organizations in India, they have this type of dependent strategy; the technology is coming from the parent company of Japan. And in India their plants are only responsible for production and marketing.

So, that type of strategy is also possible this is a kind of SBU; Indian company Indian plant is an SBU, strategic business unit. So, they are again not research is intensive. They take the technology from the parent company and their focus is only on production and marketing.

And then you have another type of technology strategy that is absorbent strategy.

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And this absorbent strategy which is normally having a truncated technology base means again you are not very research intensive, and you acquires a license from an offensive defensive innovator; whether it is offensive innovator or it can be a defensive innovator to exploit that innovation to exploit that technology in your domestic market.

So, it is a kind of some kind of licensing system, that you are an American company, I am an Indian company. So, I take license from you to use your innovation in my domestic market; that is, absorbent strategy, and for that as per our mutual agreement, I may pay you something. So, that is how I take advantage of my innovation in different parts of the world by following the absorbent strategies in different parts

So, these are the different types of technology innovation strategies which are possible and depending upon nature of my organization, size of my organization, size of my market, I choose a particular type of technology strategy for my organization. But my take is that; right now, most of the products are developed around mobile application. And in that case application strategy is the most suitable strategy where we are not working to develop a new technology, rather we work more closely to understand our customer technology is already there, and on the basis of that technology we design and develop mobile apps for various requirements.

So, that is the most popular strategy at the moment. And big companies they are the trend centers ; like, we discussed the example of Texas instruments IBM, DuPont, etcetera,

they follow offensive strategy, then there are defensive strategy, then there are absorbent strategy, and there are application strategies. So, with this we come to end of this session.

Thank you very much.