Management of Inventory Systems
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Lecture - 10
Inventory Problems and Selective Inventory Management (Contd.)

During the first 4 lectures on the Selective Inventory Management, we have discussed in detail the possible types of the classification of the systems or inventory items which are being followed by many organisations, and why selective inventory management is needed.

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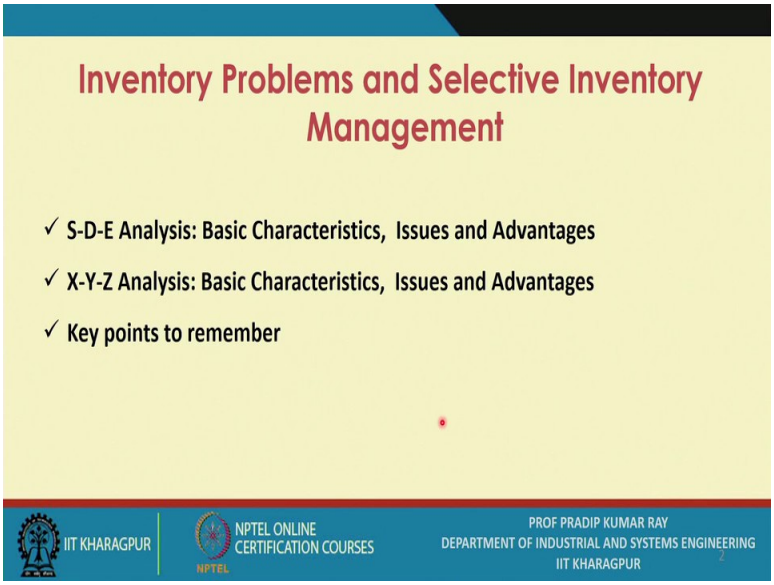

Now, during this lecture session I am going to discuss 2 other important the classification scheme. The first one is the so called S-D-E analysis of classification, and second one is X-Y-Z analysis. Now what we are going to discuss that is for both the analysis; their basic characteristics, issues and advantageous particularly at which condition which classification scheme you need to follow.

So, advantageous of you know selective inventory management is known to you already we have discussed. And certain the key points you need to remember why you propose a

one or more such classification scheme. So, this the key points also will be discussing as the concluding remarks.

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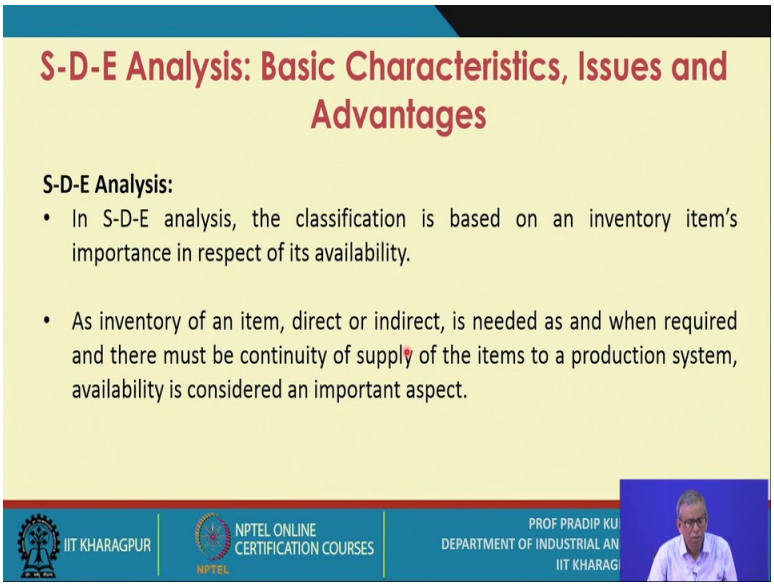

Now, let us talk about S-D-E analysis for classification of inventory items. We have already discussed in detail with a few numerical examples 4 specific you know the classification scheme. First one is known as HML analysis based on the unit price of the item. So, and the second one is well known A-B-C analysis based on annual usage value, and you attach importance to a particular item based on it is you know the annual uses value.

The third one we have discussed that is you know VED analysis the based on the criticality of the item. So, so and criticality depends on what is this functional value in relation to the concerned products or the end items. So, while you carry out say VED analysis, you must have thorough understanding of the design of the product, particularly what are the main the components of the subassemblies each the functions of each determine the functional value of the product.

So, these analysis we have discussed, and then the next one we have discussed as well that is FSN analysis, and what we have mentioned as that A-B-C analysis FSN analysis

and the VED analysis; these 3 analysis are 3 types of classifications are very, very common and they must be these 3 classifications you must use simultaneously.

Now, over and above the these classification scheme which we are supposed to use, a many a time you go for S-D-E analysis. So, let me first explain in detail the method we imply to carry out such analysis. Now in S-D-E analysis the classification is based on an inventory items importance in respect of it is availability. So, as the we know that S stands for step item mostly imported, and the D stands for difficult to difficult to procure, and E stands for easy to procure. So, this 3 types so all the items are classified under these 3 categories.

So, here the importance is defined in respect of or with respect to availability as inventory of an item direct or indirect. So, what is direct item? That means, the item which is required to produce the product ok; that means, this item is one of the component restored in the product bill of materials or products structure.

But you also must be dealing with indirect item; that means, the indirect items are those items which are required to run the production systems, ok. So, the item could be direct or indirect, and this and these items are needed as an when required and there must be continuity of supply of the items to a production systems. Availability is considered an important aspect.

So, what you as we have mentioned that that your inventory management should be such that the availability of an inventory item must be guaranteed and the as well as the continuity of supply. So, it is not that the criterion is to be made available only for a specific time period; that means, the continuity of supply has to be maintained. And availability means whether you know to what extent you are able to maintain the continuity of supply. So, this point we have highlighted here.

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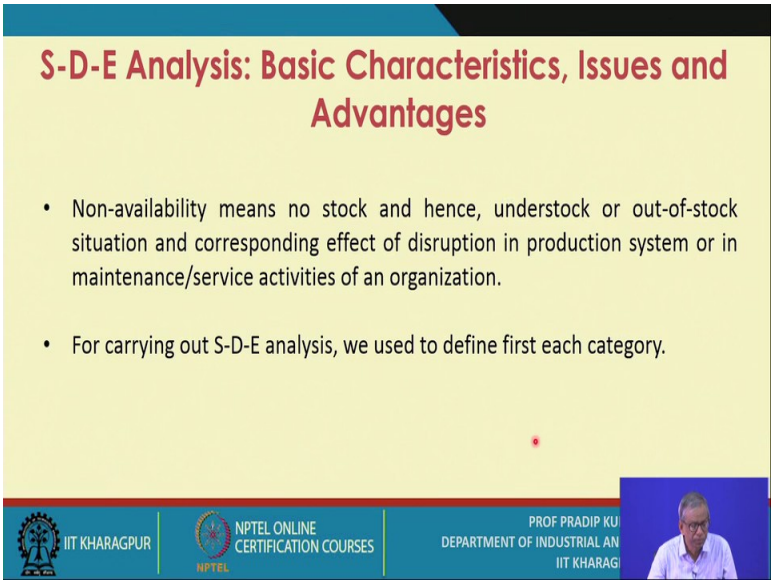

Non availability means no stock, and hence under stock or out of stock situation may occur and corresponding effect of disruption, in production systems or in maintenance of service activities of an organization. So, non-availability is the serious problem, because it will not only say affect negatively the production systems, or it also affect affect the service systems or the maintenance systems. And the as we may must be aware that the for carrying out the maintenance activities, you need many kinds of spare items. And so, obviously, you know when you classify the items so, one such type of item is referred to as MRO items.

So, availability of MRO item is also very, very important and very crucial for running a production system. Or carrying out S-D-E analysis we used to define first the each category.

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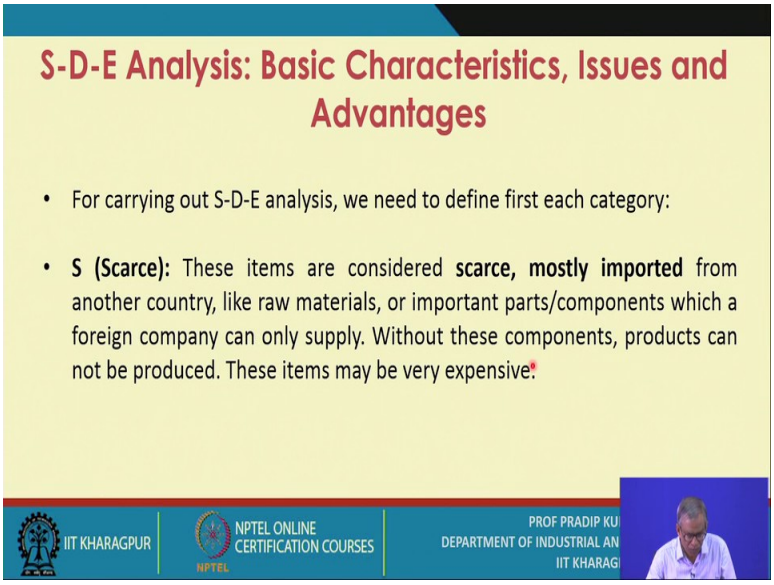

For carrying out we need to define first each category, first one is what is the scarce item S. S stands for scarce mostly imported. These items are considered scarce mostly imported from another country like raw materials. Like if you go for the producing alloy steel, now the mutual needs to be imported from say foreign country say USA.

So, there are many example of; so, the scarce or the imported items. And these items may be so the important parts of the components which foreign company can only supply, ok. Like when you get the bill of material for your product. So, you get a list of items subassemblies to be to be procure from outside, or to be to be manufactured in house.

Now, as we have found that 40 to 70 percent of such items, you need to procure from outside. So, you must select the outside suppliers, later on when you discuss the purchasing systems the purchasing management. Will come to know the details of the purchasing procedures to be imply for different types of items.

So, it is very common for many countries for many organisations. You get many items as a group of items. So, importance items to be scarce items from foreign supplier. So, these items are considered to be scarce for imported items and without these components products cannot be produced, these items may be very, very expensive, ok.

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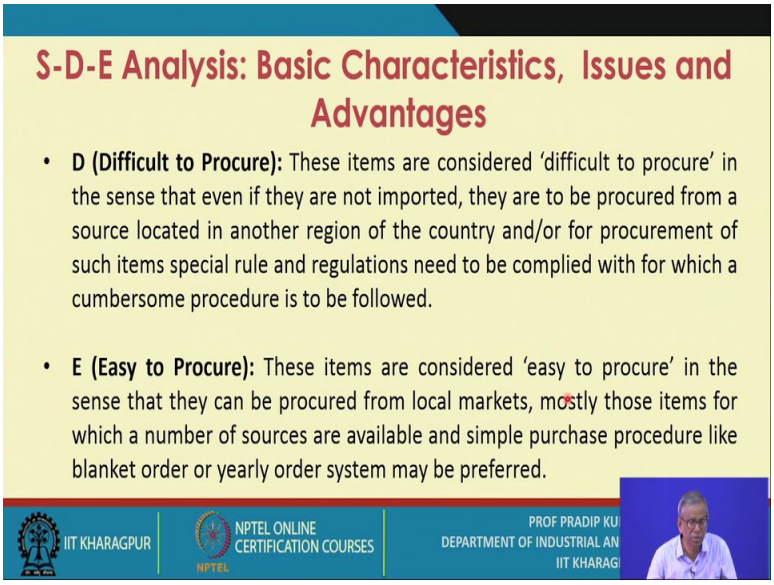

So, these are the characteristics of the scarce items and under what condition we go for importing an item.

So, next for the category of item is the d or the difficult to procure. Now these items are consider difficult to procure in the sense that even if they are not imported. They are to be procured from a source located in another region of the country, ok. So, supposing you know your company you plant is located in the instant part of the country. And the item is to be procured from the company or from a say the manufacturing the plant which is the located in so, southern region of the country.

So, it may be so, these items may be consider as difficult to procure. So, and for procurement of such items special rules and regulations need to be complied with. For which a cumbersome procedure is to be followed. So, this also could be the case, and the you need to define it in exclusive terms. That why you are saying this difficult to procure.

Either the location could be a problem, then saw it is to be procured from a far of say the place, or while you try to procure such items because of many reasons or the (Refer Time: 12:00) the rules and regulations are in place and you have to follow or you have to

comply with all these requirements as for these rules and regulations, stipulated by the state or some other controlling agencies. So, in all likelihood the purchasing procedure may be very, very cumbersome. And that is why we may we may conclude the such items are difficult to procure.

Now, in the last category we have items which as referred to as easy to procure items or E items. These items are consider easy to procure in the sense that they can be procure from local markets, ok. Mostly those items for each number of sources are available, and simple purchase procedures like blanket order or yearly order system may be preferred; that means, what you find that the many for the majority of the suppliers, and the dealing with easy to procure items, they are they are already listed in your in your say actually list of vendor or the suppliers.

And once the price is negotiated for the particular item, you can go for the blanket order or yearly order system; that means, for say suppose it is a yearly order system; that means, for the given item the price is remains fixed for one year, and as per your requirement you they are supposed to you know the supply the items in required quantities.

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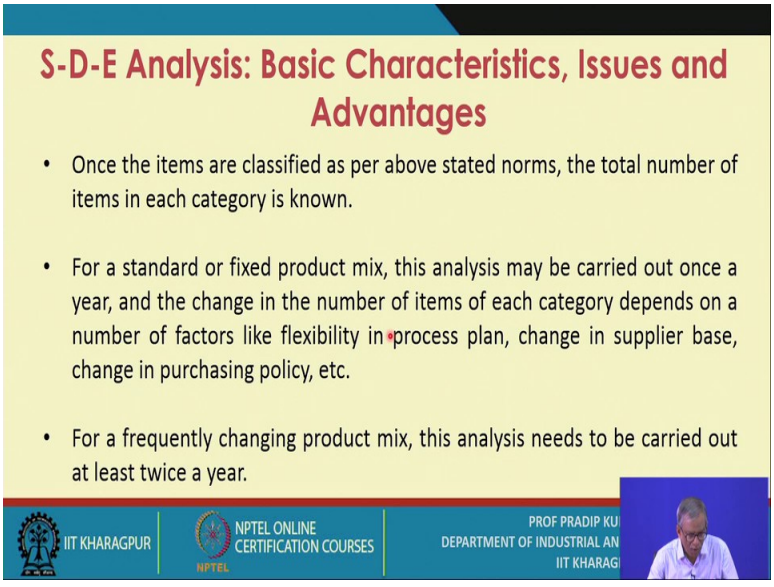

Once the items are classified as per the above stated norms so, I hope that you are understood very clearly the that the definitions of this the 3 categories of items. And why this the grouping is necessary or this classification is necessary.

So, what you have to supposed to be? That means, once you define this each category of the item, then you check the total number items in each category, how many items you have in each category. What we say that may be. So, 10 to 20 percent of the items or may be 30 percent of the items are may be in the spare space that is one case the scarce category; whereas, in another situation or in another plant or another organisations, it may be so the in the scarce category just the 5 percent of the total items. So, what you need to do? That means, you need to strengthen your international purchasing system, and particularly the import export cell of your say of your of your purchase department must be very, very strong. And there must be full proof for the procedure of procedure of purchasing such items, ok.

For a standard or in the fixed product mix, now this point you just making work for a standard or the fixed product mix, these analysis may be carried out once a year, ok. Because your product rate is not changing over the years. So, it has already kind of mixed with the test of time, and there is the a fixed or substantial market share for each of the product listed in your product mix. And you may say for the the next the few years say almost the; that is the demand is assured.

So, under such cases what you do? That means, this is the analysis you just need once a year the analysis. And the change in the number of items of each category depends on the number of factors; obviously, like flexibility in process plan. Suppose the product mix remain same or what is changing is the process plan. So, that may be the case initially you know when you start a producing a particular product, you have to adopt particular process plan, difficulty of many reasons, but; that means, you are may be following a particular manufacturing process or manufacturing procedure because of the constants of specific types of or the production systems or the machineries.

Ah So now, what you have proposed flexible production system you are implemented the so; obviously, there could be alternate process plans for the same product. So, flexibility

if there is flexibility in process plan, now if you have an impact on the number in each category change in supplier base it is so, it may so happen the previously a particular item is to be imported from outside.

Today you the you have you get another company in the country which can which can supply the same item. So, the change in supplier base that you need to that could be one of the factor. And the change in the and purchasing policy, ok. So, this is also very, very important so, there could be many factors which may affect the number in each category S D or E category.

For a frequently changing product mix; that means, as per as product mix is concerned, that the organization has not yet reached a stability or it has not become a steady system. Now this analysis needs to be carried out at least twice a year. Because the product mix system and so also the types of items to be procured from outside.

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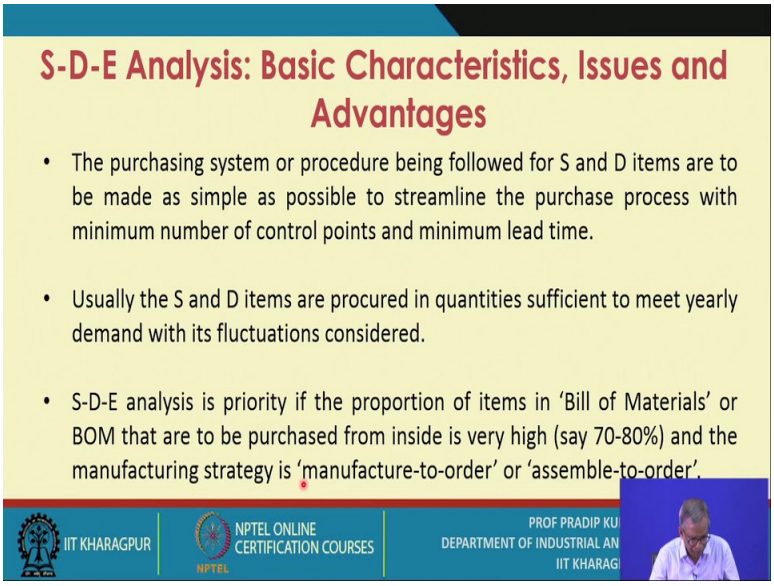

The purchasing systems or procedure being followed for scarce and difficult to procure items are to be made as simple as possible to streamline the purchase process. So, this is very, very important in the subsequent the lecture sessions we will be discussed in the details of the purchasing management. So, we will refer to this particular aspect.

Now, what you try to do? That means, while you streamline the purchase in the process make sure that there are minimum number of control points and the minimum lead time, ok; that means, the procured lead time should be as many as possible for the scarce and the difficult to procure items. Now this is the very, very challenging in majority of the cases.

Usually the scarce and difficult to procure items are procured in quantities sufficient to meet yearly demand with it is fluctuations considered; that means, as that the purchasing procedure particularly for the imported items are cumbersome, and you need to the follow the entire procedures with several control points meticulously. So, it is a in majority of the cases it is a time consuming process.

So, that is why what we try to do? That means, you the try to procure such items in large quantities whether that leads to the really demand you can fulfilled with one order; that means, what you try to have against one purchase order you try to get the entire quantity; that means one supply. Multiple supply is may be difficult so, against one order one supply, ok. So, that rule will is normally followed.

S-D-E analysis is priority if the proportion of items in bill of materials or BOM that are to be purchased from inside is very high say 70 to 80 percent and manufacturing strategy is manufacture to order or assemble to order, ok. So, already we have mentioned this in the in the previous lecture sessions; that there could be many types of marketing strategies. So, one such strategy is manufactured to order and other another strategy is assemble to order.

So, so, for such cases definitely we go for S-D-E analysis. And what is the bill of material bill of material is essentially list of items or numbers in the types of items including subassemblies, you are required to the say purchase, or manufacture in house to produce one unit of your output may be the end item or the product.

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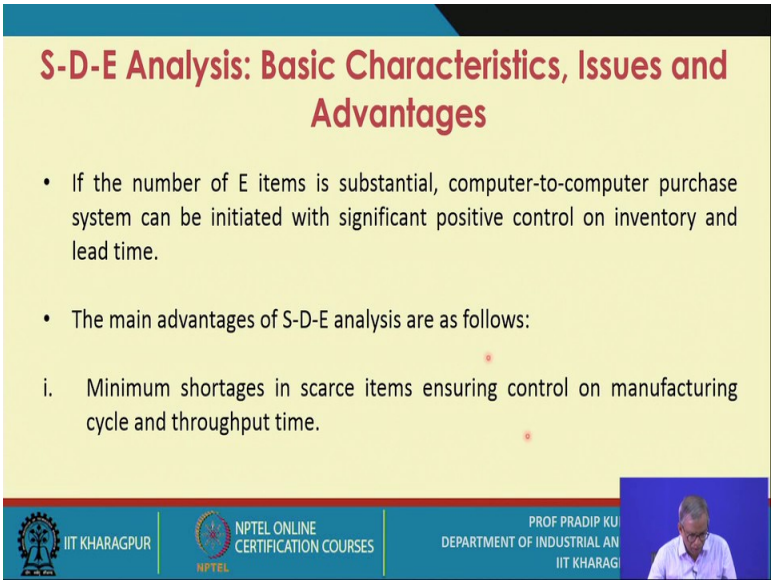

So, if the number of E items is substantial easy to procure items, computer to computer purchase systems can be initiated with significant positive control on inventory and lead time, ok. So, these are the 3 important aspects. One is the what extent you can control the order quantity, ok. So, that the average inventory these are acceptable level. This is one objective, and the second objective of any inventory management system is to the control the procuring lead time.

So, the main advantageous of S-D-E analysis are as follows, I am just the listing the main advantageous. Minimum shortages in scarce items ensuring control on manufacturing cycle and throughput time you know what the we have already refer to that the throughput time as well as the manufacturing cycle.

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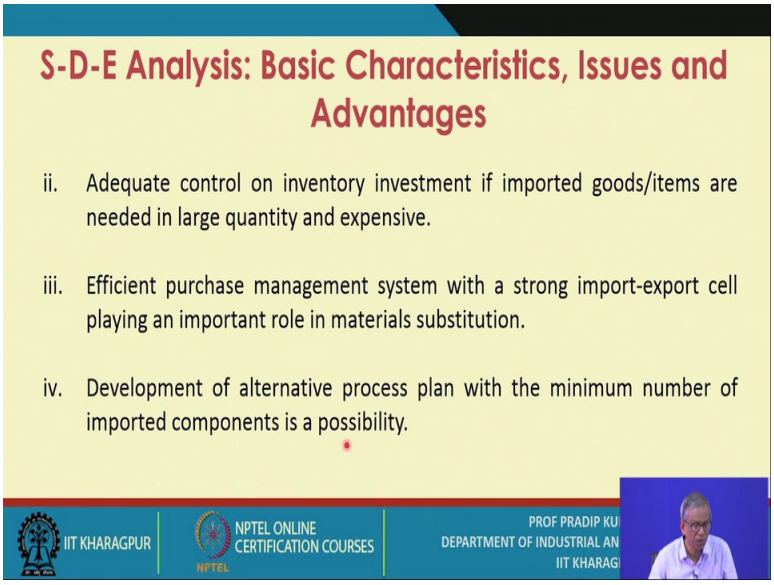

The next one is adequate control on inventory investment, if imported goods or items are needed in large quantity and expensive. Efficient purchase management system with a strong import export cell playing an important role in materials substitution. So, these aspects also will discuss later on, particularly if you important topics you note down at this point. One is that the purchasing management, and the second one is the value engineering one value analysis technique with materials substitutions. Development of alternative process plans with the minimum number of imported components is a possibility.

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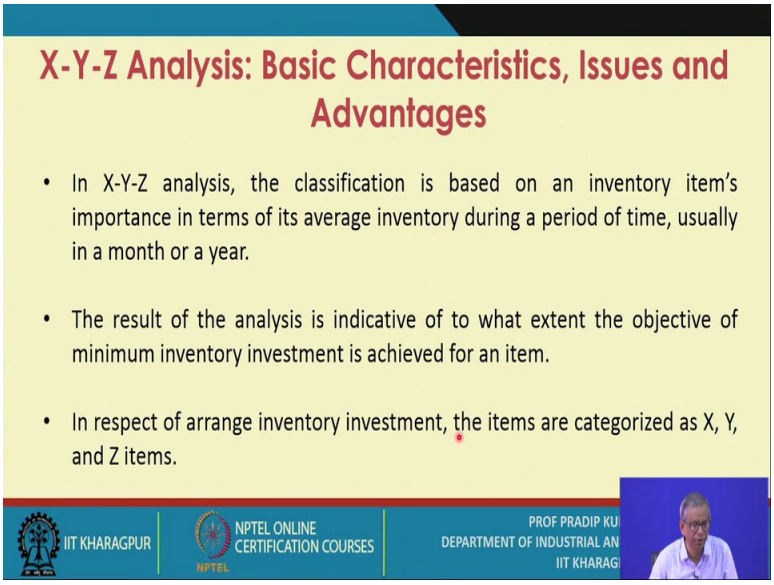

Now, the next before we conclude the sessions, let us discuss X-Y-Z analysis, and these analysis also is required in many instances in many occasions. And now the let me the discuss the basic characteristic issues and advantageous of such an analysis. In X-Y-Z analysis the classification is based on an inventory items importance. Again you are defining the importance of an item, and this importance of an item in terms of it is average inventory, this way you define; that means, if the average inventory is very high, you say this is this is considered to be very, very important, ok.

And, obviously, the average inventory you calculate or you estimate during a period of time usually for in a month or in a year, ok. So, the result of the analysis is indicative of bracket strength this is very, very important; that means, this result is indicative of what extent objective of minimum inventory investment is achieved for an item. Now this is one of the goals of inventory management systems, you have already say the mentioned the many n number of goals n number of objectives of inventory management systems in during week one or lecture sessions.

So, if you carry out X-Y-Z analysis; that means, one of the objective that is the minimum inventory investment, this particular objective it will be easier for you to achieve. In respect of say the minimum inventory investment items are so, average inventory

investment the items are categorised as X Y and Z items.

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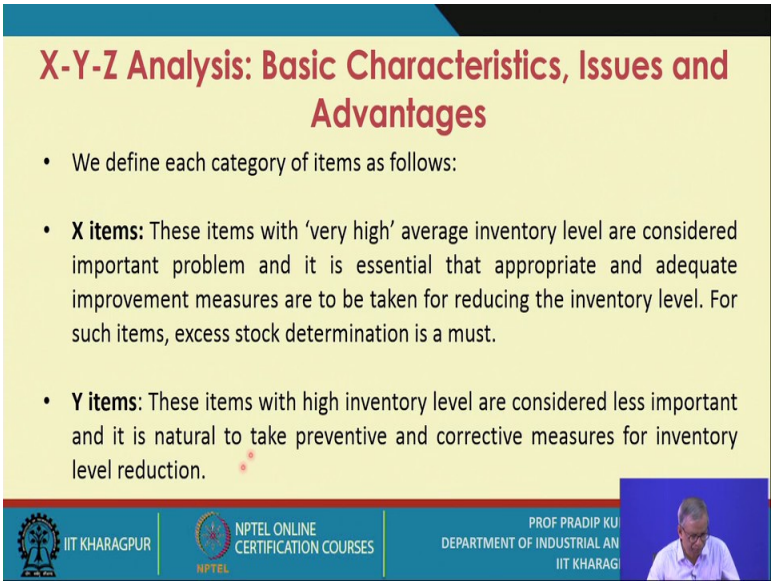

Now, we define each category items as follows. X items these items with very high average inventory level that you have to define what is means relatively speaking what is very high average inventory level. And these items with very high average inventory level are considered important problem, and it is essential that appropriate and adequate improvement measures are to be taken for reducing the inventory level.

This is obvious, that means, you need to either to change the say the inventory policies or so inventory policies or inventory control systems, or even if you follow the same inventory policy, what you can do to reduce this average inventory level that is you may change are the parameter values of given inventory control systems. For such items excess stock determination is a must.

Now, what is y items these items with high inventory level are considered less important, and it is natural to take preventive and corrective measures for inventory level reduction.

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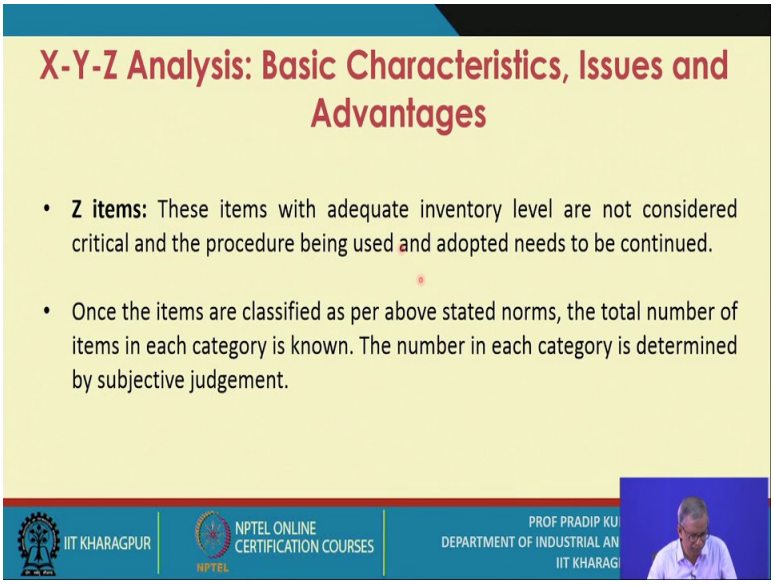

Now, what are the Z items? These items with adequate inventory level are not considered critical, and the procedure being used and adopted needs to be continued, ok. Once the items are classified as per above stated norms, the total number of items in each category is known. The number in each category is determined by subjective judgment; so, this point already. (Refer Time: 28:05)

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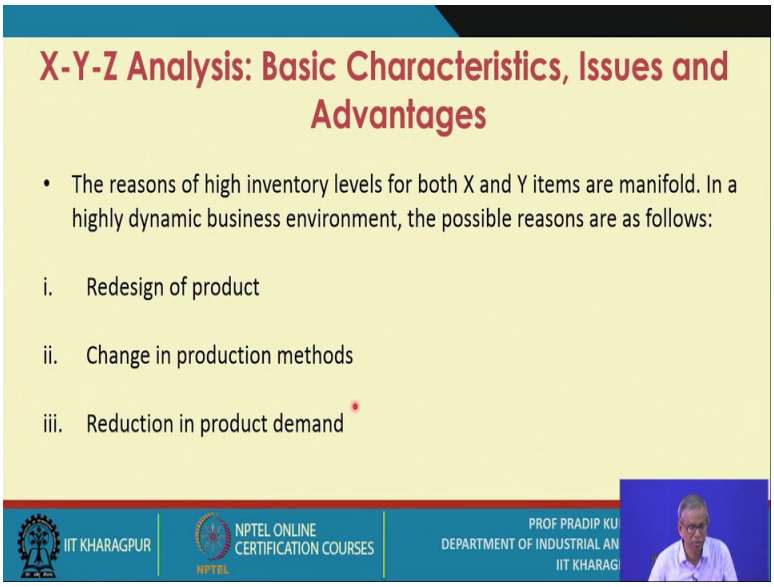

Now, the reasons of high inventory levels for both x and y items are manifold; that means, when you carry out of an analysis, you will come to know what are the possible reasons of having very high inventory level of such items. In a highly dynamic business environment the possible reasons are as follows. First I am just mentioning the reasons later on will take of all these issues in a systematic manner.

One is redesign of the product that could be the reason. Change in production methods reduction in product demand, ok.

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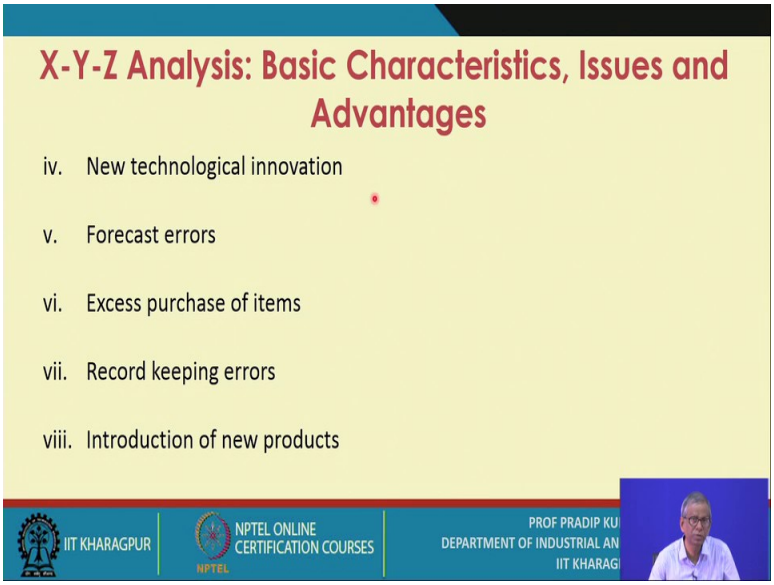

New technological innovation, forecast errors, this is also may be a serious problem, excess purchase of items, ok; that means, sometimes you become very, very aggressive, in purchasing the items. So, what we create see this so the attitudes you have you may create excess inventory.

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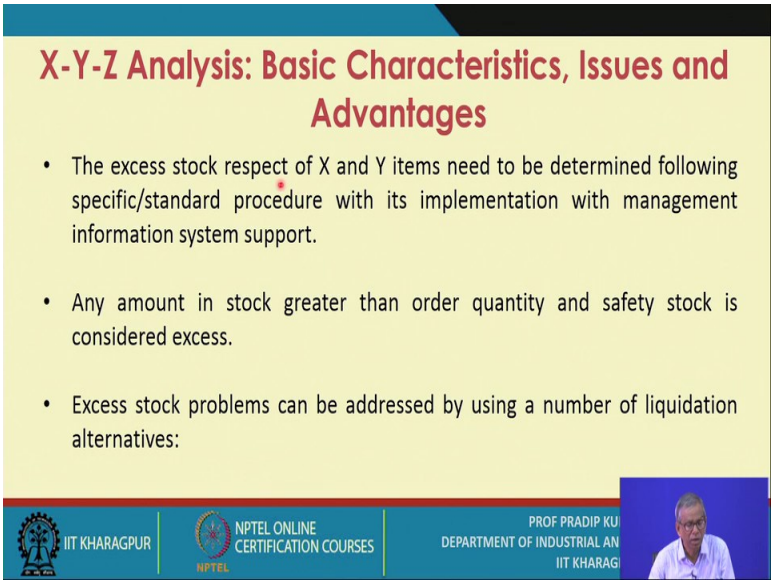

Record keeping errors, this is also possibility, and introduction of new products. Now the excess stock in respect of x and y items, need to be determined following specific or standard procedure with it is implementation with management information system support. So, this point is to be noted later on we discussed the MRP systems and the other guidelines of MRP system will refer to this aspects.

Any amount in stock greater than order quantity and safety stocks is considered excess. So, this way we define excess stock problems can be addressed by using a number of liquidation alternatives.

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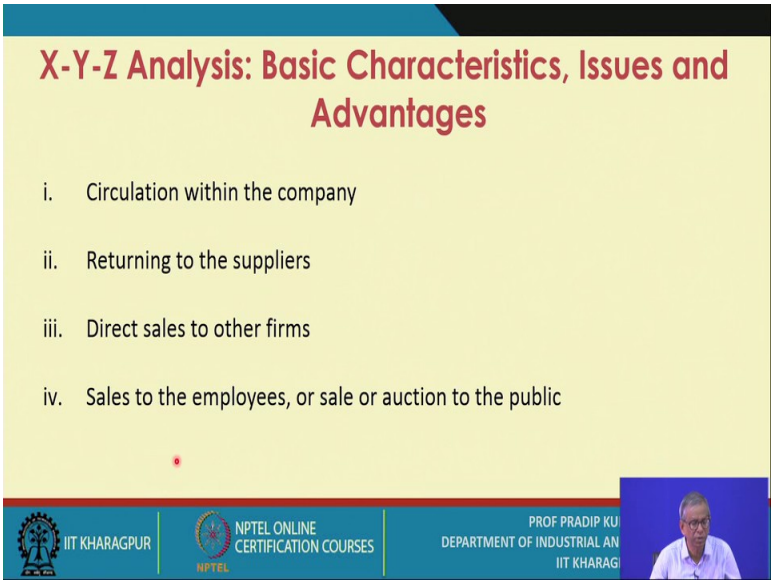

So, these are the possible liquidation alternatives, then how to dispose of these excess stock, circulation within the company returning to the supplier if this is visible you go for it direct sales to other firms if you check for it is visibility; sales to the employees or sale or auction to the public.

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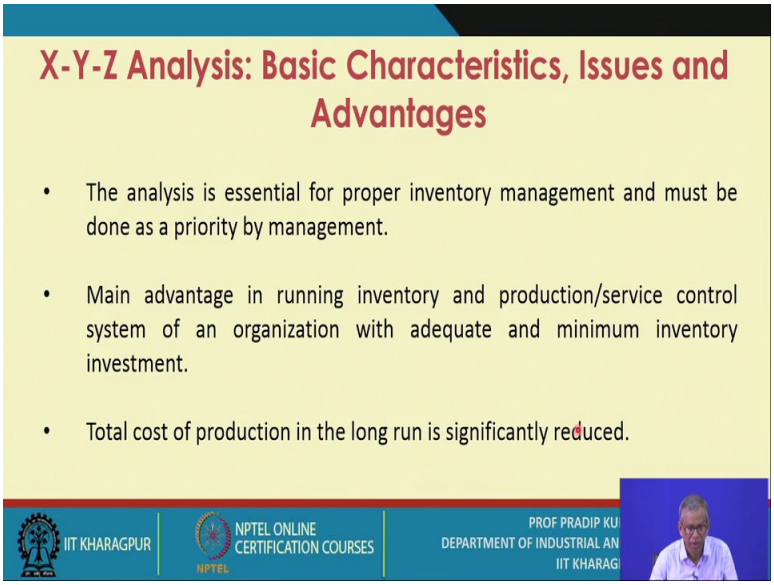

So, the analysis essential for proper inventory management and must be done as a priority by management. Many advantages in running inventory and production service control system of organisation with adequate and minimum inventory investment. Total cost of production in the long run is significantly produced.

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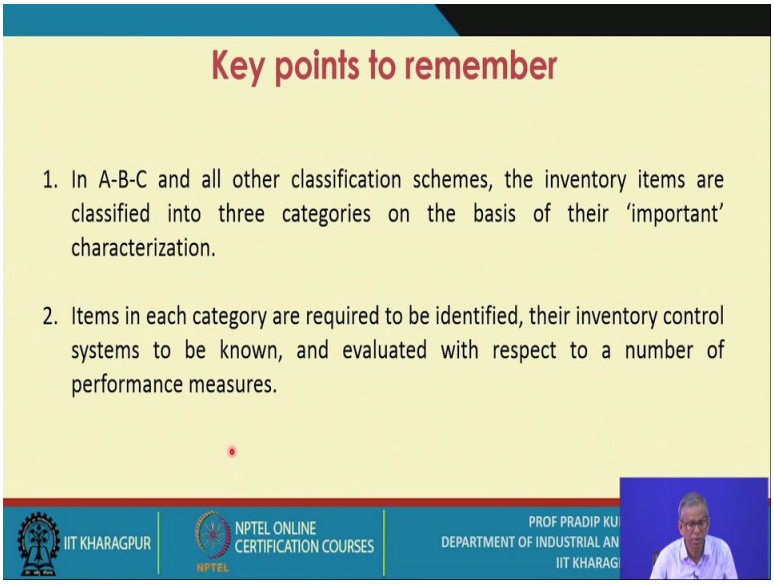

Now, just before I close this session, I will just highlight a few key points. In A-B-C and all other classification schemes, the inventory items are classified into 3 categories, on the basis of their important characterisation important characterisation. Items in each category are required to be identified, their inventory control systems to be known and evaluated with respect to a number of performance measures.

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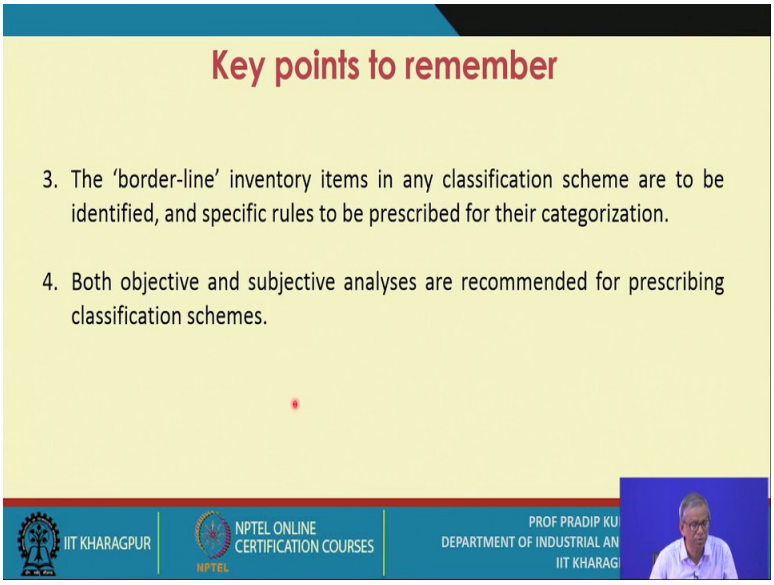

The border line inventory items, this point is to be noted in any classification scheme are to be identified and specific rules are to be prescribed for their categorization. Both objective and subjective analysis are recommended for prescribing the classification schemes. So, with this you know so, with this discussions, I conclude this sessions on the selective inventory management.

Thank you.