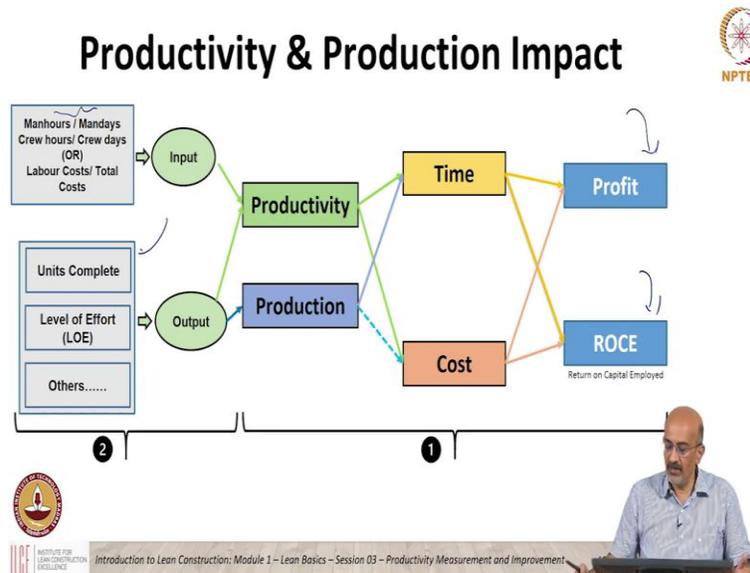


Introduction to Lean Construction
Professor. Koshy Varghese
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Profit, ROCE, Influences on Operational Productivity;
Operational view vs. System view, Summary

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So, we talked about this earlier. Now, there is one more important issue that happens. And this (happens) so you can see this whole impact on the profit and the return on capital employed, on time and cost, and all of these and, so when we are looking at measuring what is here, we should also understand how it impacts both of these.

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Net Operating Profit

$$\text{Net Operating profit} = (\text{revenue} - \text{cost})$$

- (operating expenses)

- (depreciation, amortization,

etc)

Return on Capital Employed

$$\text{Return on Capital Employed} = \frac{\text{Net Operating Profit}}{\text{Employed Capital}}$$

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When we go into profit and ROCE, there is one more issue to be considered. When we look at profit it is primarily, it is one of the ways you can calculate net operating profit, and a lot of it is looking at what was your, what do you say, what did you earn, what did you spend, all of this.

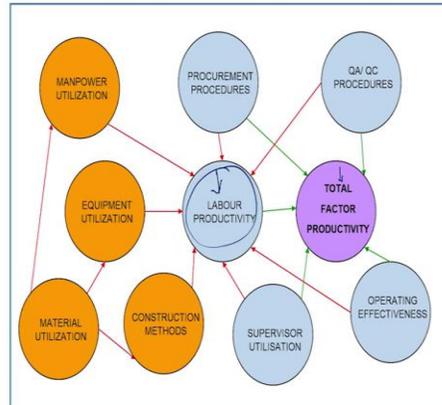
But when you look at ROCE it is also looking at capital employed. It is looking at how you do your working capital management, how does, how do you get your money as, I mean, how do you do, how do you ensure that money is cycled quickly enough that your capital employed is minimized.

So, if I am using a approach where my productivity and production are measured and I am able to reduce capital employed because of good management of time aspect, my ROCE will go up significantly more. So, the (prob), when you look at it from a profit perspective it is just looking at from the one-dimension which is mostly all these factors you see here.

When you look at it from ROCE not only are you impacting the operating profit but you are also impacting capital employed because you are using more efficiency to turn the capital around because you are building faster, collecting your money faster, doing things faster. So, improved productivity will really have a big impact on ROCE because it implies, it impacts the numerator and the denominator.

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Several Influences on Operational Productivity



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Now, as I said there are several influences on productivity. Ideally, we should be measuring total factor productivity which is kind of what we would do for record keeping. We would not measure, it would be very difficult to measure total factor productivity if we wanted to use it for monitoring because it takes effort. To do your final project accounts, this, that, total factor productivity is required.

Now, total factor productivity depends on several other factors. These are just to show the amount of, the number of influences there can be, but labour productivity is a very significant influence on total factor productivity, including other factors. And you will find that several other factors influence labour productivity, whether it is manpower, equipment lot of things impact labour productivity.

So again, rather than only measure, rather than only focus on total factor productivity, focus on labour productivity for monitoring requirements.

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Operational - View



- Operational Productivity improvement influence the project performance by *identifying and minimizing/ eliminating* sources of lost time.

Categories	Examples
Idle time ✓	Late starts & early quits; Waiting for inspection; Unavailability of tools, materials & equipment; Accidents; Mobilization & re-mobilization; front availability...
Excessive travel ✓	Logistics of tools and materials; Paperwork; Layout
Slow work ✓	Low craftsman skills; Fatigue; Adverse weather
Rework ✓	Engineering errors; Inaccurate drawings; Misleading technical instructions, Poor quality



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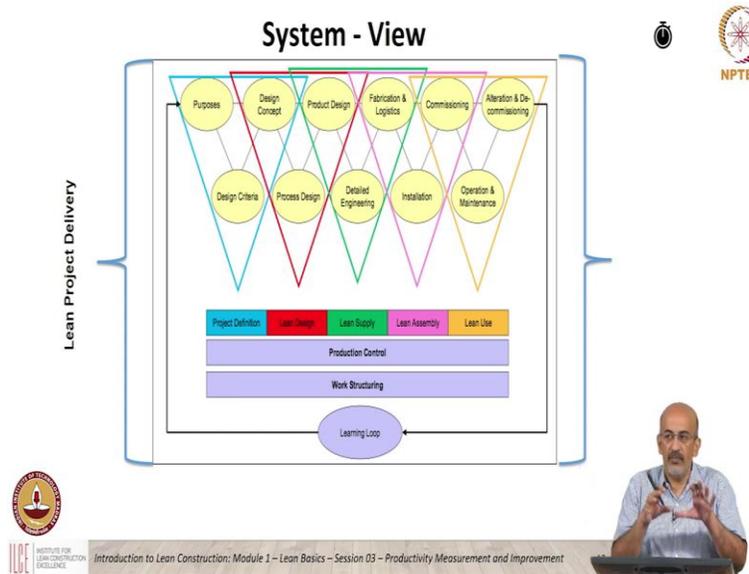


So, if we go what we are calling, so far we have been at the operational view of productivity. We are saying that productivity is at the operational level, and there are several factors which influence this at the operational level. So, for example, I have just listed a few here whether we talk about late start or early quit, which means do we actually start our sites at the time you are supposed to start.

There is always a lag, there is always breaks, do we stop work exactly or do we exceed or when, this, so actually looking at the touch time is important. A lot of time is wasted on waiting for inspection, unavailability of tools and materials, and we can go on. So, a lot of these which you can read, we can discuss but I think many people can understand and relate to all of these factors whether what causes idle time, what causes excessive travel, slow work or rework.

We can take any of these points for discussion but there would be numerous examples on all of this. And these actually contribute to what we call as, as lost time on our projects, or in another way they also correlate with waste in lean. They correlate with waste. But, in a traditional view this has been a very old, we call the operational, we also need to get a system view.

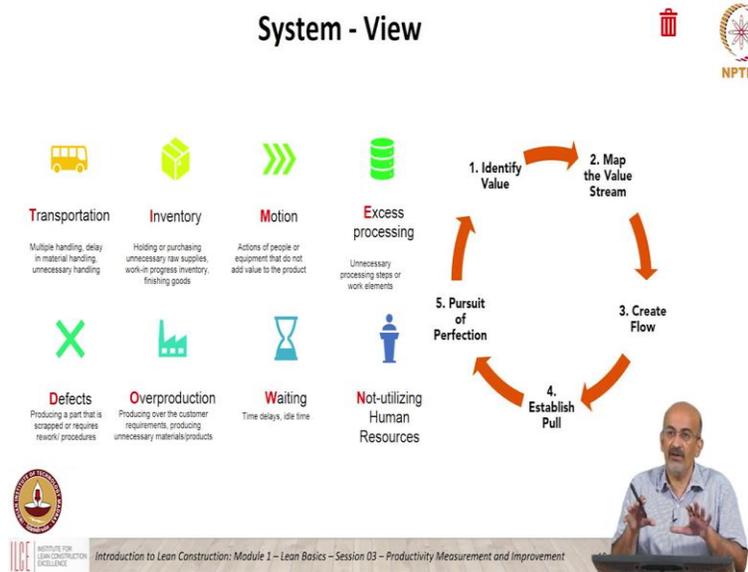
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The system view is what, when we look at lean as whole production system and not just productivity of an individual activity, but the whole flow of things through the system. So, we need to keep both views in mind. Sometimes it is difficult only to look at the system view and expect improvements to happen.

So, a lot of times what we kind of advocate is that we start with the operational view, and then move to the system view because if you only start with the system view, it is kind of too big to handle in the beginning, but operational view alone will not cause large impact. So, both are required.

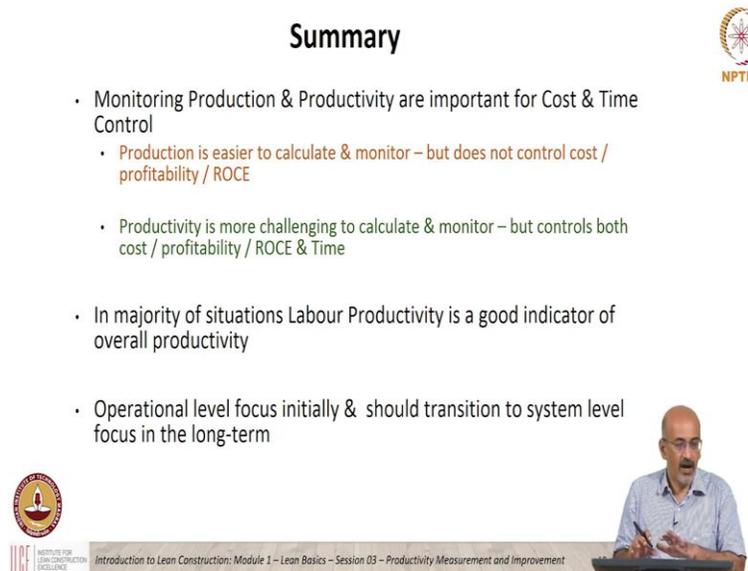
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So, ultimately, we need the, the waste view from a system level as well as, we had discussed this earlier, the overall lean thinking philosophies. So, this is the ultimate system view which you have to apply at the, like, we said at the project. Again, challenging to do so but that is where we need to be.

Now, and in terms of as we go forward in this course, these are some of the things we will look, not just looking at operational view, but how do we start looking at it more and more from a system level view.

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Now, just to summarize, I think if you can, could understand that monitoring production and productivity are important for cost and time control. I think that is the biggest takeaway from this lecture. Production is easier to calculate and monitor but does not control cost profitability or ROCE. Productivity is more challenging but controls all of these elements, but ultimately, we have to monitor both.

And in most situations labor productivity is a good indicator but be careful where it is equipment intensive, where you can monitor equipment easily, where you, today you have a lot of control systems, you have automated monitoring systems, equipment productivity is also a very good indicator which is something which sites are doing and should keep track of so.

So again, it requires judicious analysis, thinking, understanding what productivity you are going to measure when you are on a project. Just using a formula, using a standard method you should question the method, and go to the factors which affect your operations, your project, your requirements.

And ultimately the operational focus should transition to a system level focus. It is fine to start with operational focus in the beginning but consciously the effort to move to a system focus is required. I will stop here with this. If there are any questions, I will be happy to take it.

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The slide features a light blue background with a white cloud-like shape in the center containing a stack of books icon. To the left of the cloud is a QR code and a link: <https://tinyurl.com/ygtycliw>. Above the link is the text 'Link (to read and contribute)'. To the right of the cloud is an icon of a laptop, a smartphone, and a calculator. In the top right corner is the NPTEL logo. In the bottom left corner is the IIT Bombay logo and the word 'Workbook'. In the bottom center, there is a small video inset showing a man with glasses and a blue shirt speaking. Below the video inset is the text 'Topics to be Covered Slide' and the number '26'. At the very bottom of the slide is the text 'Introduction to Lean Construction: Module 1 – Lean Basics – Session 03 – Productivity Measurement and Improvement'.

So, this is the supplementary module. Please go here. You can find readings, additional readings on this topic and more discussions on production, productivity and other things which are relevant to this. Thank you.

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Quiz



1. Consider the following statements and select the correct option: with respect to Productivity and Production

Statement 1: Productivity is more challenging to calculate & monitor but controls both time and cost/profitability/ROCE

Statement 2: Production is more challenging to calculate & monitor but controls both time and cost/profitability/ROCE

Statement 3: Productivity is easier to calculate & monitor but does not control cost/profitability/ROCE

Statement 4: Production is easier to calculate & monitor but does not control cost/profitability/ROCE

- a) All Statements are False
- b) All Statements are True
- c) Statement 1 and Statement 4 are True
- d) Statement 2 and Statement 3 are True
- e) None of the above

