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Pitfall!
Don't deploy TPM and SMED everywhere

Going too far...

In the excitement and momentum of deployment of methods like TPM or SMED, their promoters may encourage themselves to go too far, with the risk to lose sight of the main objectives.

This article proposes to recall TPM's and SMED's context:

1. Of their origins,
2. In the paradigm of the XXI century.

And finally to remind the necessity to focus on important issues rather than to scatter resources.

Postwar Japan

Postwar Japan is a ruined country where everything is to be rebuilt and replaced. The needs are huge and every resource is scarce, meaning precious.

Part of what will be called "Japanese methods" have been brought by the US (General Douglas MacArthur) Reconstruction plan :
- TWI Program,
- Productive Maintenance,
- Quality improvement program
- Etc.

Texte disponible en Français

From postwar period to the 73-75 oil crisis, the West enjoys a period of steady growth (known in France as the 30 glorious). During this period, the needs are bigger than offer, and for industrials, priority is to produce then sell.

For Japan, the objective is to catch-up with the US, at least in some businesses, like automotive industry.

Japan's industry could not follow and compete on the Ford Production Model basis, so industrials sought new original ways, adapted to their constraints.

Market was eager to buy, what ever was manufactured was sold. These conditions pushed to maximize production.

Yet Japan still having limited natural resources, it could not increase production by multiplying productive investments.

These local conditions explain the birth of methods based on waste elimination (saving scarce resources) and maximizing production (Sales!!) and productivity (sell more while saving resources)

The author, **Chris HOHMANN**, is manager and consultant in an international consulting firm.

He advises and trains about lean thinking and techniques, industrial & Supply Chain performance.

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Available on HC online:

- **SMED** Single Exchange of Die
- **TPM** Total Production Maintenance
- **lean manufacturing**
- **Theory of constraints**
- **8 or 9 types of wastes**

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Context of TPM and SMED birth

TPM seeks the maximization of machines and equipments availability, best productivity, meaning a high number of OK products (suitable for sell) manufactured in the allocated period of time.

SMED has a similar logic, trying to reduce the machine downtime for changeovers, which is non productive time.

In the context of their origins, what can be manufactured is sold. Conversely, what could not be manufactured is a lost opportunity of sales.

In Japan, for the domestic market, the production system is not the **Ford model**, but an original one seeking to give clients a broader choice;
- more models,
- more colors
- customization
- …

This Production System brings shorter series:
- shorter (shelf) life cycle for models
- multiplication of manufacturing batches within the life cycle.

Hence, changeovers multiply and shorter shelf life impose a wise, waste free usage of available manufacturing time.

Ford's production model

Ford's model favors massive production of goods with few variants. This model is/was adapted to huge needs of cheap products, made available to the mass of customers.

Tilting of economies

The paradigm shift from penury (high demand) to economy of offer (excess offer vs. low level of demand) will happen in the 70s. Offer exceeds demand on the double effect **global competition** and **consumption slowdown**.

Oil crisis 1973-1975 and aftermath

A consequence of the oil crisis was the increasing of raw material and production costs, while the fears linked to the crisis slowed consumption and shifted customer's expectations:

- Ordinary products have to be cheaper, as customer buy the lowest price,
- Equipment and expensive goods have to show durable, robust and most of all suit quality expectations,
- other products must bring to the buyer an esteem value (pleasure, exclusive features…).

In a very competitive economy, the cost management appears as a priority. Yet the Japanese have accumulated years of experience and have a new production model handy, which will show its matching to the new paradigm: the **TOYOTA Production System**.

The new paradigm

The new, actual context shows increased demand for customization and specific customer expectations, in a globally growing offer. Except for few products, mass production is changed to small batches with shorter life cycle.

The challenge for industrials is no more to mass manufacture at low cost, but propose products (and services) suiting the client's desire, at a price he is ready to pay. Hence more, with the number of competitors (alternative sources for customers), the clients are not longer ready to wait to get their whishes fulfilled. They rather seek satisfaction elsewhere.

Manufacturers can not longer push merchandises **they decide** to design, manufacture and sell towards the market, but have to respond in a economic and quick manner to **spot demand**, **triggered** (pulled) **by the market**.

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TPM and SMED in the actual paradigm

New ways of thinking

In the new paradigm, new ways of thinking operations and marketing raise.

Lean manufacturing, linked to Toyota's production system and further to what is called "*Toyotism*", is already widespread. Tools and methods (among them TPM and SMED) made Japanese industrial and commercial successes.
They deeply impacted the decades 1980 – 1990 in the West.

These new "models" teased western firms, which will not wait long before adopting / adapting them.
Lean manufacturing spreads from workshops and becomes global, ***lean thinking***, Thanks to authors like **Goldratt** (theory of constraints) and **Womack** & **Jones** (lean thinking).

Impacts on TPM & SMED

The methods of World Class Excellence, lean manufacturing, Keep all their pertinence, and even get renewed interest.

The difference is in the objectives to fit the paradigm:

- maximize volumes at the beginning,
- minimize delay and costs nowadays.

The first impact on TPM is that "available time" has to be reconsidered; no more as the total available time of the shop or machine, but as the required time to manufacture the goods likely to be sold, ideally already ordered by customers.
Manufacturing during all available time may end up in increasing inventories, which is a waste.

In the new paradigm, it can be wise to let machines dwell. The machines being stopped, the changeovers can be made meanwhile, in masked time, without impacting the machine's availability. This means **SMED is not to be deployed systematically**.

Further, the new approaches (lean thinking, theory of constraints) distinguishes critical resources from non critical resources and only the first deserve special focus and treatment.

Pitfall!

The trap for TPM or SMED promoters is to try to deploy them without sorting out the types of resources, critical or not critical.

Examples:

- deploy quick changeover techniques on machines busy only 50% of available time. What for? Anyway these machines dwell half the time!
- deploy TPM on machines having excess capacity.

It is a double waste:

- The means for improvement are limited and may be used up to improve yields and/or performances of non critical resources which are not even on high priority. This is waste.
- Resources requiring quick care stay in their current state of under-performance, which is a waste of opportunity.

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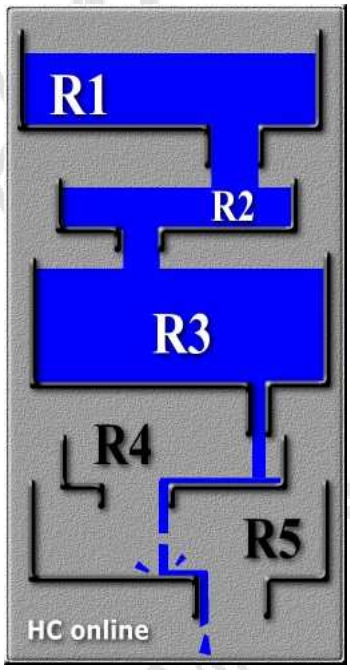
Focus efforts

Bottleneck Resources and non-bottleneck resources



The diagram on the right hold the essential of the theory of constraints.
The processing capacity of each resource **R** is relying on the throughput (tank drain diameter).

Tank **R1** stands for raw materials.

Tank **R5** is the last step before shipment to customers. Even the processing capacity of **R5** matches the market expectations, the flow is much lower than expected.
The root cause of this poor performance is upstream.
In the global process, resource **R3** has the lowest throughput. **R3** is visibly a bottleneck, as the products piling up before it and filling the tank, show.
Even **R4** and **R5** have an important capacity, they cannot process more than what **R3** supplies.
So the global performance of the whole system is limited by the performance of the bottleneck.

Focus efforts on critical resources

Continuing with same example, it is obvious than improvement efforts on resources R4 or R5 are useless, as they already have excess capacity.

> R4 and R5 are under utilized, so deploying SMED for example would be waste.

Improve performances of R1 and R2 would only increase the WIP before R3, without improving the performance of R3!

R3 has a limited throughput. If the little throughput is discarded at quality control, it is critical for sales.

If R3 is down, slows or stops, it is critical.
So management must insure that raw material, parts delivered to R3 are free of any defect, that R3 is reliable and nothing will disturb this resource from processing. Only R3 must be the focus point of all the efforts, in order to maximize the global throughput.

Conclusion

All means to improve performance; time, financial means, competences, etc. are limited, that's why it is necessary to use them wisely and avoid wasting them.

It is necessary to discriminate critical resources from non critical resources and proceed in order of priority.

It is better to focus improvement efforts and means on critical resources properly identified, rather to scatter and dilute them on all resources.