Introduction to Lean Construction
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Module 1, Lecture 8
Key Lean Concepts # 1 (Wastes)

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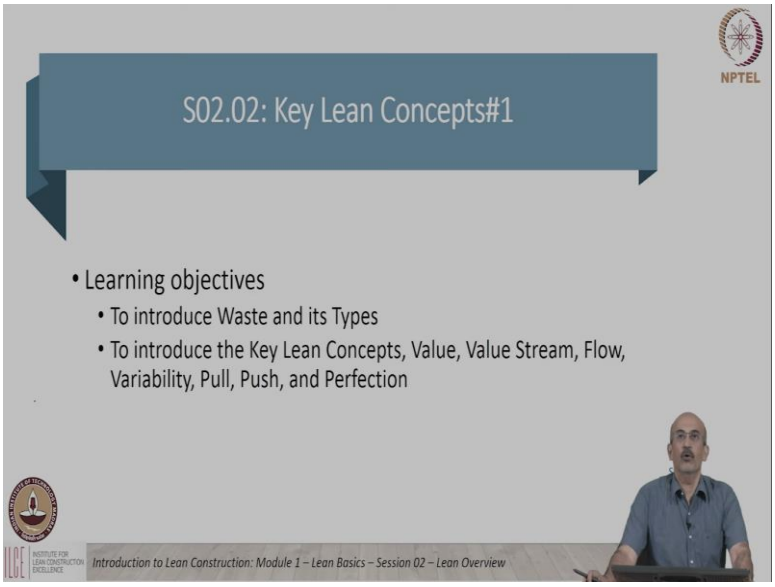

Now going on to key concepts. These are some of the concepts, which we will cover next. One is to introduce waste and types of waste, which is very very important and very core concept in Lean. And then we will go on to the classic concept of value, value stream, etc.

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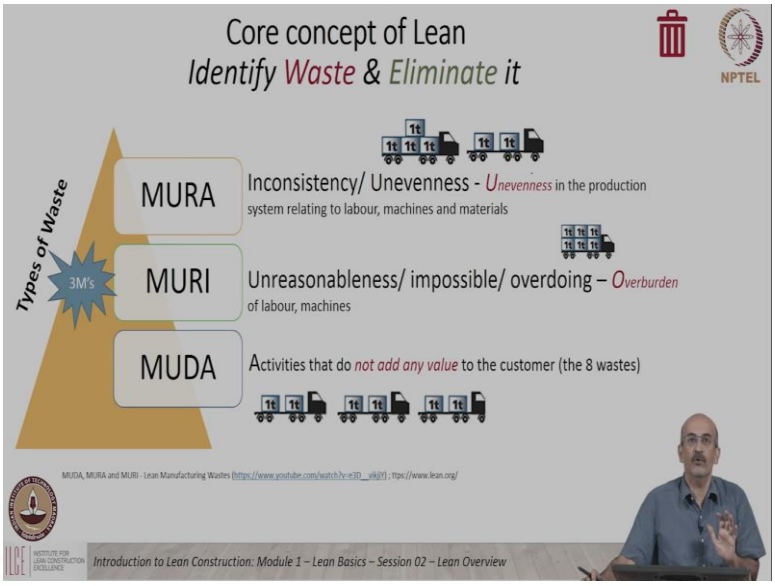

Now, coming on to this issue of waste, and identifying waste and eliminating it. As mentioned earlier, this is not a concept that is explicitly identified by Womack and Jones in their five lean concepts, but it is embedded in it. And the reason I want to give it specific emphasis is because, in a lot of projects, we have seen that when people understand the level of waste there is on a project. It really opens your eyes to requirements to eliminate it and then the Lean journey begins.

Now, by waste, it is not the material waste that we normally see concrete or rebar or bricks. But it is a waste that is hidden in the processes, which we are paying for and which actually decreases our profitability. Now again, this concept of waste started with a Toyota Production System. And the terms you see here, MURA, MURI, MUDA are Japanese terms with different high-level types of wastes. And these wastes, as you can see are inconsistency or unevenness, unreasonableness, impossible or overdoing, and activities that do not add any value.

Now, all of these are important and you can see an inconsistency or unevenness, that as you can see in the example there, there is an unevenness in the way the trucks are loaded. Now, as we are also aware, similarly, our processes are also sometimes uneven or inconsistent. And this causes other kinds of waste.

Now, because of this unevenness, there could be overdoing or overloading, which cause MURI. And this can result in MUDA. So, there is a relationship between these wastes. And what we typically focus is on this MUDA, which is the eight wastes. And but do remember that MURA, MURI are also important. But a lot of times to start with, we will focus on MUDA.

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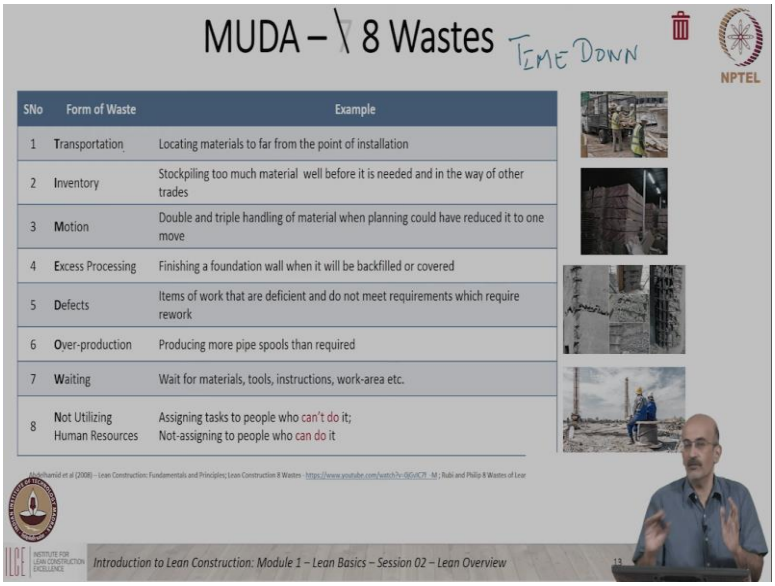

When we take MUDA, or the eight wastes, this is our classic 8 wastes, in 7 which became eight, in any process or any organization. And we have an acronym, which says TIME DOWN. This is the acronym that is used, with to describe these wastes or to be able to refer to these wastes.

And we will take a bit of time to go through each one, because this is very important as a base. So, we can see there is a 'transportation waste'. So, if material is located far away from point of installation, there is a lot of time the workers spending going up and down. It could be transportation waste.

'Inventory waste'. If I stockpile too much material, much before it is needed, it is an inventory waste. So, here you can see an example of, whether it is bricks that are stockpiled, or cement or any material that is too much of it, it is a waste, even half-finished product. Let me say it is an apartment, building, where I have several apartments that are partially finished. That is also my inventory of apartments. It is partially finished, it is not sold to the customer, it is also a waste.

I could have 'Motion waste', where it could be a rebar yard and people are doing a lot of motion unnecessarily and it increases the time it takes to be able to do the rebar activity, that is also waste. 'Excess processing'. Either finishing a foundation wall, which is going to be backfilled or covered or doing, you know, high tolerances, where the tolerances are not required, is excess processing. 'Defects or rework'. We are familiar with it. When there is

deficient or something that does not meet requirements, we need to rework on it. That is defect. That is also typically a waste.

'Overproduction' When we produce something in excess and it has to be stored that results in inventory and other types of waste. 'Waiting' we see a lot of this on our site, people waiting for materials, tools or instructions, basically the worker being idle because something has not there, definitely more waste.

And the eighth waste that is Non-utilization of human resources. Whether you are taking people who cannot do work that level of work and assigning it to them, or getting capable people and not giving them enough kind of work they can do. So, these 8 types of wastes become very important.

And if there is any specific takeaway from trying to implement Lean construction, is to try to identify these types of wastes on a site and to try to eliminate it. Now, lot of the tools which we learn. Try to focus on these, in some way, either directly or indirectly and this tends to be a critical requirement.

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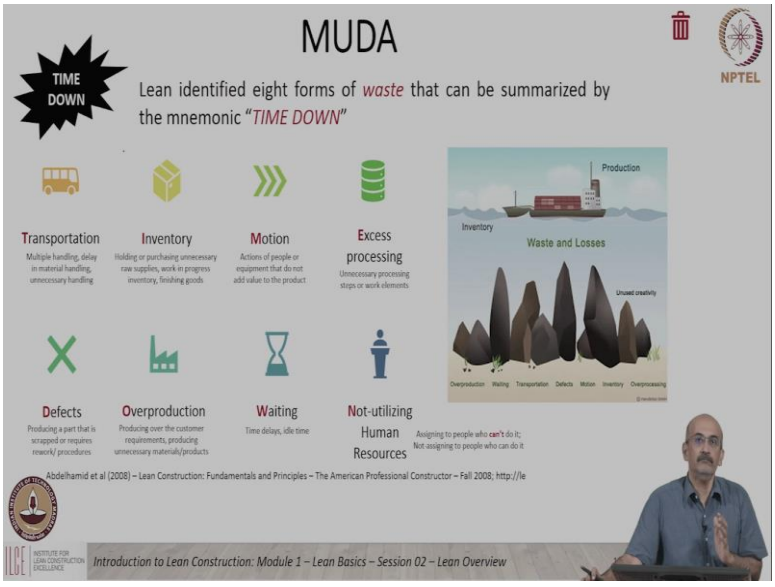

Now, we can look at this from another perspective, and basically this shows different types of waste again with the acronym TIME DOWN. The critical question, I would like, you all to think about this is, here we have a graphic, where we can see that inventory is shown as the level of water and you can see the barge floating above this and these rocks are the different

kinds of waste that are there. The question you have to think is what happens, should I lower the inventory and face these wastes? And kind of, or should I keep the inventory level high?

This is something to think about and something we should be able to discuss in the chat. Because ultimately, the way waste manifests itself and the way we can identify waste and the way we can eliminate waste, becomes a very very important, way in which we can bring efficiency into our projects.

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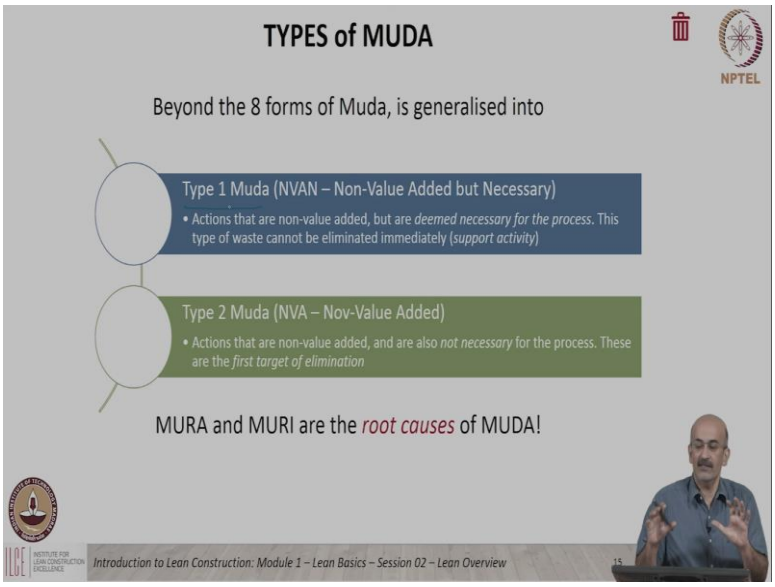

Now, we can take the eight forms of waste and we can look at it in two types. We call it 'Non-Value Added but Necessary' that is type 1 MUDA. Here, what we talk about is that something that is you need to do it, to be able to do value added work. So, it is non-value added in essence, but necessary.

And the type 2 MUDA is 'Non-Value Added' that is just non-value added. So, if a worker is idle, definitely non-value added. If a worker is actually transporting brick, you know, it is probably value added but if the transportation but it is not necessary, because it actually contributes to value added work, which is the placing the brick on the wall.

So, these two also become very important, these are a generalization of the 8 types of wastes and sometimes we will look at type 1 and type 2 wastes to simplify it. To look at where is, value not being added and to be able to classify the non-value added into the two categories. And as discussed earlier, MURA and MURI are the root causes of MUDA and there should be a focus on variability as well as overburden, but these are a topic of another session.

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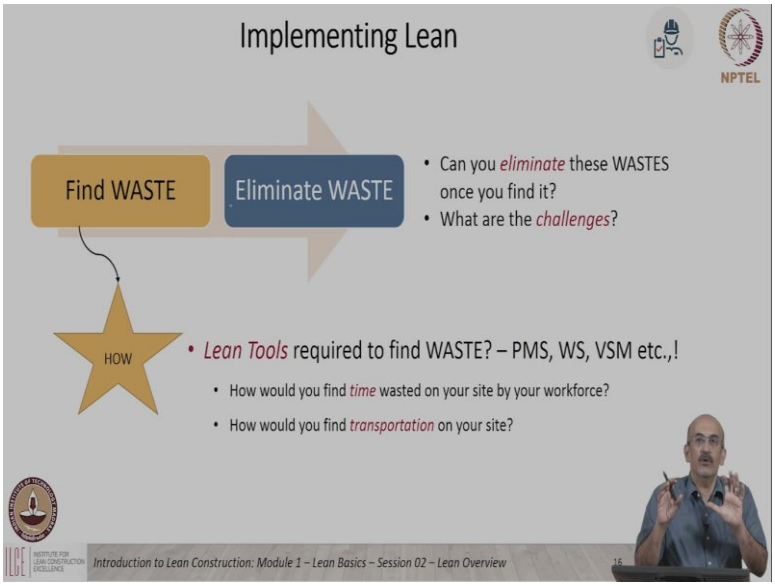

Now, when we look at implementing Lean, to put it very simply, it is to find waste, eliminate it. And how do you identify waste? We can look at different types of Lean tools which can be used to identify waste and be able to then discuss, collaborate and eliminate the same. So if you put it in a very very simple form, this is the kind of approach we would like to take at a very basic level.

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