Decision Support System for Managers
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Module – 04
Lecture – 20
ABC-FSN-VED Analysis; Space Calculation in a Warehouse- For Staging Area

Hello and welcome to "Decision Support Systems for Managers"! We are into module 4, lecture 5. Now in the previous four lectures of this module that is 'decision support systems for materials managers', we had discussed in summary, that is earlier; the functions of warehousing was performed by warehouse manager, and storing of material; the safety upkeep of the materials, all were performed by the materials manager.

But over time, these two functions since they are very-very intertwined, we have only one person who is referred to as either the warehouse manager or the materials manager in terms of functionality but essentially they are a single person who is looking after the entire set of activities; ok.

What are the decisions that this person has to take? This person has to take the decisions of both the warehouse manager and the materials manager. Example; they have to take decision on how many warehouses they should have, where should they have these warehouses, how to synchronize the demand and supply. So, that there is very-very less material that is stored in the warehouse.

Because, more and more material you store more and more space you require in the warehouse and more and more space you require in the warehouse more and more rent you pay. Just like in the previous example in the previous class we were telling you that the rent of warehouse space per square feet out on the outskirts of Calcutta besides the highway is about 25 rupees per square feet; ok.

In normal times it is about 27, 28, during COVID now we are seeing that it is about 25 rupees and within the city limits if you have a warehouse in normal times it is a bit more, but now during COVID we are seeing that it is rupees 35. 30 to 35 rupees is the range depending on the exact location of the warehouse within the city limits.

So, if this is the cost, there is tremendous effort on reducing warehouse space. So, these are the functions that a warehouse manager or the materials manager have to play. Now so, some decision making is required. So, first decision making was where to locate the warehouse.

The next decision making system was how much to store in the warehouse which essentially means; how much should come in your warehouse every day; that means, that this decision has to be in such a way that it is very-very economical. So, what is the most economical order quantity that should come in my warehouse every day? So, that my total warehouse cost is minimum; ok.

Once we get this most economical order quantity, then what we will do? We will pressurize the dealers and the distributors and the wholesalers and the retailers to take that much quantity per day from the warehouse which in simple supply chain terms we call as lift. To lift this many products from the warehouse.

So, what will happen? At the end of the day you will have zero stock in the warehouse. When you have zero stock in the warehouse and products is coming in piece mill and products is going out also in piece mill, then what is happening? Your space requirement in the warehouse will be very-very less.

This part is as we call as a semi structure decision. How much you should be the economical order quantity and based on which how much you should ask the dealers and the distributors to lift. But, the issue is the dealer and the distributor has his or her own estimates.

Even if you want he will not lift more. So, here comes in batch size, discount ok, extra commission. So, that the dealer and the distributor lifts more and then equates the zero stock situation in the warehouse; ok.

So, this part we have done and this part we did was called as economical or economic order quantity; ok. Today we will go in one step ahead and move into what is called as ABC, FSN and VED Analysis as well as space calculation in the warehouse for staging area; ok.

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So, let us start for today's lecture. Other issues in estimating material requirements in a warehouse; the ABC FSN and VED analysis; ok. Now what is ABC analysis? What is FSN? What is VED? ABC stands for there are different ways by which we mention it A is how much material is consumed what is the value, B is again how much material is consumed what is the value.

So, based on the value and the quantity ok. And the common balance that is called is as always better control. FSN means fast moving, slow moving, non-moving and VED is vital, essential and desirable; ok.

So, let us see, how do we classify these types of materials in a warehouse setting; ok.

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Now, this is very important because we seldom dump things in the warehouse; ok.

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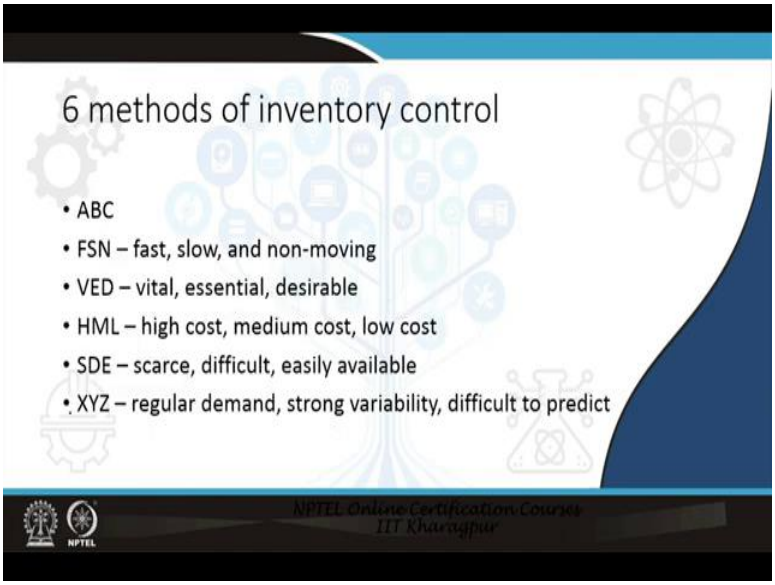

I will tell you of a story, I think I will tell you of a story that is; once a particular company called me and they said that we are having tremendous problems in our warehouse. We feel that we should increase the warehouse space because, everything is dumped. We do not have any more space left. So, can you just suggest how much space, additional space; not how much space, how much additional space we will require in our warehouse.

So, I said that let me first visit your warehouse and see what you have. When I visited this warehouse this was an electrical goods manufacturing company. They manufactured some electrical goods and they are a very-very old company about 100 years old. And they produce they manufacture a product which in India only two companies manufacture ok. So, the demand is also pretty huge and also another characteristic was the demand was very stable; ok.

So, remember these two points the demand was huge and the demand was very stable; stable means; there is no fluctuation based on months means no winter season sales come down, summer season sales move up nothing like that demand is stable all throughout the year. It was that type of an electric electrical good.

Now when I went there, when I went to this warehouse what I found was everything was just lying on the floor. You literally cannot walk from one end of the warehouse to another you have to really topple over things and move.

So, I said this is not the proper way. Just a quick glance I said you forget about increasing warehouse space. You reduce your warehouse space by at least one third for the time being you can and in the days to come you can reduce your warehouse space by 50 percent forget about increasing warehouse space.

So, then I just showed them a diagram of: ‘how things should look like inside the warehouse’. There should be proper lanes just like all of you have traveled by local train, express train and many of you have traveled by air also. What is there? In between there is a passage for passenger movement in aero plane we call it as an aisle; ok.

And we say; we need an aisle seat or please do not give me an aisle seat ok. So, in airplane it is called an aisle. So, what does what is that aisle? In express trains also you

will see in sleeper compartments or AC compartments, sleeper compartments; there is a passage through which all of us go and get down or move up; ok.

So, one side there is the longer berths and the other side is the side upper and the side lower berths ok. So, there is an aisle in between. So, I say where that aisle in your warehouse is. You do not have space for people to move, you do not have space for workers to move and pick up the products.

So, where is the aisle? This person is scratching his head and he is saying I do not know. I said so, then I told I by hand only I drew a diagram I said this is a common way of having aisles in the warehouse. So, that your workers can move and products will be in between two aisles and moment you do that you will see all this haphazardness is gone.

Next thing that you should do is; all your products are lying on the floor. Is it a heavy product, is there any material specification that prompts that these products should be on the floor, it cannot be on the racks. So, check up if a product can be kept on the racks, why do not you erect racks beside the walls and in the middle?

Then if you have four racks, very simple if you have four racks theoretically one fourth of your warehouse space is not required anymore all are lying on the floor. If you now have four racks, one fourth of your warehouse space is gone you do not require it theoretically because you will need aisles in between.

So, you will need a bit more space. So, this is it. So, can you keep your products in the racks, they said yes we can put our products in the racks, so then please do it. Second thing is; do you have any warehouse equipments means forklifts or anything. They said no. We have those hand trolleys and the workers bring out the products, they lift it up from the floor and put it on the hand trolley. As I said so, you do not have any equipments to load unload goods. They said; yes, all are manual. I said very good; no problems; ok.

So, if it is manual look at the issues if it is manual then you cannot have a rack of too much of height because the worker has to be able to pull it with at his or her height ok. So, it has to be pulled. So, your rack should be up to that height from where it can be pulled; right.

So, you have racks up to that size; number one. Second, how are you arranging your products? There is an entry gate in the warehouse you enter the gate and then what do you see? Do you have the products arranged in such a manner that the product which is required very often is kept in front?

So, the worker need not walk down till the extreme end and every time go to the end bring it go to the end bring it. So, the fast moving good should be kept in front, products which are required regularly should be kept in front. Products which are required once a week; keep it in the middle and products which are required once a month; keep it at the end similarly the products which are very costly.

Now there are two different ways of looking at it products which are very costly keep it in front. So, that it is under constant surveillance or watch there is another version to it. Products which are costly keep it at the back because if you keep it in the front somebody can come take it and go.

Whatever be it, but extreme either keep it in the front or at the extreme end. So, valuable products which are essential keep it in front keep it towards the beginning. So, that they are required products which are desirable means; you will not require it at the end keep it at the back ok. So, this is the way next is your how many products are consuming, how much of your money, how many products are consuming how much of your money? Have you categorized them?

For example, your warehouse has 100 products ok, forget warehouse go back to your homes go back to the kitchen that your mother is in which your mother is cooking or maybe your wife is cooking or maybe someone else is cooking.

In the kitchen you will see you get you will at least 50 products; rice, dhal, atta, spices, salt, sugar, tea, milk, you will get at least 50 products. Take those 50 products put in beside how much quantity you require per month. Say rice; you require 20 kgs per month.

Put the price of that 20 kg rice. So, you get a value 20 kgs into per kg rupees 40 or 50 whatever and you get a value. Atta or wheat; how many kgs you require and then put a money value to it. So, then you will get a total value for the rice or atta ok. So, in this way create a total value list for all the items.

And then you will see that only a few items is taking up this much of value in terms of money only few items. You know what will they be? Rice, wheat, sugar and cooking oil. These are the four items that will take up this much of your monthly expenditure ok. Are you understanding?

Rice, wheat, sugar, cooking oil; these are the products that will take up this much of your monthly expenditure. And the rest some pulses, salt, little bit of masala, items will be these much items; number of items will be these much huge number of items small small things; ok. Then jeera, some spices, some salt, then maybe little mirchi; ok, small small items, but count it these many count it these many; ok.

What is the total value, what is the money value of it? Only this much ok. So, what is in a nutshell you will see that a few items only four items rice wheat sugar and cooking oil these are the item in some states of India, they do not take that much of sugar. So, rice wheat and cooking oil these many these three items will consume this much of money value.

So, what type of control will you have for these products? You will always try to control, you will always try to see that there is no wastage ok. You will always try to see there is no wastage this is always A. Come to the next level tea. Now take sugar, tea, sugar, some kurmura, murmura and all those things medium value. Money spent is medium not as big as rice wheat, but medium. What do you do with that? You better control it, you better control it means you it is wise for you to control.

So, better B and the third is all your 2 rupee, 3 rupee, 10 rupee masala packets. You control it not as strictly as rice wheat cooking oil ok. So, always better control A B C; that is ABC analysis always better control A B C analysis.

So, and it is very logical, if you are spending too much of money you will take maximum care of that product. You have purchased a wrist watch 10000 rupees; you will take lot of care, he have purchased a mobile 50000 rupees, you will take lot of care, but you have purchased a football for playing 200 rupees, you will not take that much of care; ok.

So, all so, ones which have more value you take maximum care. So, always better control. So, come back to the warehouse setting, you will see that a few products have

more value and the other products are all many many products, but less value. So, which one will you have more control over?

The ones which have more value ok, the ones which have more value you will have more control right ok. So, these this is in essence what are the methods of control in the warehouse. One is ABC always better control as we just now mentioned with the kitchen example. Second is valuable essential desirable or vital essential desirable third is fast moving slow moving non moving.

On similar lines you have high cost, medium cost and low cost; HML. SDE; scarce, difficult, easily available and XYZ; regular demand, strong variability, difficult to predict. So, based on all these things you take a decision on. See what are these actually. Let us come back again, ABC, FSN, VED, HML on the screen what are these actually? These are basically giving you indications how you should control your inventory your stock.

If you can control your inventory based on these methods your total stock in the warehouse will come down and your cost also will come down ok. Your total stock will come down and your cost also will come down right. So, these that is the reason why these methods have come up; ok.

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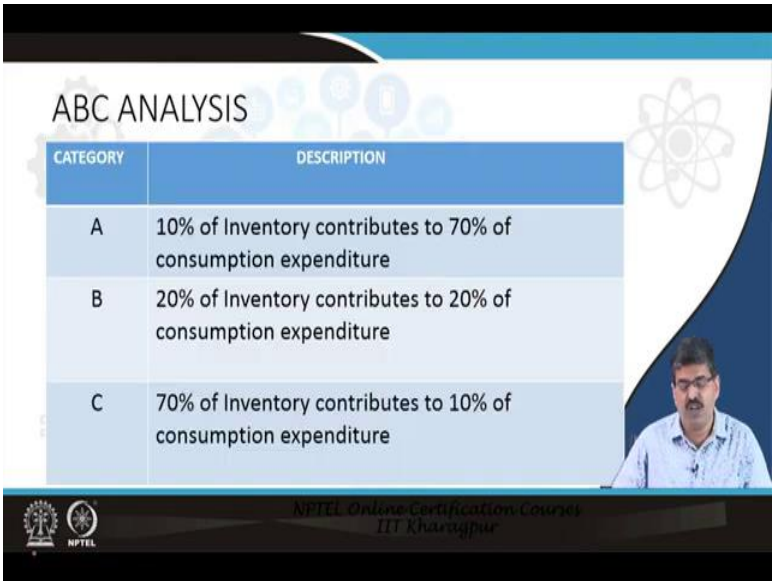

So, let us go through them 20 percent of your stock contributes to only 10 percent of your expenditure. If it is difficult to understand go back to your kitchen example ok, go back to a kitchen example and see 10 percent of your total items; that is rice, cooking oil and maybe wheat contributes to 70 percent of your total expenditure of [FL] them extreme.

C; seventy percent of the balance side biscuits, tea etcetera etcetera contributes to only 10 percent of your total expenditure the masalas etcetera tea, biscuits, etcetera will fall under category B; ok.

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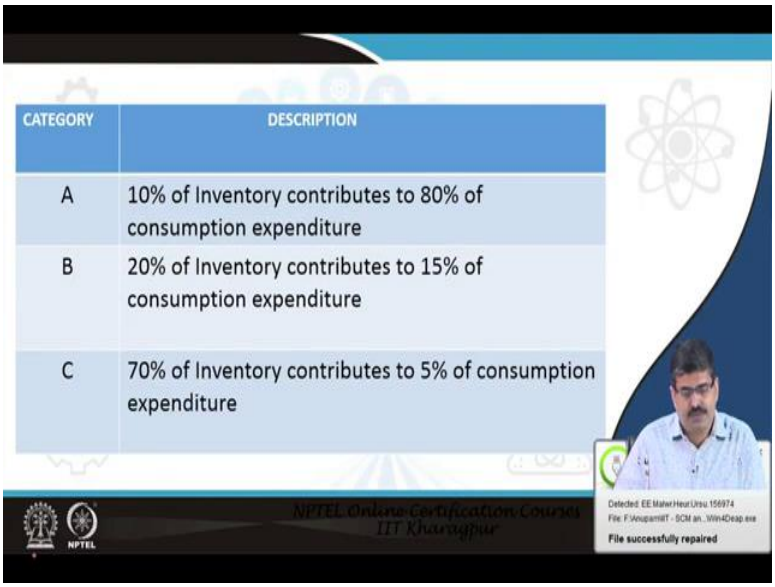

There is another way to it different people come up with different ways of categorization. Another way to mention it is same thing just a minor just a minor thing 10 percent of inventory contributes to 80 percent of consumption expenditure, 20 percent of inventory contributes to 15 percent of expenditure, 70 percent of inventory contributes to 5 percent. So, it is just a minor variation. Remember these are not water tight compartments you these can be tweaked; ok.

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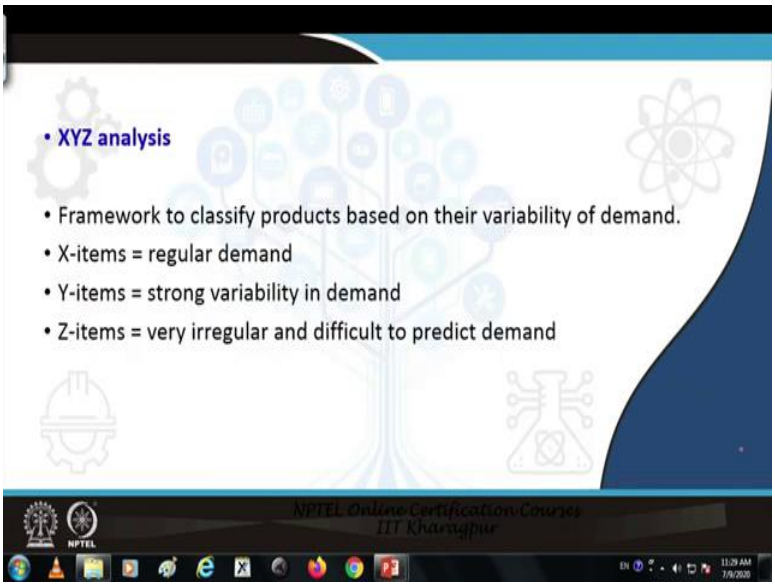

Now, what is XYZ analysis? XYZ analysis is framework to classify products based on the variability of the demand. X items is regular demand, Y items is strong variability and Z is very irregular and difficult to predict demand; ok.

See X items is regular demand. Can you mention some items that are in regular demand? Go back to the retail outlet or store from where we buy things. It may be Big Bazaar it may be Spencer's, it may be more and in some states of the country, you have your own specific giant retail outlets; ok.

What are the X items that are in regular demand? Same thing, rice, wheat, cooking oil etc. and also to some extent maggi, cornflakes, these are also you can say regular demand tea, sugar, biscuits all are X items regular demand. Now what are Y items?

Strong variability in demand or we may not use the word strong, what are these items? These items are your soups, s o u p soup ok. These items are your marmalade, these items are your cheese spread, these do not have that high a demand of that regular demand. How do you know these items do not have a regular demand? That regular demand there is a variability if the product is not in store it is not in store.

But if rice is not in store or cooking oil is not in store, store manager will ensure that it is delivered by tomorrow morning by next day morning ok. So, that shows that which one is very-very regular and which one there is a variability; and Z items are very irregular

and difficult to predict. For example, Z items you can see the moppers the floor moppers is not there not there it will come whenever it will come back to the store ok. So, very irregular and difficult to predict; right.

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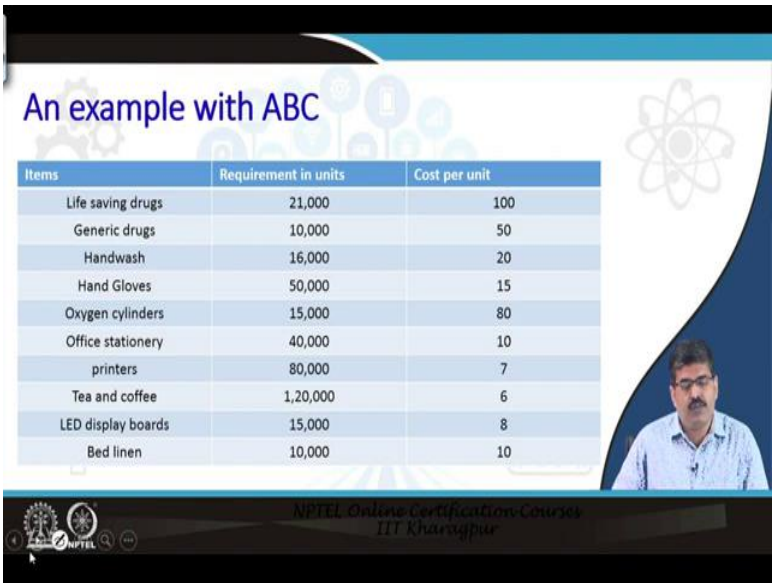

So, now let us check we have an example with ABC analysis. It is a life saving drug and these are the requirements in units and cost per unit. So, what we what do you do? We have just told you how to do it just multiply; ok. And see the value and then arrange in descending order arrange in descending order.

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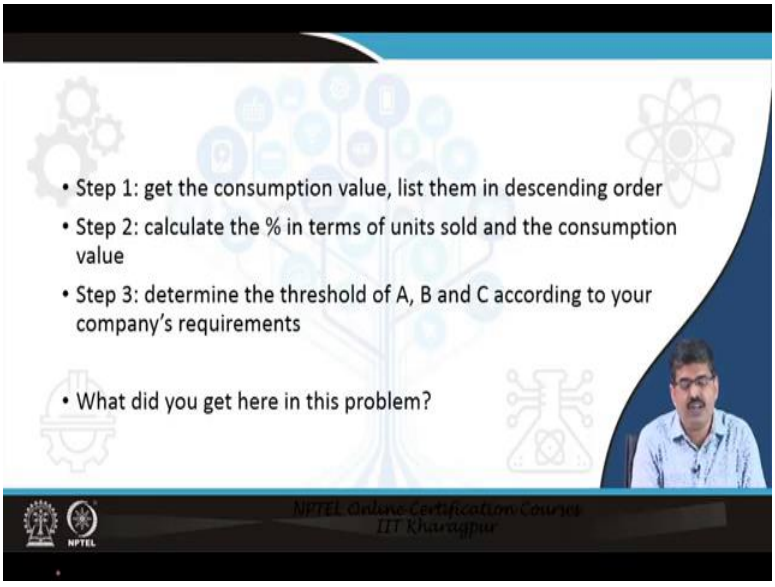

Get the consumption value, list them in descending order calculate the percentage in terms of units sold determine the threshold of A, B and C; ok.

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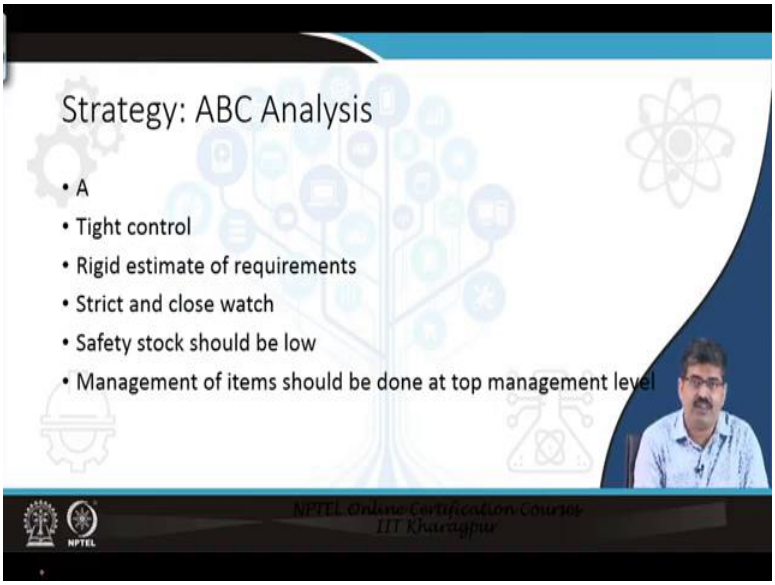

And these are the strategies that you have for A B C. A; we all have mentioned this is just a recap you have a tight control on products with A; right.

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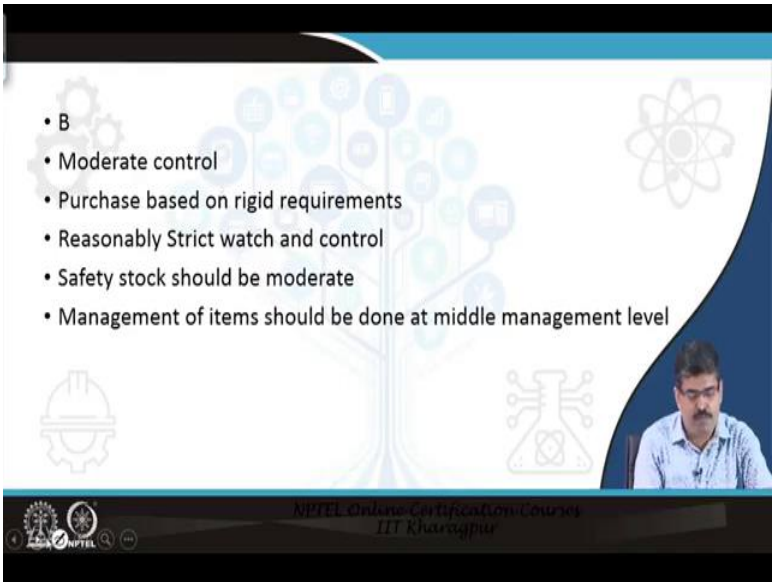

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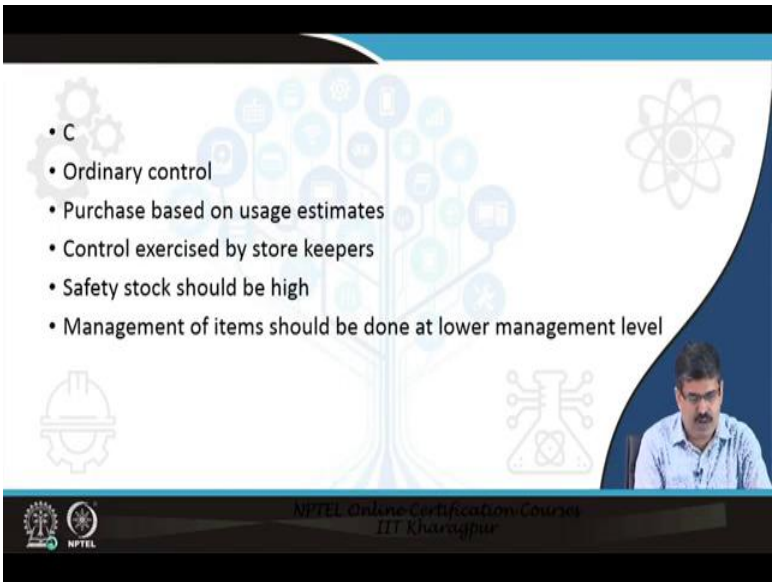

B is moderate control and C is ordinary control; ok.

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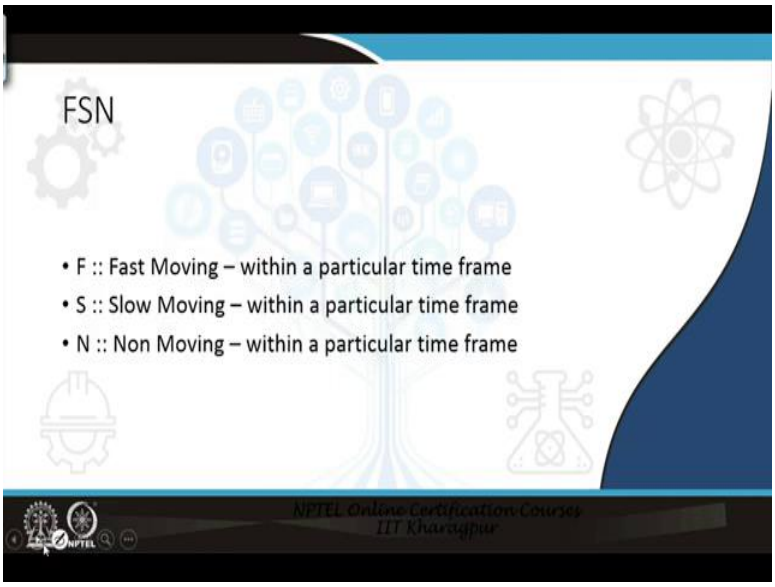

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Same for FSN; we have just mentioned it; fast moving, slow moving, non-moving. Same for VED; vital, essential, desirable.

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HML; high cost, medium cost, low cost. We have just mentioned all these things. So, it just a repetition and SDE is scarce, difficult, easily available. Now one thing you must, you might ask that which of these methods is best; there is no best.

Look at what is written in red; certain businesses, certain types of methods are more suitable; ok. You will have to see which method suits your company; right.

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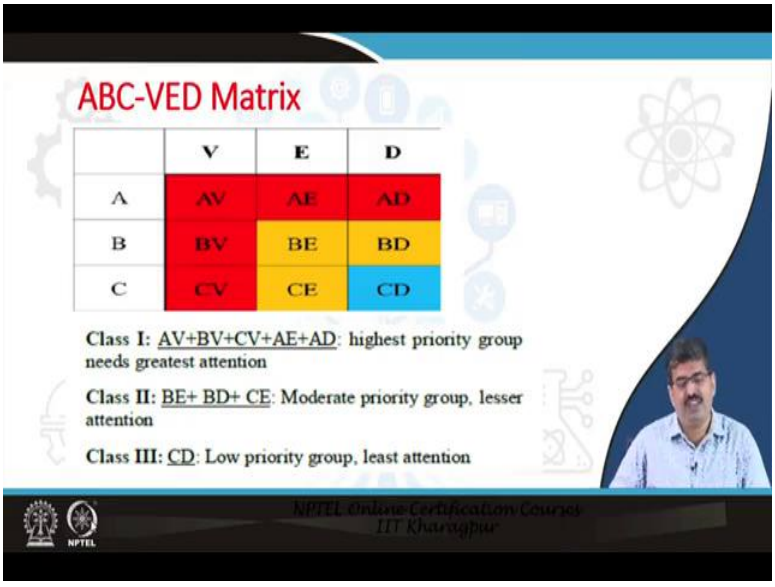

This is the matrix basically we combine A B C, V E D matrix and we see class one AV, BV these cells are already mentioned here highest priority group needs greatest attention.

These are the red; AV, BV, CV, AE, AD ok. This zone is red, highest attention medium zone is orange moderate and CD is low priority clear. So, this is the red ones needs highest attention. You know train signal is red means it is asking for the highest attention from the train driver; ok.

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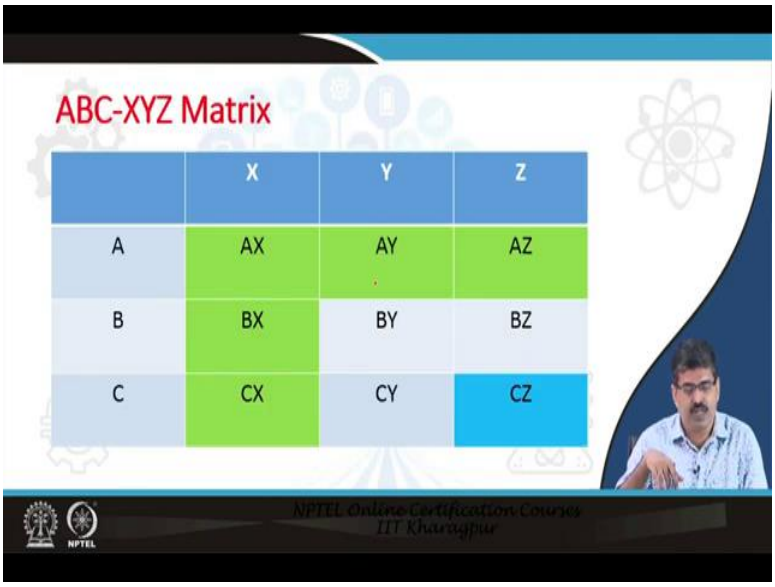

So, then is ABC, XYZ matrix right. Same thing; green is A and the medium ones are B and the last one is C;; ok.

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Now we just want to very quickly run you through space calculation in warehousing; ok.

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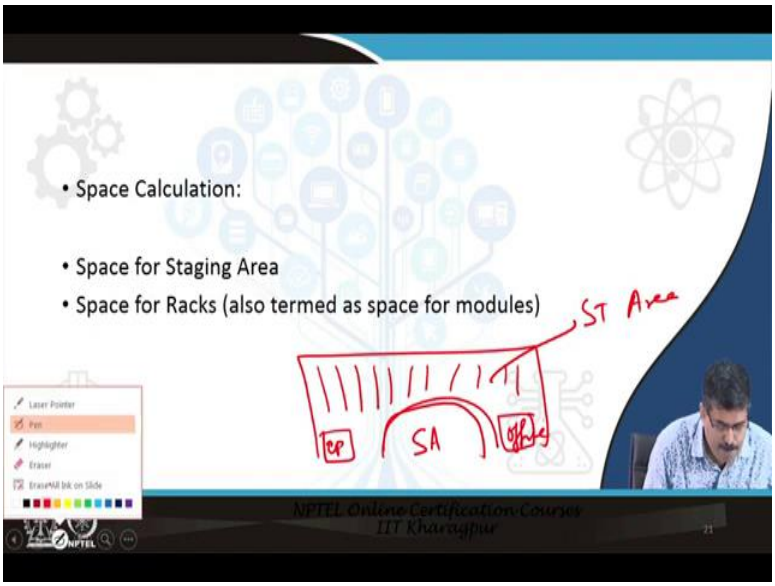

Now, space calculation in warehouses, as we mentioned in our previous diagram either; this was your; sorry; this was your; this was your warehouse and this was your staging area; and these were the racks where you stored the goods; right; agreed. This was the place where your forklifts are charged; charging point, this was your office; ok.

Now, when we do space calculation; we have to do calculation for this staging area and next we have to do calculation for this storing area right. And then the office and the charging point are to be added that will give us the total calculation for space in the warehouse; clear.

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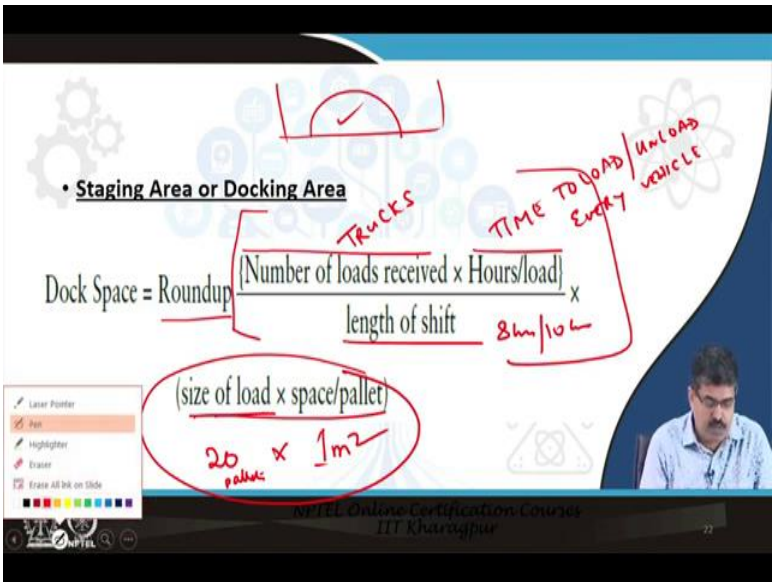

Staging area is roundup number of loads received into hours per load divided by length of shift. Number of loads received hours per load length of shift into size of load multiplied by space per pallet. All looks very Greek jargon no nothing like that. Number of loads received is equal to number of trucks that have come in your warehouse in a shift of 8 hours or 10 hours; ok.

So, number of loads received is basically the number of trucks that have come in hours per load ok; that means, how many how much time is required to load unload every vehicle ok. How much time is required to load unload every vehicle.

Time to load unload every vehicle, time to load unload every vehicle ok. Time to load unload every vehicle. Length of shift as we have mentioned it may be 8 hours, it may be 10 hours ok. Size of load means how many pallets of goods is this vehicle bringing in into space required per pallet.

Let us say space required per pallet is 1 meter square ok. And how many pallets are coming in a vehicle? Let us say 20 pallets are coming in ok, 20 pallets are coming in ok. So, 20 pallets into 1 meter square. So, this is the size of load, this is the number of trucks that are coming in.

Each truck is bringing this many goods and this much is the space required for per truck multiplied by time to load unload and divided by length of shift. Whatever and this first

part this first part whatever is my answer; if my answer is in decimals, it has to be rounded up to the next higher number and then multiplied by this. So, this will give us the total space required for remember this area total space required for this area staging area.

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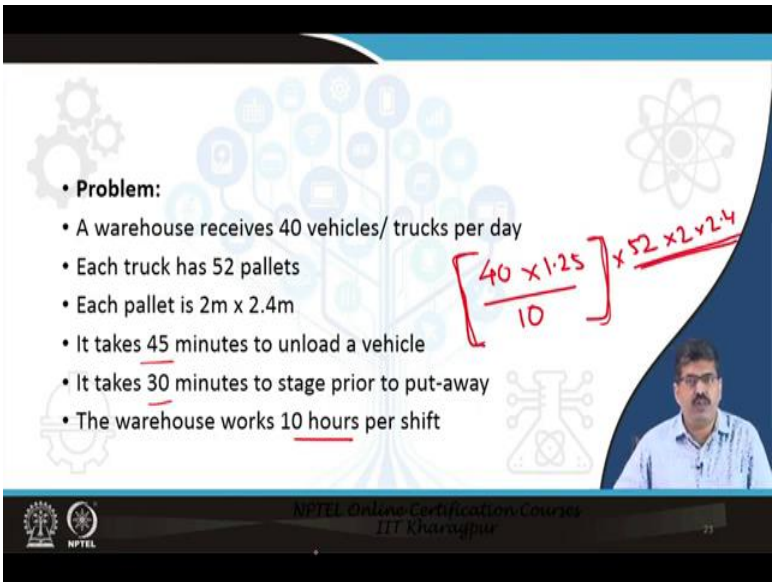

Now, let us take it that way. This is a problem, very simple; warehouse receives 40 vehicles or trucks per day. What was our formula? Number of loads received per day 40. Each truck has 52 pallets each truck has 52 pallets ok, each pallet is 2 meter by 2.4 I will do something.

Let me erase this. Warehouse receives 40 trucks per day ok. This is roundup right. Each truck has 52 pallets into the area of the pallet right 2 meter into 2.4 meter, it takes 45 minutes to unload a vehicle and 30 minutes to stage prior to put away, put away means; putting it in the racks.

So, 45 minutes plus 30 minutes it is taking in that area for unloading and then putting it away means to clear away that space you are taking 45 plus 30; 1 hour 15 minutes. 1 hour 15 minutes means 1.25 hours divided by warehouse is working 10 hours per shift; right.

So, whatever the answer for this, this has to be rounded off to the next higher number multiplied by this one right. This is my space required; agreed.

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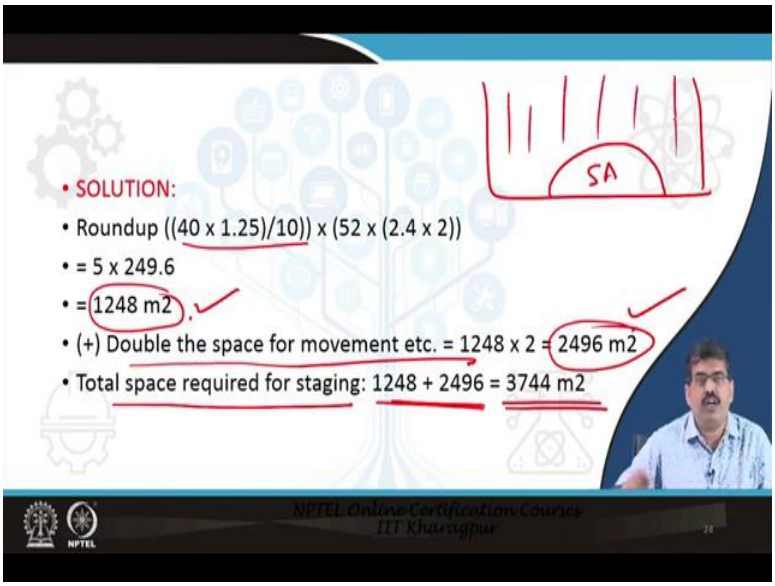

As we said 40 just go back see, 40 into 1.24 by 10, 40 into 1.25 by 10 multiplied by 52 into 2.4 into 2; that is, 52 is your 52 pallets multiplied by dimension of 2 into 2.4 ok. So, what you get is 1248 meter square.

Double it; double is the space for movement of workers and machines inside; that is 2496, whatever the material space double it for worker movement. So, and now add it total space required is 1248 plus 2496 is equal to 3744. This is for only the staging area. For storing area, what is required?

We will tell you in the next class.

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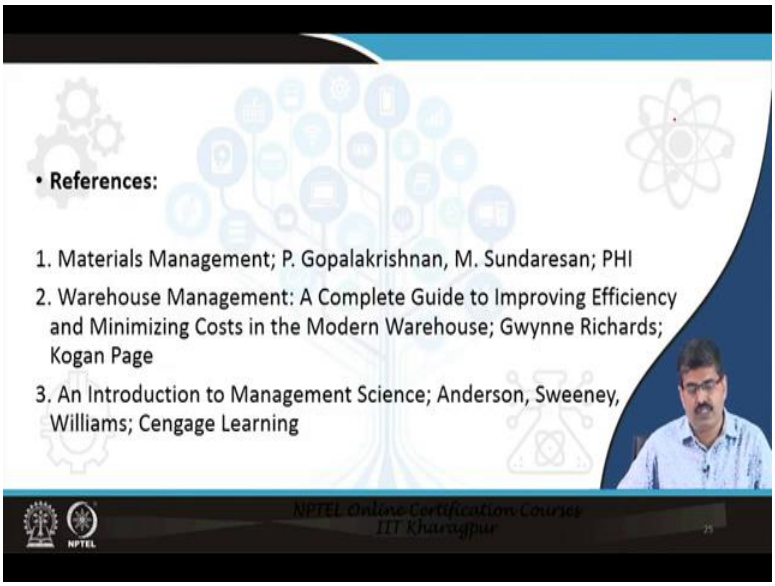

Thank you!