

Introduction to Lean Construction
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Module - 1
How to Start Practicing Lean Tools in Project Sites-1
VSM

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Steps in Value Stream mapping



- Step 1 – Create the Current State 'As-Is' Value Stream Map
- Step 2 – Identify wastes and bottlenecks
- Step 3 – Create the Future State 'To-Be' Value Stream Map
- Step 4 – Prepare Action plan to achieve Future State VSM
- Step 5 – Repeat steps 1 to 4 (Continuous Improvement)



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Hello, today, we are going to discuss about how we can go about implementing a value stream mapping on a current project. There are 5 steps which are involved in value stream mapping, step 1 is to create the value stream as is that is the current situation of how that particular activity is happening. Step 2 is to identify waste and bottlenecks. Step 3 is to create the future state to be value stream map, how you would want or what future steps you can achieve, prepare an action plan to achieve the future state value stream map.

And finally, step 5 is to continuously repeat steps 1 to 4 in order to achieve continuous improvement.

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How to start Value Stream Mapping?



- **Define scope of VSM**

- Completion of one piling cycle
- Casting of pre-cast girder

- **Clarify objectives of VSM**

- Improve time cycle by 15%
- Reduce wastage by 10%

- **Involvement of right people (Stakeholders)**

- People who use the process – Site engineers, supervisors, operators, sub-contractor's representatives, etc.
- People who support the process – Quality & Safety engineers, Equipment Engineers, etc.
- People who have input to the process - Project Manager, Planning Manager, Construction Designer, Supply chain, etc.
- Recipients of the process – Client, Consultant



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Now, how do we start the value stream mapping on the project? The first and foremost important point is to define scope of value stream mapping. Like an example, you want to do a Value Stream Mapping for completion of one piling cycle. So, we have to focus only on the activities which are involved from start to end of one piling cycle or another example could be casting of precast girder at site.

Once the scope is defined, the next important point is to clarify the objective of value stream, why we are doing the value stream mapping for that particular activity. For an example, it could be to improve the time cycle by 15 percent or it could be to reduce the wastage by 10 percent. So, when we do the value stream mapping, we need to focus on the objective on which we are working.

The next important point to understand is the people who are involved in the exercise of Value Stream Mapping, all stakeholders should be involved in the discussion for Value Stream Mapping. The people who use the process the, ground workers like site engineer, supervisors, operators, subcontractors representatives, these are the people who are working on the ground.

And are the most important people in the activity people who support the process like quality and safety engineers or equipment engineers, they should be involved, people who have input to the process like the project manager, the planning manager, construction manager, the designer, supply chain, et cetera. And finally, the recipient of the process like the client and consultant. So, all these people should be involved in the value stream mapping exercises.

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How to start Value Stream Mapping?



- **Stay focused on the norm**
 - Remember 80:20 rule – 80% of outcomes are from 20% of causes
 - Don't focus on exceptions to solve problem
- **Environment conducive for open discussion**
 - Every stakeholder gets a fair chance to express his concerns and give inputs
 - Moderator to check that no one person dictates the flow of discussion



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Stay focused on the norm, once should always remember the 80:20 rule - 80 percent of the outcomes are from 20 percent of the causes. So, the idea is we should focus on the 20 percent causes which are going to have the maximum impact on the outcome and do not focus on exceptions to solve the problems. There may be many other small, small points, which could be contributing towards the entire activity, but the maximum focus should be on those 20 percent which are giving you the 80 percent outcomes.

And finally, the most important thing is there should be an environment conducive for open discussion, every stakeholder should get a fair chance to express what he feels about the process, what are his areas of concerns and what inputs he wants to give. And there should be a moderator, who will see to it that no one person dictates the flow discussion in the entire exercise.

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Step 1 – Create As-Is process map



- Collect the information by actually walking at the site
- Start with a quick walk through the entire value stream to get a sense of the flow and sequence of activities
- Begin at the last activity and come upstream.
- Bring your own stopwatch. Don't rely on standard times or information
- Map the whole value stream yourself
- Draw the value stream by hand. The goal is not the map, but the understanding of the flow of information and material



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Having said that, now let us look at the step 1, which is to create as this process map, we need to go and collect the information by actually walking at the site. Starting with a quick walk through the entire value stream to get a sense of flow and sequence of activities, begin from the last activity and go to the first, record your own timings with your own stopwatch do not rely on standard times or information given by others, map the whole value stream yourself and you can draw the value stream by hand. The idea is the goal is not how good you are drawing the map but to understand the flow of information and material.

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On Site VSM



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So, this is how you can create a value stream mapping exercise, you have all the information, you put all the activities and the relevant data.

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Step 2 – Identify wastes and bottlenecks



1. Identify and eliminate non-value added activities
2. Tackle the low-hanging fruits first
3. Improve information and material flow flow by using pull principles (Kanban)



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Once that is done, step 2 is to identify wastes and bottlenecks. Once we have mapped the entire activities, then we can find out which are the areas where there are possibilities of waste and where are the bottlenecks. So, we need to identify and eliminate the non-value added activities. Tackle the low-hanging fruits first, it means the 20 percent areas which are given 80 percent of the problems is the areas which we have to handle first.

Because once we are able to take care of those you will have, you can immediately see a large impact happening on the activity. And improve the information and flow by using pull principle like Kanban.

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Step 3 – Create the Future State 'To-Be' Value Stream Map



- Based on information obtained in Step 2, identify possible reduction in resources & time in each activity

Wastes & bottlenecks	Corrective actions
Defects – Defects in liner & reinforcement cage	Liner yard checklist Cage fabrication checklist
Defects – A-frame welding breaking frequently	Daily maintenance routine for winch and A-frame pulley
Tremie thread getting damage	SS on gantry – Quick response, safe working and tremie thread protection
Motion/Waiting – Waiting for O2 / DA cylinder	Daily supply from land store during shift change to gantry for essentials – O2/DA cylinder, wire rope, grease, electrodes etc.
Frequent wire rope change	Trial for different type of wire-rope – Core and core material. Spare wire rope for every 3 piles
Blunt Chisel / Chisel not cutting	Record for chisel hard-facing and mandatory refacing every two piles

- Draw the Future State VSM



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Step 3 is to create the future state to be value stream map. Based on the information obtained in step 2, identify possible reduction in resources and time in each activity and example is given. So, identifying various wastes and bottlenecks, and what are the possible corrective action that you can take in order to mitigate those issues. Based on this information, then you draw a future state map, value stream map, it means what can you achieve by taking care of all these problems,

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Step 4 – Prepare Action plan to achieve Future State VSM



- Breakdown the implementation of Future State VSM into small steps
- Identify measurable goals for these steps
- Assign responsibility to the appropriate person with defined timelines



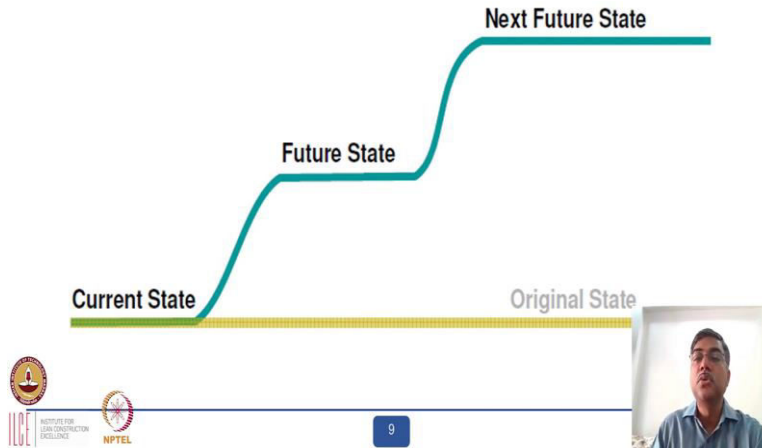
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Prepare an action plan to achieve the future state value stream map that is the step number 4. So, break down the implementation of future steps into small steps, identify measurable goals for these steps, assign responsibilities to appropriate person with defined timelines that these activities need to be completed in so, and so, timeline, so, that we will be able to achieve the future state value stream map that is your step number 4. So, this is how the entire exercise of value stream mapping has to happen from step number 1 to step number 4.

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Step 5 – Repeat steps 1 to 4 (Continuous Improvement)



Step 5 – Repeat steps 1 to 4 (Continuous Improvement)



Description	Baseline			TARGET = 195 hrs After 1st Workshop			TARGET = 172 hrs After 2nd Workshop		
	All	1500	1200	All	1500	1200	All	1500	1200
Sample (nos)	13	12	1	46	30	16	97	57	40
Average Boring depth (m)	13.96	13.59	18.32	13.49	13.33	13.77	13.35	12.87	14.04
Max (hrs)	784:05	784:05	311:00	356:45	356:45	228:50	330:25	330:25	183:10
Min (hrs)	232:00	232:00	311:00	84:05	13:45:0	84:05	68:44	105:00	68:44
Mean (hrs)	416:09	424:55	311:00	170:28	197:07	120:29	161:58	193:28	117:05
Standard Deviation (hrs)	154:22	157:32	0:00	58:33	50:29	35:19	60:16	56:11	29:43
Median (hrs)	367:30	369:37	311:00	164:09	182:42	118:40	150:45	178:30	115:27
Improvement over mean (hrs)							4.99%	1.86%	2.83%
Improvement over median (hrs)							8.16%	2.30%	2.70%
Avg hrs (total) for 1 rm of boring	31:59	33:14	16:58	12:57	15:00	9:04	12:28		
							3.69%		



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Having done that, then the next step, which comes is a step 5, which is continual improvement. So, you had a current state, when you started, and you design a future state for that activity, then you work on that activity and you achieve that future state. Now, this future state becomes your current state, and then you further act on it in order to achieve the next future state.

Just to quote an example here, you can see this is how the time cycle for a piling activity was improved. So, as a baseline, if you look under the column of all, you see that on an average 367 hours were required for completing one piling activity, after the value stream mapping was done, after the first workshop, we were able to bring that 367 down 164.

So, that is the first target that we have achieved. So, the current state was 367, the future state was 164. Once 164 was achieved, another workshop was conducted, another target was taken as 172 and we were able to then achieve 150 hours of timeline. So, this is how you have to continuously improve on your activity and try to get the required improvements using value stream mapping. Thank you.