

Planning Improvement Projects

Knowing WHAT TO improve is as important as knowing WHEN TO improve and WHAT NOT to improve!

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Last month, I made a trip to 2 different plant locations of a company. Both the locations produced the same range of SKUs with almost the same volume of production per month. The difference between 2 plants was however very striking. One of them was very clean. Machines were well organized as per desired material flow. While the other one was very dirty with too much of work in progress almost everywhere. Even before I could ask the plant manager, he offered an explanation. In the cleaner plant, they have implemented lean techniques of organizing plant layouts for better material flow, 5S etc and hence plant was cleaner. He promised that the next plant would soon go through the restructuring and eventually both the plants would look similar.

The plant manager was very proud of his achievements.

I asked him about the WIP in both the plants; he said it is almost 10 days in both the plants. So your manufacturing lead time is just 10 days? No, he said, it is 4 weeks. There were two contradictions in his statement.

01. How can WIP be 10 days while manufacturing lead time be 4 weeks.
02. How can both the plants have same WIP?

I realized the problem with first one. He was giving me the month end figures. Further investigations revealed that the actual WIP builds up to a peak in the middle of the month and then flushes out by the month end. It is almost like a wave, remarked the plant manager. The reason is very simple. Every month end, the financial figures are reported and there is a pressure to maintain low inventory. So plant managers have figured a way out. They just have to chock the plant of raw material release in the last week to get the effect. For raw material (RM) inventory, they just have to prevent the supplies from entering the plant gates. Yes orders in first week will suffer, but as long as due date is measured in month's horizon, it does not matter. I got the explanation for the inherent contradiction between 10 days WIP and manufacturing lead time of 4 weeks.

Why do you have inventory targets? I asked. The management wants strict control on working capital and has made targets for the various inventory categories, he replied. These targets were checked in the month end MIS. I went ahead with more questions. Does this month end choke of WIP do anything to working capital requirements? Does it really reduce or increase the working capital requirements? The plant manager started thinking.

In the lunch break, the plant manager thanked me for the realization that the month end inventory is not real reflection of working capital requirements. So one needs to check snapshot of inventory at multiple points within a measurement period (to discount the measurement bias) to understand, whether one has really reduced the inventory (and hence released working capital) on a sustainable basis.

Another important point is that the inventory cannot be reduced just by a management mandate, I added. We would be just playing with numbers and creating a bigger damage. To reduce the inventory on a sustainable basis (without the measurement bias), we need to look at the basics of how the plant is being managed. Maybe the answer lies in the second contradiction. Let us look at WIP and lead time in both plants. Are they the same? I asked. They are exactly the same. Lead time is same 4 weeks, while the month end WIP is around 10 days, he replied:

In the plant with cellular layout, the inventory was not spread at all the work centres, it was kept after the starting operations and then before the closing operations where lot of space was available. This gave it a cleaner look. Moreover, my visit was during the last week of the month.

My next question unsettled him. **If the quoted manufacturing lead time and WIP are same in both the plants, what have you gained by implementing the lean techniques? It seems you have not implemented the Kanban system.**

Kanban is very difficult to implement in our environment of wide variety, fluctuating loads, replied the manager. Moreover we have implemented lean with the objective of reducing costs. The new layouts will help us reduce costs. We can operate with much less people.

What happened to all the extra people? I asked. Are they out of company rolls?

They have been relocated, he replied. Gradually over the years, the recruitment will be controlled and the cost reduction will be realized eventually.

It seems your company has strong focus on costs!

Yes he replied proudly.

I looked at the total costs of the plant; I saw a gradual increase in costs rather than decrease. Some of the increased costs were due to increased expenses of automation, done primarily to reduce direct labour. *(I wonder why most manufacturing companies are obsessed with reduction of the comparatively inexpensive direct labour rather than the management layer. It could be because of the "mathematics" involved in cost accounting. Direct labour is mostly used to absorb the overheads, which includes management salaries, to determine the product costs).*

After implementation of most of these automation projects, the labour is not immediately taken out of the rolls of the company. So the company incurs additional short term costs, for the automation project, to hopefully realise the savings in the long term. These proposals always get cleared with promise of manpower reduction.

But in reality, the labour reduction either does not materialize or do so gradually in the long run. (*Moving people from one place to another does not reduce the overall costs*)

I asked him to put two additional information fields in such automation proposals -the names of people who will be asked to leave the organization, because of the automation and their last date of employment. This will help us understand real payback period, if any, of such investments. The manager added enthusiastically; I expect about half of the proposals will get rejected, if we ask for the above information.

While looking at cost elements, I found this company had very high expediting expenses, like high over time, emergency freights. If you guys are so cost focussed, why are you not reducing these obvious wasteful expenses to zero?

Well we have lots of problems: absenteeism, supplier issues, quality problems, capacity issues in our plant. It is very complex. We cannot do away with all the problems. So expediting is going to be there.

My next question again unsettled him. **Do you see a pattern in these expediting expenses? If I am not mistaken most of it is incurred during the last part of the month?**

Yes, he said. How did you know? Well the skew of WIP movement shows it, I replied. I have another question for you, if these expediting expenses are because of uncertainties, then it just implies that lady luck (or Murphy) is very selective yet consistent. They hit mostly in the later part of the month.

I could see the discomfort in the plant manager. Well, you have a point...but.., continued the plant manager trying hard to explain. I intervened in between. Now don't you see that this is nothing but a self inflicted injury?

Can you elaborate, requested the manager?

What is percentage of touch time to the overall lead time of a typical order? If it is much less than 10%, it just means that we can actually deal with the uncertainties, if we do not waste time (and capacity) in plants.

Well we have some machines with very high setup and efficiency of some machines is low. We are working on it.

I am not referring to the "visible" wastages. I am referring to the biggest wastage of capacity which is hidden from management. The biggest wastage of capacity is producing items which are not immediately required at cost of something else. It is like urgent items waiting for their turn in front machines which are busy producing items, which eventually are going to wait as WIP or Finished good inventory. This is capacity stealing.

Well, I am not sure, if there is capacity stealing in our plants.

It is very simple to check, do you have common resources where many different parts can be made? Yes, he replied.

What is the choice set available for your work centre managers? How long into the future can they see the orders to pick and choose?

Well they can look at the entire order booking done till date, replied the manager.

This means that every work centre can exercise a choice set of what it wants to make. *(The first work centre has the entire order book to choose from while the next one can choose from what has been made by the preceding work centre).*

Yes he replied.

We already know that every work centre has significant choice set in front of the work centres. When there is a large choice set, work centre managers select items to maximize local efficiency without regards to potential waiting time of the produced items. This local efficiency thinking can jeopardise the speed of movement of inventory (the flow). Having a large choice set is one of the primary reasons for capacity stealing. We just validated that the cause (having a large choice set) of capacity stealing exists. Now let us look for existence of effects.

Do you also have, in front of assembly, lot of parts inventory but at same time there are parts which are missing? Yes he replied. Do you have some line items of orders completed much ahead of time, waiting in FG while many others are delayed? This shows that you have resource stealing in your company. As long as resource stealing is predominant in the plant, the overall flow of inventory is poor (inventory moves in waves or gets stuck in many places). In such plants we cannot hope to get any local improvement initiative (set up reduction, layout changes, quality improvements etc) translate into global benefits (reducing lead time, on-time delivery, reduction in total costs etc).

Please elaborate further, asked the plant manager.

Look, if there is capacity stealing, how will it help, if we increase net available capacity of equipment? We are just opening more avenues for more stealing.

What about quality improvement initiatives? Can't we work on it without doing anything about the overall flow, asked the plant manager?

Yes, we can work on them. But how do we ensure that the initiatives we are working upon are not within the noise of the system. There are many quality problems which crop up once in a while but we need to deal with the ones which are repetitive and at the same time have got significant impact on the order lead time. What is the current mechanism to identify the right quality improvement projects? It is mostly based on where there is lot of hue and cry. Let me explain further, I offered. When most part of the order lead time is wasted in waiting time, any small quality problem close to the last work centres looks big, because there is hardly any time left. But such quality problems may be within the noise of the system which could have been managed within the lead time, if there was no wastage of time in the initial work centres. Any resolution of quality problems which is within the noise of the system does nothing to overall delivery capability.

Do we always have to select quality projects based on impact on deliveries? , asked the Manager.

Look, you have limited management band-width. So if there are quality problems where delivery is not impacted while there are others where delivery is impacted, one should anyway choose the later as first priority projects. Currently it appears to us as if most quality problems, if not all, impact deliveries. Let us first prevent the wastage of time and then we can understand which quality problems really impact deliveries. Remember in many situations, rejections are also because some quality assurance steps are missed. This is usually when there is a pressure of time. So unless we remove this "pressure of time" from the system, we cannot expect people to follow all the rules of the game.

Remember, many times, such violations are allowed by management to make up for the order delays. Let us look at the good housekeeping initiatives like 5S. They are great tools but when flow is bad and expediting is predominant, nobody cares about putting things in right places. Look at the way most shopfloor look by the end of the month.

What about 6 sigma projects, asked the manager?

Look the first 6 sigma project one should consider is improving the reliability of overall lead time. When capacity stealing is rampant, the lead times are widely fluctuating. Doing any other initiative in this environment does not help the manufacturing set up as a whole.

6 sigma starts with mapping the voice of customer. It assumes that the verbalized voice of customer is the real need of the customer. When we start listening to voice of "internal customer" for selecting a project, we have a problem because in an environment of flow problems, the perceived problem is usually not the real problem. Look at all the problems that you specified when we discussed about reasons behind expediting. You did not tell me that the main problem is wastage of time and capacity in your plant. So your voice does not depict the real problem. You only verbalized the symptoms. When one launches improvement projects listening to these symptoms, not only we have too many improvement projects, but also many which may be unnecessary for any system wide improvement.

So the first focus of any plant manager is to straighten up the flow problem. From the current situation (of having too much wip), when you solve the flow problem, you will see lead time drop down with improvement in consistency of the lead time. The system becomes more predictable. Your job is not over. Time to time, uncertainties will create flow problems. Select the ones which are repetitive and have significant impact on flow. Then use all the improvement techniques (SMED, 6sigma etc) to deal with those specific uncertainties, to keep on improving the flow. This approach of management helps plants not only have lower lead times and a very high on time delivery but also lower overall costs. But remember the first thing to be done is solve the current flow problem.

How can one apply a flow solution, he asked?

The biggest problem to flow is presence of inherent excess capacity in almost all the plants. This excess capacity is misused to produce inventory which is in excess or made ahead of time (at cost of something else). Excess inventory is a clear proof of excess capacity.

So one needs a locking mechanism which prevents overproduction or ahead of time production. The locking mechanism should force people to focus on flow and not start jamming the shop floors with ahead of time or excess production. The geniuses of production management have invented such locking mechanisms; like use of space by Henry Ford, Kanban cards by Taichi Ohno and Time Buffer by Eli Goldratt.

How do I learn more about them? And which one is applicable to my environment, asked the plant manager?

You should read the article "Standing on the shoulders of the Giants" by Eli Goldratt to understand the flow solutions and their applicability in various environments. I realized knowing what to improve is as important as knowing when to improve and what not to improve, remarked the plant manager.

The Author is a founding Director of Vector Consulting Group – India's largest and premier Theory of constraints based consulting company that engages with leading corporate to deliver bottom line results and takes its fee from the increase of profit thus delivered.