

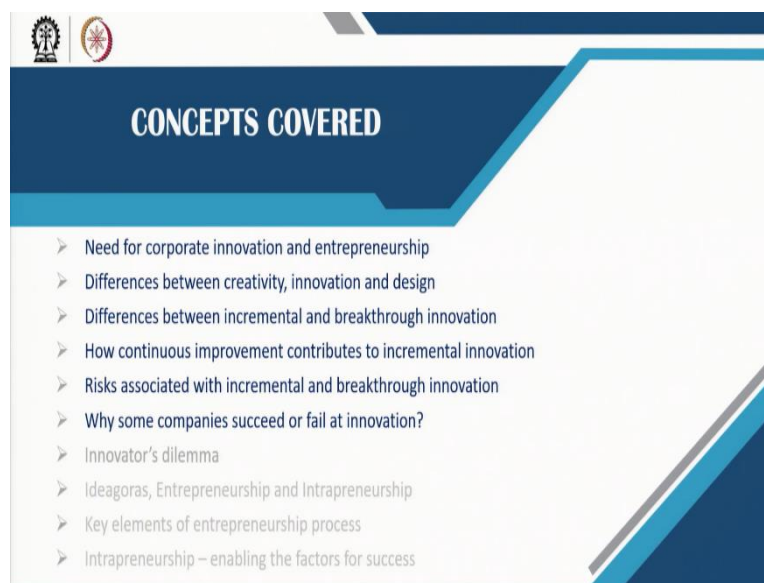
**Strategic Management for Competitive Advantage**  
**Professor Sanjib Chowdhary**  
**Vinod Gupta School of Management**  
**Indian Institute of Technology, Kharagpur**  
**Lecture 47**  
**Innovation for Survival and Growth - I**

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Welcome to the course Strategic Management for Competitive Advantage. Today, we will start a new module, Innovation and Entrepreneurship. In this first lecture, we will be covering innovation for survival and growth, and the second lecture will subsequently go on entrepreneurship.

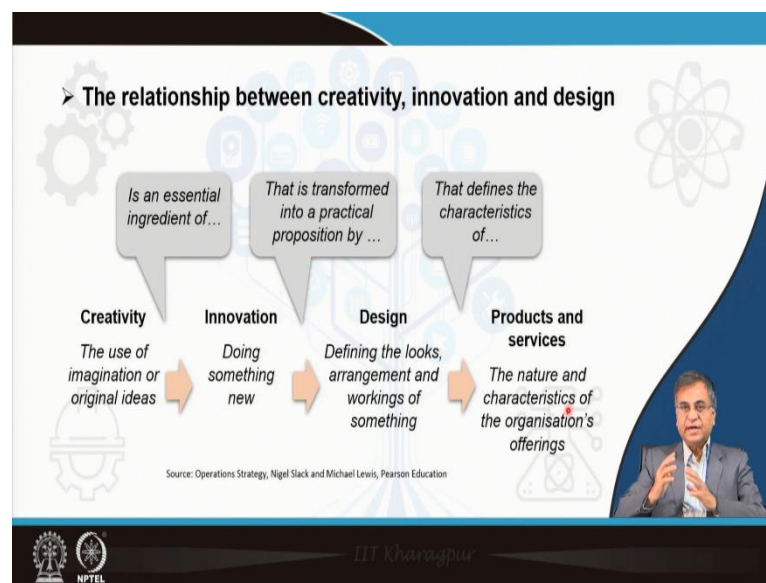
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The concepts covered in the first lecture are why we need corporate innovation and entrepreneurship. Then what is the difference between creativity, innovation, and design? Then we will also cover the differences between incremental and breakthrough innovation and how continuous innovation contributes to incremental innovations. We will also discuss the risk associated with incremental and breakthrough innovation and also why some companies succeed, or some companies fail at innovation. We will be covering all in this lecture.

In the next lecture, we will be covering the rest, okay?

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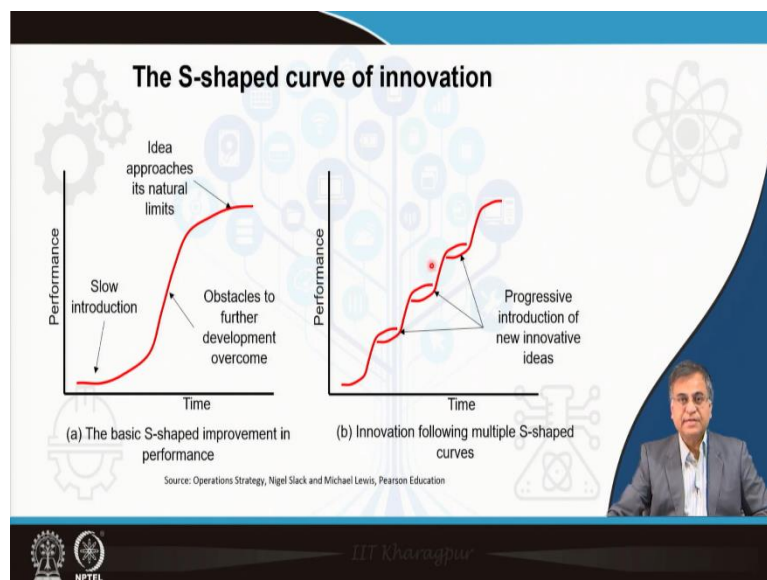
Now, to start with, say, why do we need innovations and all? You know, today's business world is very competitive, and everyone wants new avenues for competitive advantage for growth and survival. So, innovation is a potent means of getting a competitive advantage for acquiring products, processes, or services. So, these innovations and entrepreneurship are potential means in today's business world for strategic and competitive positions.

So, to start with, we have heard these innovations, inventions, creativity, design all these words and, but what are the differences between them? Generally, most of these words are used, you know, say as synonymous but there are differences are there. First, we will talk about the what is the relationship between creativity, innovation, and design.

Say for this, say creativity, what is creativity? Creativity is your imagination, is your original ideas that come to that. So, creativity is an essential ingredient of innovation, new knowledge, the new ideas that will lead to innovations. what is innovation? Innovation is doing something new, something novel. Novelty is associated with innovation, and this innovation is, in a sense or a process that is transformed into a practical proposition by something. What is that? That innovation needs that practicality. So, that is the design part of it.

So, that is, the design defines the looks, arrangements, and workings of something. It may be a product. It may be a process; it may be a service, anything. So, these designs all lead to the product and services that define the characteristics of the products or services that you are inventing or, in a way doing the innovations, the nature and characteristics of organisations offerings that. It is that innovation is transformed through design. So, these are the linkage between creativity, innovation, design, new product and services.

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Next, we will be going to know this innovation generally follows an S-shaped curve, you know, that the basic S-shaped curve looks like this is that if you take performance versus time at the beginning of that your creative ideas, you are innovating some product or processes or services that what do you need? you need resources, time, and ideas, all those things are put

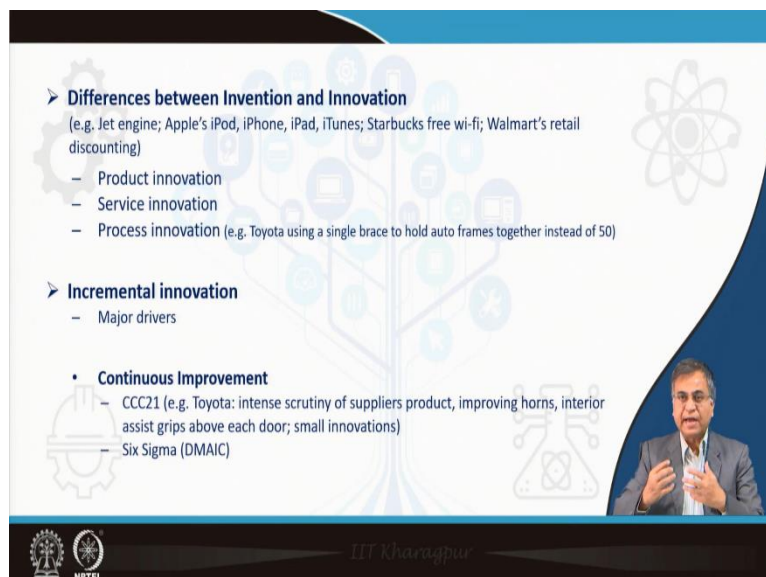
in, and it is time-consuming, and the performance is that time is very low because this is the development phase.

So, the performance you are not knowing when we are going to lead. You have ideas you have planned. You are trying to go that new product, new processes. So, the performance is predictably low. Then after some time, when time elapses then, what you find you gain experience, you gain further knowledge. So, it shapes a form of a new product or new product or services, new processes. So, your performance increases; this is you overcome the obstacles during this development phase to go to higher performance.

The idea and approach, whatever you have, come to a maturing stage that is tapering off or is a natural limit. It is tapering off or reached. So, this is at this point of time what happens some new ideas come in, and those new ideas again take the shape of the S-shape goes, and it enhances so, it enhances your product that is the design, performance, everything. So, it also the next phase S-shaped reaches that tapering stage.

So, in that stage, another new idea comes, and it developed, say, this is progressive in the introduction of new innovative ideas that makes the small S-shaped makes a big a complete S-shape for your utility products or your services or your processes, this is the way the innovation processes move.

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➤ **Differences between Invention and Innovation**  
(e.g. Jet engine; Apple's iPod, iPhone, iPad, iTunes; Starbucks free wi-fi; Walmart's retail discounting)

- Product innovation
- Service innovation
- Process innovation (e.g. Toyota using a single brace to hold auto frames together instead of 50)

➤ **Incremental innovation**

- Major drivers

• **Continuous Improvement**

- CCC21 (e.g. Toyota: intense scrutiny of suppliers product, improving horns, interior assist grips above each door; small innovations)
- Six Sigma (DMAIC)

The slide features a background with various icons representing technology and innovation. A video inset in the bottom right corner shows a man in a suit speaking. The NPTEL logo is in the bottom left corner, and the text 'IIT Kharagpur' is in the bottom center.

It is now, going further into it. So, we will discuss the difference between what is the difference between invention and innovation. The invention is doing something new, like you are with your new knowledge, new ideas creating a new product or new service or new

processes. Something new you are creating based on the new knowledge or then a new combination, combinations of the new knowledge you are doing inventions that may be very useful that may not be as useful and innovation that is an invention, innovation is the first commercialisation of your invention that is called innovation that means your profit angle is embedded in it.

So, for example, jet engine. The jet engine was patented in 1930. But the first commercial flight took off in 1957. So, it was invented in 1930, but innovations are for commercial purposes when it is used, it is in that is innovation. So, these are the differences.

Now, for another example, say Apple's iPod, or iPhone. Ipad, these are innovations, and they say these are the blockbuster's innovations means their innovations are also of different types depending on the degree of the changes. So, it may be incremental innovations; it may be the breakthrough innovation. So, Apple's iPod, iPhone, iPod, iPad, and iTunes all are innovations based on microprocessor chips. They came out very quickly and earned many profits, and they swept the markets. So, that type of innovation, whether incremental or breakthrough innovations I will talk about a bit further away. But these are all product innovations. The innovations you can define in different terms; may be product innovation, service innovation, or process innovation.

The product innovations are which one? These jet engines, then Apple's iPod, iPhone, these all are the product form of innovation and service innovations are, say that Starbucks free Wi-Fi, you know, Starbucks, when they it started came with novel ideas that they will offer free Wi-Fi in their cafeteria and opened it for more than 8000 their centres. So, it was a novel idea, and it attracted many customers. They gained many customers; they stay there nine times longer during the off period. So, these are the service innovations.

And similarly, Walmart's retail discounting also came as a service innovation that changed how this idea, a novel idea changed the course of the businesses. Now afterwards many other companies and entities were following that. These are service innovations. There is process innovation, which is business process innovation or business model innovation; I will give you the example of Toyota.

Toyota is one of the admired companies, and analysts look at it and study it in depth. So, Toyota, some years back, used a single brace to hold auto frames that frame together instead of the 50 that used to do it. It was you know for the Toyota scale of operations, it might not be a very the savings may not be very substantial, even then, their savings for this account on

this account was annually 3 billion dollars just so these are the process innovations. So, these are the various types of innovations that are available.

Now, as I told you, depending on the degree of change that there is called something incremental innovation and breakthrough innovation, so incremental innovations are the simple innovations, adjustments, simple adjustments and all your minor adjustments you improve your productivity, process, product, service and anything. So, major drivers for these are your continuous improvement, then your cost saving, then quality management, and quality improvements, and all these are the drivers for that incremental innovation.

Incremental innovations are mostly found in the manufacturing sector; incremental innovation is associated with continuous improvement, and it is always you who are doing it. It follows the philosophy of TQM, total quality management. So, every part of the organisation is always improving itself further. So, this is a marginal improvement. So, as you know, Toyota is thus famous.

CCC21, what is that? Construction of cost competitiveness in the 21st century. So, what do they have built this culture, and what does that do? Toyota has realised that in the global area for the past decades and all you know lot many auto giants were merging to get the overall cost leadership to get their cost less and all. So, Toyota has to do something.

So, Toyota, what it did internally, tried to improve improvement continuously. One instance is the intense scrutiny of suppliers' products; whatever the products they get, they scrutinise it very intensively like take the case of the horns, you know, that automobile horns, the suppliers, they give the supply horns to Toyota, then Toyota engineers what they did? they disassembled those horns and found there were 28 components in them. within those 28 components, they can eliminate 6 components and improve the quality of the product, the quality of the horn and all, so that could save 40 per cent of costs on that product. So, Toyota could save that. So, this is intense scrutiny.

So, another thing the Toyota engineers did was that interior assists grip above the doors of the car, you know, they had 35 types of grips, and they reduced it to 3 grips, 3 types of grips over 90 models of Toyota. So, you see, in the production lines and all, it is much faster, and they could save a substantial amount, and it is also that uniform product. So, these are what they call it is possible only for continuous improvement of all the employees.

Then another way of continuous improvement, as you know, is Six Sigma. Many companies applied six Sigma, which started with Motorola Engineers. So, Motorola, after General Electric, and Honeywell before that time, it was named Allied Signal SAP, IBM, all the Texas Instruments, and all the giants used it, and they could save substantial amounts of money. So, Six Sigma is based on continuous improvement. TQM philosophy is a statistically intensive statistical approach, a quality approach.

Here the natural variation of three sigma is squeezed into the Six Sigma level, and here, the defects per million are 3.4. So, it is an enormous improvement, and Six Sigma follows many rigorous processes. It follows that statistical process control. It follows the eliminating redundancy value added to keep the value-added steps, and also it follows a called DMAIC that is Defined, Measured, analysed, Improved, and controlled. This is the DMAIC cycle. It follows it, so I will not go deep into this. These are the ways you can make continuous improvements to your product, your process, for your services.

Now, that one thing I just missed saying to you is that product innovation. Product innovation says you are creating a new product and that this will give you what advantage, an advantage over your competitors. So, this is associated with a differentiation strategy. When a company is getting following a differentiation strategy to capture the market product division, product innovation is generally used. Process innovations come in after the product has grown and matured sufficiently. The later stage, that maturity stage, is what you need. you can go to have better efficiency that will lower your cost.

So, it is possible that during the maturity stage, you do that so that it is associated with the overall cost leadership strategy. So, these are that continuous improvement which is part of incremental innovations.

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➤ 10 Essential Elements that Lead to Incremental Innovation

1. Define quality and customer value
2. Develop a customer orientation
3. Focus on the company's business processes
4. Develop customer and supplier partnerships
5. Take a preventive approach
6. Adopt an error-free attitude
7. Get the facts first
8. Encourage every manager and employee to participate
9. Create an atmosphere of total involvement
10. Strive for continuous improvement

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Then what are the 10 essential elements that lead to incremental innovations? These are some steps or elements that will foster the culture of incremental innovations in the organisation. Define quality and customer value, then develop a customer orientation like your organisation. You do not develop the product or improve it as you feel it, as the organisation feels it; it is not the way it is. Then you must have an orientation of a customer as to how the customer, what the needs are. what are they will look for? Do you go for that?

Focus on that company's business process, then develop customer and supplier partnerships. What is the like you think you go for a horizontal integration or? Horizontal will look like different departments may think of them as the internal customer and suppliers to each other. So, you extend it to the supplier side.

So, the supplier side will be the supplier who will be extended to those internal customers. So, they gave it, and customers are on another end of the extended entity. So, you look it that way and develop a partnership as you work as you were working with the internal departments or the groups within the organisation, you extend that things also to the customers and suppliers.

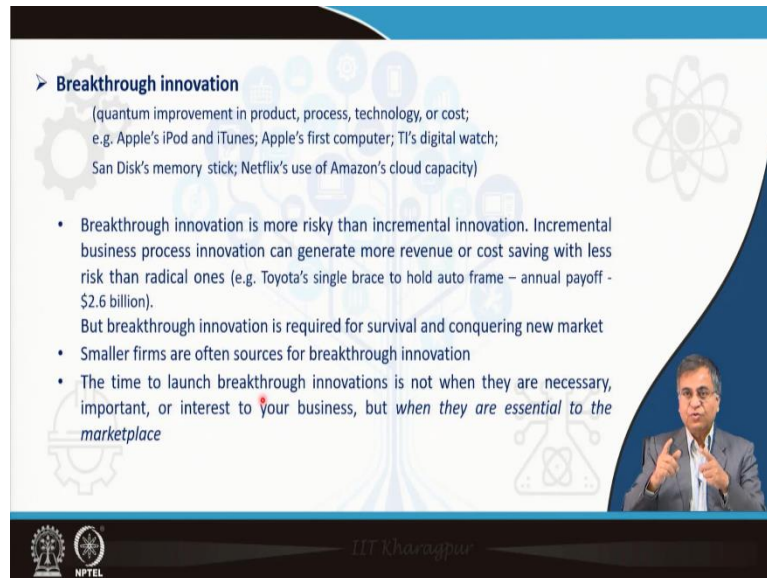
Then taking a preventive approach means there are, you know, companies generally reward those who do the firefighting, but it is more important you give recognition to the fire preventers. So, that is also very important for incremental innovations then adopting an error-free attitude. This comes with experience; this comes with your practice and all. So, this attitude you have to build. Get the facts first, then encourage every manager and employee to participate. This is very important. So, these innovations are more than just the R&D people's



job. Innovation is the job everybody, every employee and every group has to participate in. I will talk about this more in future slides and all.

Then create an atmosphere of total involvement that is the fostering of that environment and strive for continuous improvement. These are the 10 elements that help you prosper in incremental innovations.

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➤ **Breakthrough innovation**  
(quantum improvement in product, process, technology, or cost;  
e.g. Apple's iPod and iTunes; Apple's first computer; TI's digital watch;  
San Disk's memory stick; Netflix's use of Amazon's cloud capacity)

- Breakthrough innovation is more risky than incremental innovation. Incremental business process innovation can generate more revenue or cost saving with less risk than radical ones (e.g. Toyota's single brace to hold auto frame – annual payoff - \$2.6 billion). But breakthrough innovation is required for survival and conquering new market
- Smaller firms are often sources for breakthrough innovation
- The time to launch breakthrough innovations is not when they are necessary, important, or interest to your business, but *when they are essential to the marketplace*

The slide features a blue and white color scheme with a large gear graphic in the background. A small inset video shows a man in a suit speaking. The bottom of the slide includes the IIT Kharagpur and NPTEL logos.

Now, we will talk about breakthrough innovations. What is breakthrough innovation? These breakthrough innovations are a quantum leap forward in product design, product process, technology, or reduction of cost. It can come in anything. So, what do you do? It is a drastic improvement that is a breakthrough innovation. For example, as I told you in the earlier slides that Apple's iPod and iTunes you know this was breakthrough innovations. Say then apple's first computer when came. It was a breakthrough innovation. Why?

First, this was that desktop computer was developed in the garage of Steve Jobs and Wozniak, his colleague, so they developed it. At that time, the people, you know, companies ridiculed them as toy computers because that time, the computers were huge IBM mainframes, and all were they used to take a building to house a computer.

So, this was ridiculed as a toy computer, but that second IBM and all came down to knees when these things came, so the desktop computer came, they were nearly going to the extinct that state affair happened. So, this is the breakthrough innovation. Similarly, Apple's iPod and iTunes, then that is what that is the that started these from the microprocessor chips that they used Apple used for their computer, which they have innovated and used in digital music. So,

they developed this digital music and those iPod and iTunes first when they came, they 200,000 songs they downloaded and then sold it first in that came in the market.

In 2003 that Steve Jobs had, for the next two years' intensive negotiations with the music industry. The music industry was recalcitrant for coming to this. So, after that, they got the manage that rights and they downloaded, say, around 330 million songs there and, you know, they over to that Walmart. Walmart was a retail music dealer and all. Within a short period of five years or less, they captured the 5 billion dollars of revenue they generated and became the industry's digital music the foremost player. So, compared to before, Apple's first computer used to have only a 2 per cent market share. So, it is a breakthrough innovation.

Similarly, in Texas instrument digital watch, when they brought out this digital watch monopoly, the dominant players were the Swiss Watch Industry that came down suffered the onslaught heavily. It changed the course of industries and all. So, this is a breakthrough innovation. Then further is SanDisk memory stick before that was, you know, floppy drive, what is that floppies drive and all were there for your memory, and all but this was a breakthrough innovation.

Then Netflix uses Amazon's cloud capacity, that Netflix streams movies, videos, and all that they need cloud capacity cloud services. So, even though that Amazon was there, competitors for retailing those things and all products and all. So, today Netflix is the largest consumer or customer of Netflix, the single largest customer of Netflix. So, these are the breakthrough innovations.

So, talking about these breakthrough innovations is generally riskier than incremental innovation. Say, incremental process innovation can usually generate more revenue or cost-saving scope with less risk than radical ones. These radical ones are the breakthrough. So, for example, I have given you an example. Toyota single brace to hold the auto frame. So, that thing has an annual payoff of nearly 2.6 billion dollars for Toyota.

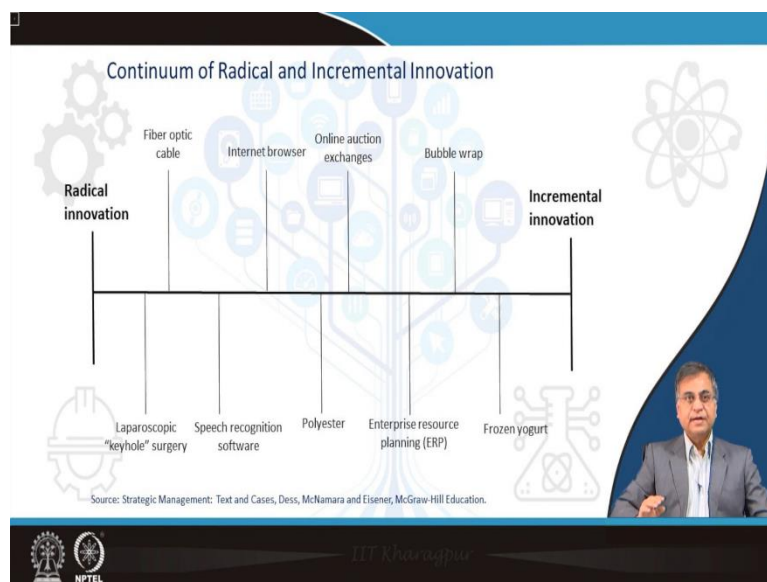
Now, for a single product-level assembly line, they can carry out all 90 models in this same production line; it is a huge breakthrough innovation, but breakthrough innovation is costly and risky also, uncertainty is more than incremental innovation which is why some experts talk about this going for in favour incremental innovation, but that one Harvard professor Clayton Christensen, he says, that breakthrough innovation is required for survival and conquering the new market for that because you cannot do away with the breakthrough innovations. So, it is you have seen, all these products, as I told you are all breakthrough

innovations. And you have seen how all these products have changed the course of the industry.

So, next, smaller firms are often the source of our breakthrough innovation because smaller firms are more focused, they are doing those jobs, and they have a smaller customer base to cater. So, they are sleeker, and they can the so, in fact, nowadays, it is found that the big companies and all are acquiring the innovations from the smaller firms or those start-ups and all. So, we will talk about these more after some time.

Then the time to launch breakthrough innovation is not when the companies feel it is necessary or in the interest of the company's business; it is not like that; it is only when they are essential to the market for the customer's need that is the correct time to launch the breakthrough innovations.

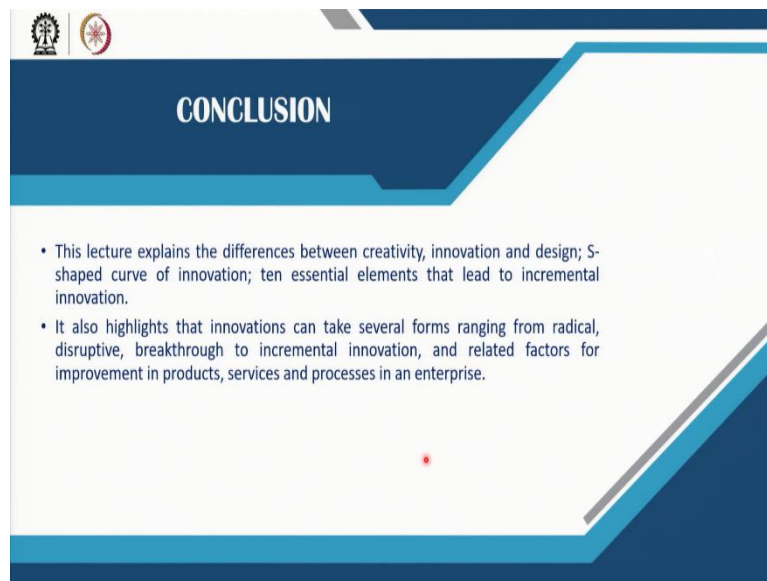
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So, if you see this continuum, this is the continuum of radical or breakthrough and incremental innovations. See, one end is the incremental innovations, and the other extreme is the radical innovation. These are the frozen yoghurt, then bubble wrap, and then your ERP (enterprise resource planning). These are more of the sides of incremental innovation, and as you move more to the right, it approaches radical innovations. So, if here you can see laparoscopic surgery (keyhole surgery), that is more of a breakthrough innovation.

Then fibre optic cable, then speech recognition software, these are all more radical. So, you can also do that; what is the continuum of incremental and radical or breakthrough innovations?

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Now, to summarise today's lecture, we can say that we have explained the differences between creativity, innovations, and design, then the S-shaped curve of innovations. Also, we discussed 10 essential elements that lead to incremental innovations. We have also highlighted that innovations can take several forms ranging from radical, disruptive breakthroughs to incremental innovations and their related factors for improvement in products, services, and processes in an enterprise. So, all these we have covered in this session.

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So, I will give you some references. These are the references book. You can go through Strategic Management Planning for Domestic and Global competition by John Pierce

Robinson, Operations strategy by Nigel Slack Then, Strategic Management text and cases by McNamara, Dess, McNamara, and Exploring Strategy text and cases by Gerry Johnson, and Richard Whittington.

So, thank you for attending this lecture.