Manufacturing Strategy
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Module No #02
Lecture No #08
Contribution of Skinner and Hayes and Wheelwright

Welcome, friends. This is the eighth session, of the course of Manufacturing Strategy. So far, we have developed the context, of the Manufacturing Strategy. In the previous sessions, we discussed two important things. One is, the concept of World Class Manufacturing, which is derived from the idea of Manufacturing Strategy. And, second, we discussed, different perspectives of Manufacturing Strategy. Different P's are there. 6P's, we discussed.

And, finally we integrated, those different perspectives, to get a holistic view of Manufacturing Strategy. We discussed, that most of those perspectives, are aiming towards, developing superior manufacturing capabilities, taking advantage of those capabilities, and finally, continuously improving those capabilities. That is, the desirable state for, World Class Manufacturing organisations. Now, when we study, World Class Manufacturing, or Manufacturing Strategy, we need to remember, few names.

And, one of the name is, W Skinner. Now, Skinner's contribution, and subsequently, the contribution of Hayes, and Wheelwright, is the direction setting contribution, in the field of Manufacturing Strategy. So, in this session, we are going to discuss, the contributions made by Skinner, and Hayes, and Wheelwright, in the field of Manufacturing Strategy, and World Class Manufacturing. Now, first, we will start, with the contribution of, W Skinner.

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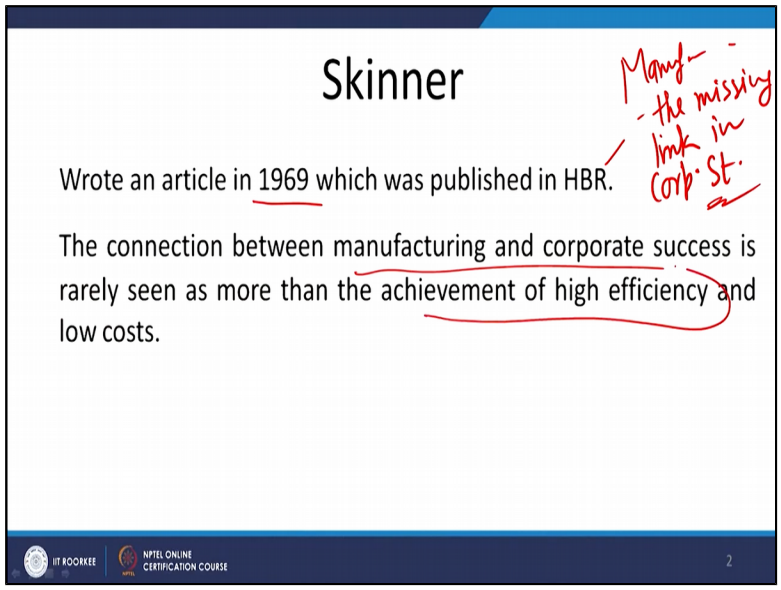

Now, Skinner, actually is responsible for coining this term, Manufacturing Strategy. He wrote, one article, in HBR, Harvard Business Review, one of the most renowned journal or magazine, in the field of management. In 1969, he wrote this article. And, the title of the article was, Manufacturing - The Missing Link in the Corporate Strategy. The articles name was, title was, Manufacturing - The Missing Link in the Corporate Strategy.

I would request you, to go to internet, and search for this article. We can share this article, in our forums also. Because, when we are reading, when we are going through, the course of Manufacturing Strategy, it is important to know about, the contribution of Skinner. Because, he was the first time, identified the strategic role of manufacturing. Before that, we discussed yesterday, in our functional dominance, that manufacturing was a dominating functional area, in the organisation.

Because, demand was more, supply was less. So, there was obviously, a pressure on the manufacturing, that how much you can produce. But, again this pressure was, just to fulfil the requirement of the market. Manufacturing was not doing, any strategic contribution, in the organisation success. But, there was no pressure of any other kind, on the organisation. So, only dominance was of the manufacturing.

But, around 1970, Skinner's idea was, a very different kind of concept. That, taking the

involvement of manufacturing, in the development of the corporate strategy. So, that idea was proposed by, Skinner. And, he says that, the connection between manufacturing and corporate success, was very low. Nobody studied that, what is the relation between, manufacturing and corporate success. And, most of the time, we expected from manufacturing, to deliver or to achieve, high efficiency and low cost.

Beyond that, we never gave, any kind of importance, to manufacturing, or to operations. That, operations role, is limited to high efficiency, and low cost. But, nobody studied, nobody tried to create, a kind of relationship, between your manufacturing excellence, and your corporate success. Skinner thrusted, the need of this kind of research, that we need to establish, the connection between, manufacturing performance, and corporate success. So, that is the first important idea, which came from Skinner.

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Skinner also coined, one more term, and that is, Millstone Effect. He said that, either manufacturing can be a competitive thing, or it can be a millstone thing. Manufacturing, can never be neutral. So, how manufacturing can be competitive, that we have understood, in our earlier sessions. It cannot be neutral, he said. He said, either it can be competitive, or it can be providing you the Millstone Effect. So, what is Millstone Effect? Let us try to understand, that point.

Now, according to Skinner, when companies fail to recognise, the relationship between manufacturing decisions, and corporate strategy, they may become saddled, with seriously non-competitive production system, which are expensive, and time-consuming, to change. Because, you have not established, any connection, between manufacturing decisions, and the corporate success. And, over a period of time, you actually ignore these relations also.

You understand, that there is no relation, between manufacturing performance, and the corporate success. And therefore, your manufacturing activities become saddled, stagnated. And, when your manufacturing activities become stagnated, saddled, then you are actually leading, you are actually carrying, a non-competitive production system. Either, you are having a competitive production system, or a non-competitive production system.

According to Skinner, you cannot have a neutral production system. So, when it is a non-competitive production system, obviously, the consequences are, that it becomes expensive, and time-consuming to change. We require flexibility, as I am saying. But, if it is a non-competitive production system, you will not be easily able to change, the production system. We want efficiency. We want low cost. But, if it is a non-competitive production system, it is going to be expensive.

So, many a times, like in case of Indian example, I take, go for Air India. And, because of variety of reasons, this Air India has become an example of, non-competitive production system. And, the way they are working, it is a challenge, it is a kind of a management challenge, that it is very difficult to change. And, the system is also very expensive. Therefore, their losses are increasing year by year. On one side, we want to make them competitive.

But, what is actually happening, because of this Millstone Effect, their losses are accumulating, and increasing, year by year, recently, Government of India, try to disinvest, Air India. But, unfortunately, because of mounting losses, they could not find, a proper customer for it. So, it is an example, that how your operation system, can either be competitive, or can be non-competitive, it cannot be, the neutral one. This is the idea of Skinner.

And, it is very, very appropriate idea, that if you are unable to establish, the connectivity between your manufacturing and corporate success, it is going to happen, that you will not focus on your manufacturing activities. Because, you do not know, how was these manufacturing activities, are creating a benefit for you. If I take you to an example, which is very, very, you can say, away from, what we are discussing now.

If, you are taking a sleep, of 6 to 7 hours a day, then probably, your working efficiency will improve. Now, large number of medical journals, are writing this, that for a healthy person, 6 to 7 hours of sleep is must. But, many of us are not able to establish this connectivity, or this connection, or this understanding for our self. And, they feel that, I can work with, just 4 hours of sleep, 3 hours of sleep.

So, what happens? For some time, you are able to get, longer working hours. But, all of a sudden, your health will go down, and you will not be able to work, for even a single hour in a day. So, that is the kind of consequences, it may create. If your health is good, it is going to provide you, competitive advantage. If your health is not good, you will not be able to produce.

So, it cannot be neutral. If health is good, certainly you will use that positive health, for achieving higher objectives in your life. If your health is not good, you will be struggling to survive. And, same applies, in the case of manufacturing activities also. Either, you will get competitive advantage, or you will not, or you will be non-competitive. There is no situation, where you can remain neutral.

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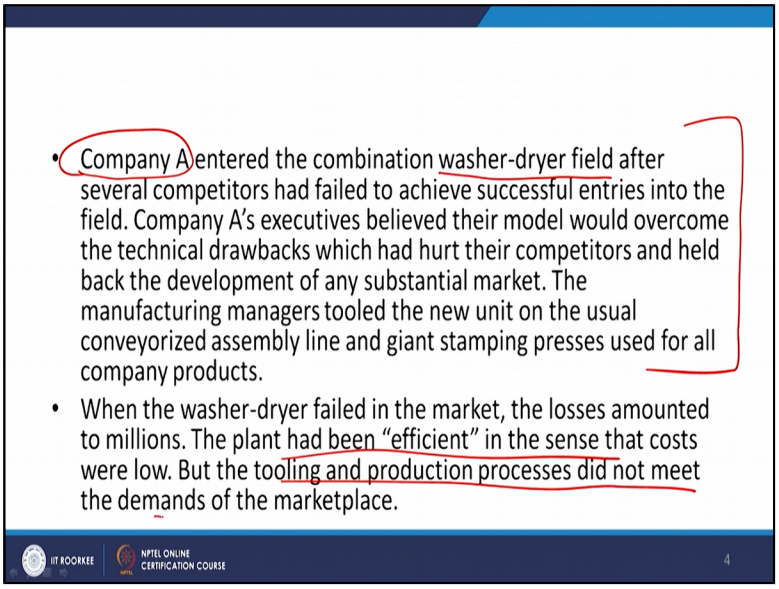

Just to prove this very point, we have some examples with us. Now, in this example, and I take this opportunity to say, that these examples are taken, from the original Skinner's paper. The paper, which was published by Skinner, in 1969. So, these examples are from the same paper, so that, what actually Skinner mean, by Millstone Effect, or the competitiveness from manufacturing, can be very well explained, by using the same examples.

Now, in this examples, Skinner considered three different companies, Company-A, Company-B, and Company-C. Now, the Company-A, entered into the washing machine market. And, they are producing a washer dryer kind of, where you have the washing facility, and a drier facility. Nowadays, to which, we call as, fully automatic washing machine. So, you please keep in mind, the time context. I am talking of time context of, 1965 or 68, that period, I am talking of.

So, this company introduced, a new type of washer dryer facility, after many competitors had failed, to achieve success, in this particular kind of product market. Now, Company-A's executive believed, their model would overcome the technical drawbacks, which had hurt their competitors, and held back the development of any substantial market. Before that, all the efforts in this market of washer dryer combined facility, were failed, because of variety of reasons.

But, the executives of Company-A, had this belief in themselves, that no, we will be able to overcome, earlier problems. The manufacturing managers tooled, the new unit, on the usual

conveyorized assembly line, and huge stamping presses were used for company's products. Now, if you read this paragraph, you are entering into a market, which is not well established. Already, many competitors, before you, have failed in this market.

And, you have a firm belief, that we can overcome earlier failures. Our product will be the success one. But, despite all these understanding, your manufacturing manager, or your manufacturing executives, they used the conveyor assembly system, they used huge stamping presses, for manufacturing the outer body of that assembly. Now, when I am talking of huge, huge word, again and again, when I am talking of assembly line, again and again, the meaning is, I wanted to use, economies of scale, for this product.

Now, this whole idea becomes, totally irrelevant. On one side, you are entering into a product, which is not well established. So, right from the beginning, there is no question, you go for efficiency, you go for economies of scale. So, this plant was actually efficient plant. Because, you are using assembly lines, you are using huge stamping presses. So, it was a low-cost plant. It was efficient plant. But, the tooling and production process, did not meet the demands of the marketplace.

Because, the needs were not well established. It was in the process of prototyping. So, customers may give, different types of needs. But because, you are using efficient tooling, you are using assembly lines, it was not possible for you, to change those tooling, on a regular basis. So therefore, your product also failed. So, this is one example, that how your manufacturing function, is not able to support, the corporate level objectives.

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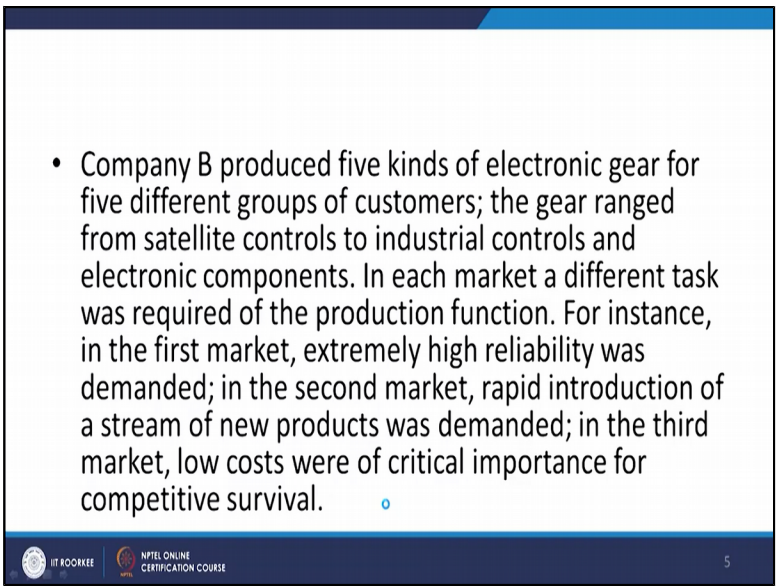

Then, take another example. Now, this Company-B is coming. Now, Company-B is producing, five different kinds of electronic gear, for different group of customers. And, these gears ranged from, satellite controls, to industrial controls, and electronic components. Now, these are the different types of products, where these electronic gears were used. Now, in each market, a different task was required, of the production function.

For instance, in the first market, extremely high reliability was demanded. In the second market, rapid introduction of a stream of new products was demanded. In the third market, low costs were of critical importance, for competitive survival. Let us see, what this company did. There are, five different types of customer groups. They have, different types of requirements of electronic gear. And, company thought that, we will produce, all five types of electronic gear.

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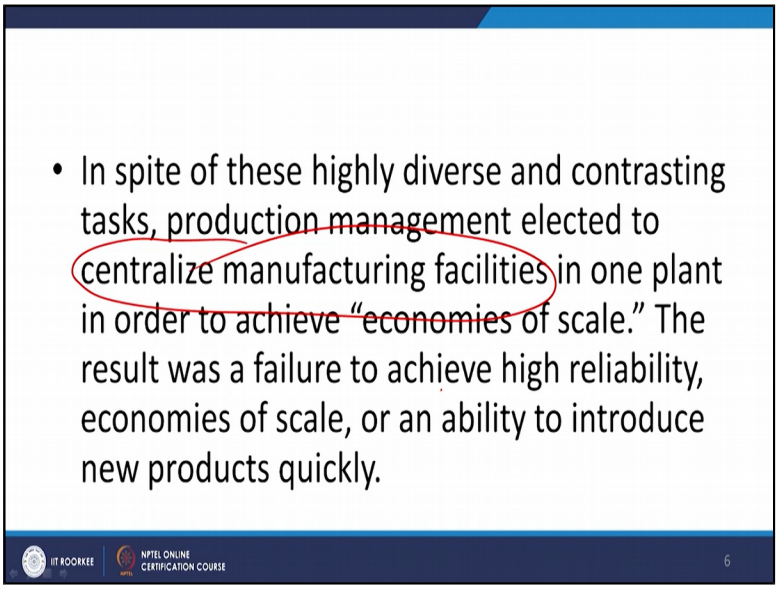

But, in spite of these highly diverse, and contrasting tasks, production management elected, to centralise manufacturing facilities, in one plant, in order to achieve, economies of scale. You have, a specific type of requirements, for specific target customers. But, because of lack of understanding at the manufacturing level, manufacturing people, combine the demand of all the diverse customers, into a central pool.

And, the centralize manufacturing facility was thought, to get the economies of scale. The result was, a disaster, obviously. Because, all these three things, high reliabilities, low-cost, ability to

introduce new products quickly, cannot be achieved, simultaneously. We need to develop, portfolio of manufacturing capabilities. In our seventh session, we discussed, one P of manufacturing, that is the portfolio of manufacturing capabilities.

But, this portfolio of manufacturing capability, was dealt to be separately. On, one centralised manufacturing facility, you cannot have, all these different types of manufacturing capabilities. So, again, this resulted into a failure story. Then, we have the Company-C. Now, Company-C produced, plastic moulding resins.

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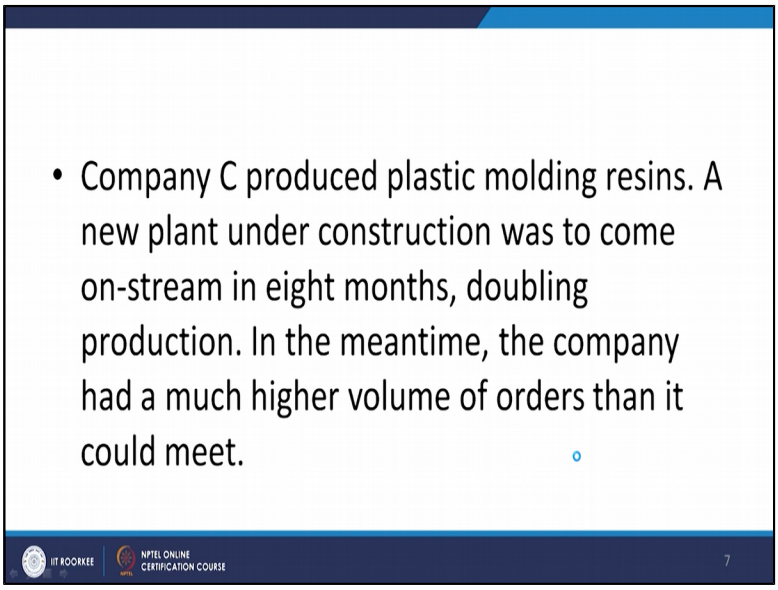

A new plant under construction was to come, on stream, in 8 months. And, this new plant, will double the production capacity, of this Company-C. In the meantime, the company had a much higher volume of orders, than it could meet. Now, Company already has, higher volumes. And now, the company is thinking, to make a new plant, which will double the capacity. Now, what is possible. Because, already those orders are there. And, company is feeling, that after 8 months, we will have double production capacity.

Maybe, it is quite possible, that these customers may not wait up to, 8 months, or 10 months. And, they may go to, some competitors. Again, the failure of manufacturing, to anticipate the new demands. And, if you are not able to anticipate new demands, it is again going to create problem for you. So, even in this case also, demand is there. But, demand is today. And, you are

making some arrangement to fulfil this demand, after one year.

And, customer is always in hurry. And therefore, all these customers will go, to some other competitors. And, even it is also possible that, whatever capacity you have, that also becomes under-utilised, even today. So, your proactiveness is required, in providing these products, at the right time, to the customer. If you are not proactive, even if your orders are there, those orders may go, to some other competitors. So, these are the important things, which Skinner highlighted, that how manufacturing needs to, handle these things.

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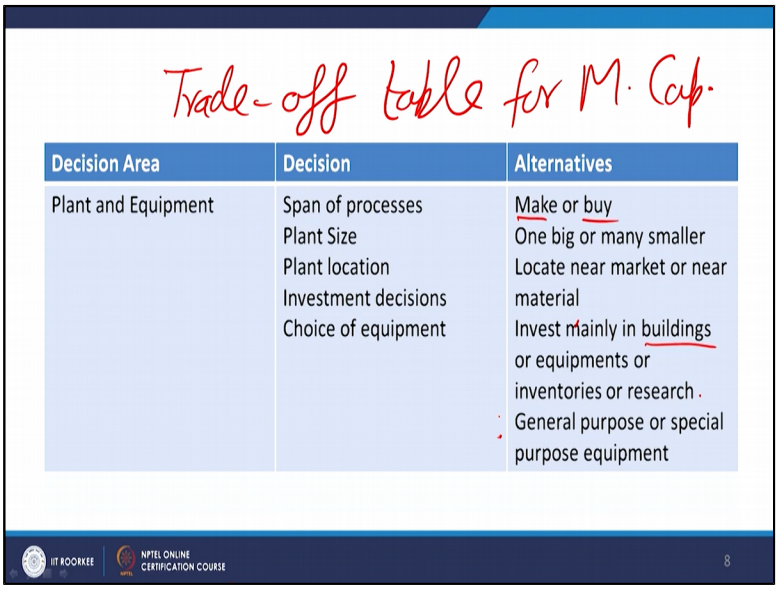

And, for that purpose, he in his paper, mentioned some important decision areas, and said, that as a manufacturing executive, you need to take decisions, with respect to various alternatives, which are available to us. So, we have, some of those decision areas. And, let us see, what are the various alternatives available, for those decisions. Like, we can take decisions, and you can say that, these are a, trade-off kind of table. Trade-off table for, manufacturing capabilities.

Now, you take decisions about, plant and equipment. And, when I am talking of plant and equipment, we take decisions, in the area of processes, plant size, plant location, investment decisions, and choice of equipment. The list is not exhaustive. But, these are broadly, you can understand, are our decisions. Now, when I am taking decisions, so I must have some kind of alternatives. And, from those alternatives, I will choose, the decision which is more suiting, to

my organisation.

So, the decisions may be, having the alternatives of, whether to make or buy, these plants, equipment. You should have, one big plant, or many smaller plants. Another critical decision. Sometime, you look for economies of scale, you may go for one big plant. But, when you want more flexibility, you will go for the many smaller plants. You have issue of, locating the plant. Whether to locate the plant, close to your market, or locate your plant, close to your raw material. A very perennial debate, discussion.

Then, whether you want to invest mainly, in building, or equipment, or inventories, or research activities. There are different types of organisations, they have different types of priorities. And accordingly, companies like Qualcomm, companies like Samsung, invest heavily, in the field of research. And, many of the public sector undertakings in India, invest mainly in buildings. So, there are alternatives. If you have capital, where will you invest. So, that is also, one important decision area.

Then, in your plant, whether you want to have, general-purpose machines, or special purpose machines. General-purpose machines, will be used for variety of products. If I want to produce variety in my plant, I will go for general-purpose machines. But, if I want to produce limited variety, or no variety in my plant, I want to produce them in volumes, then I may go for SPM's, a special purpose machines.

So, whether to have, General-Purpose Machines, GPM's, or Special Purpose Machines, SPM's, are guided, that how much volume I have. It is quite possible, that I make a one big factory. And, in that one big factory, I keep large number of general-purpose machine. And, when I make many smaller factory, so in one small factory, I am making only one type of product. So, in each small factory, I can have, a special purpose machines.

Because, in one particular factory, I am making only one model of watch. In another factory, I am making, another model of shoes. So, my products are limited, with respect to a particular location of production. So, in that case, I can go for, special purpose machines also. So, it is

important, that what type of decisions I am taking, for different types of decision areas.

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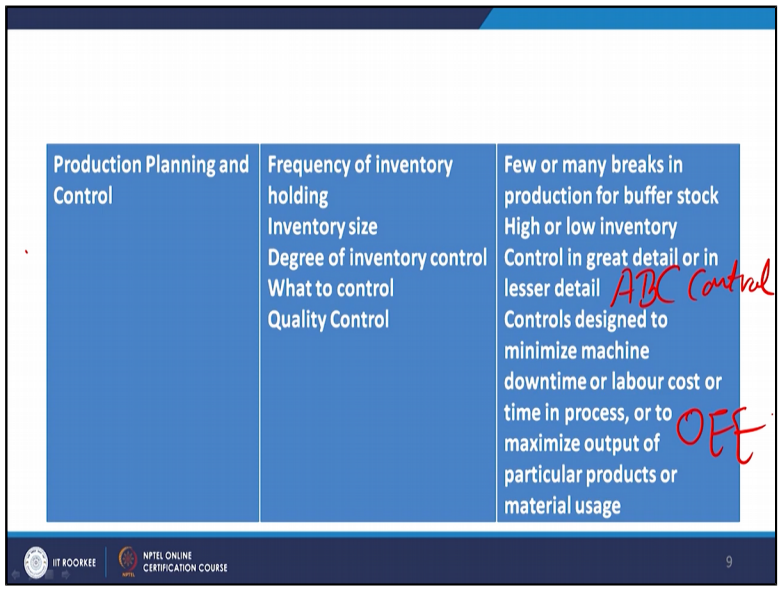

Similarly, you can take decisions, for production planning and control. In production planning and control, you have issues like, what are the frequency of inventory holding? What are the inventory sizes? What is the degree of control, you want to exercise, on your inventory? Then, what are the things, you want to control? The quality control related activities. All these things are the, decision areas, in case of production planning and control. And, what are the alternatives available? Whether you have, few or many breaks, in production for buffer stocks?

You want to have, high level of inventory, or low level of inventory? If you have, high level of inventory, you will have higher service levels. But, if you have low level of inventory, you have efficient supply chain. Your cost of holding inventory, will go down. You want to have, a greater control on your inventory, or a less control on your inventory? Then, you can think of, concepts like, ABC Control. For, A-items, you will have, higher control, and for C items, you will have lesser control.

So, what type of control system, you want to have. Then, controls designed to minimise machine downtime, labour cost, time in process, or to maximise output of particular products, or material uses. So, we go for, concepts like, OEE, Overall Equipment Efficiency, so that, we need to design our control system, in such a way, that all the time, my overall equipment efficiency,

should increase. So, these are the various types of alternatives, which we need to take, in case of production planning and control.

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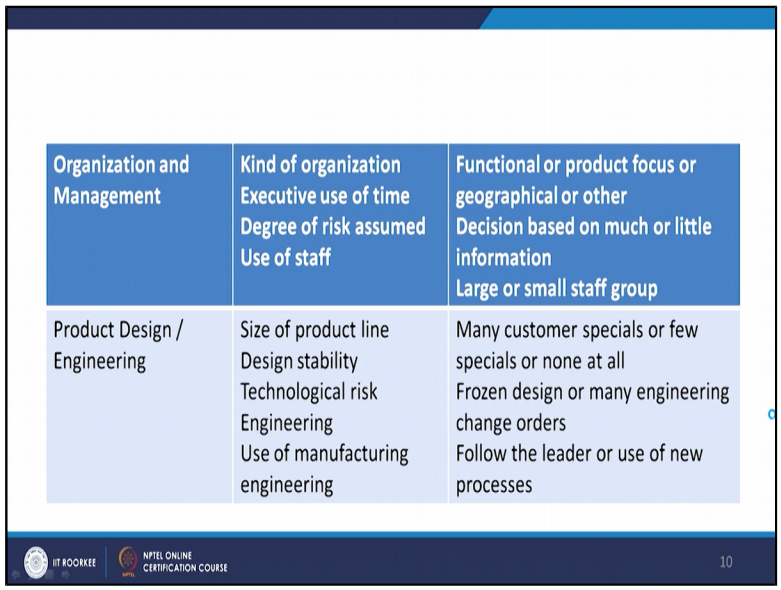

Then, another area of trade-off, can be the organisation and management. So, here we take decisions, in the area of, what type of organisation you want to have, what are the executive use of time available to you, what are the degrees of risk associated, and what are the use of various staff persons. And, you can see, what are the trade-offs, what are the alternatives available to us. Then, whether you want to focus, on functional aspects, product aspects, or the geographical aspects.

Or, you have something else, in your mind. Whether, you have sufficient information, for making the decision. Or, you are working on some partial information, for taking the decision. Then, whether you want to have, large staff group, or small staff group. These are the various types of trade-offs. With respect to product design and engineering, similarly, you can have, trade-offs like, you will like to have, many customer specials, or few specials, or none at all.

So, what type of customers, you want to serve. Then, you have one standard design, or you are ready to change the design, as per the customer's requirement. You are having, the technological leadership. You believe that, I should be the first user of a new technology, or you see that, when others can use this technology, others have established the technology, then I should change

technology, at my organisation. So, depending upon, your own personality, we take a particular type of decision alternative.

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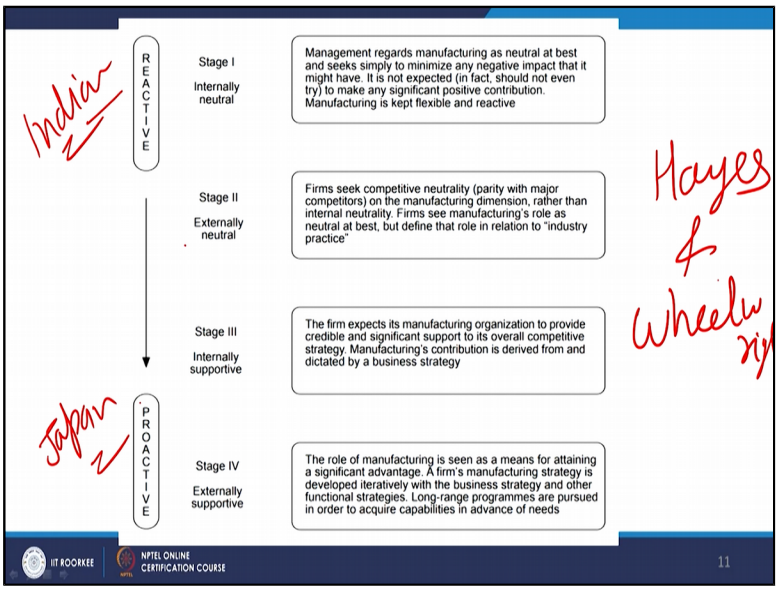

That was the contribution, given by W Skinner. The other important name, we need to discuss is, Hayes and Wheelwright. Now, this particular slide, is the result of Hayes and Wheelwright. Now, Hayes and Wheelwright, divided organisations, into 4 stages, from Stage-1 to Stage-4. Stage-1 organisations, are highly reactive. And, Stage-4 organisations, are very, very proactive. And, Stage-2, and Stage-3, are in between, somewhat reactive, somewhat proactive. Somewhat proactive, somewhat reactive, these are Stage-2, and Stage-3.

Most of the Indian organisations, are in category of Stage-1. And, most of the Japanese organisation, are in Stage-4. Chinese, European, American organisations, are Stage-2, and Stage-3, type of organisations. Now, Stage-1 organisations are reactive, which are internally neutral. And, Stage-4 organisations are proactive, which can anticipate. Like, in case of Company-C, the example we discussed, we wanted to have, a Stage-4 organisation, that demand is going to come, in near future.

And accordingly, I should be readily available, with excess production capacity. So, because many of these organisations, are not able to see the future. And therefore, they remain mostly either in Stage-1, or in Stage-2. So, we need to see, how to change this aspect, of being reactive

to proactive. And, that will help us, in using the manufacturing, for our competitive advantage. We will discuss, slightly in more detail, this particular concept of Hayes and Wheelwright, in our coming session. Since, time is getting up. So, we will like to close the session, now. Thank you, very much.