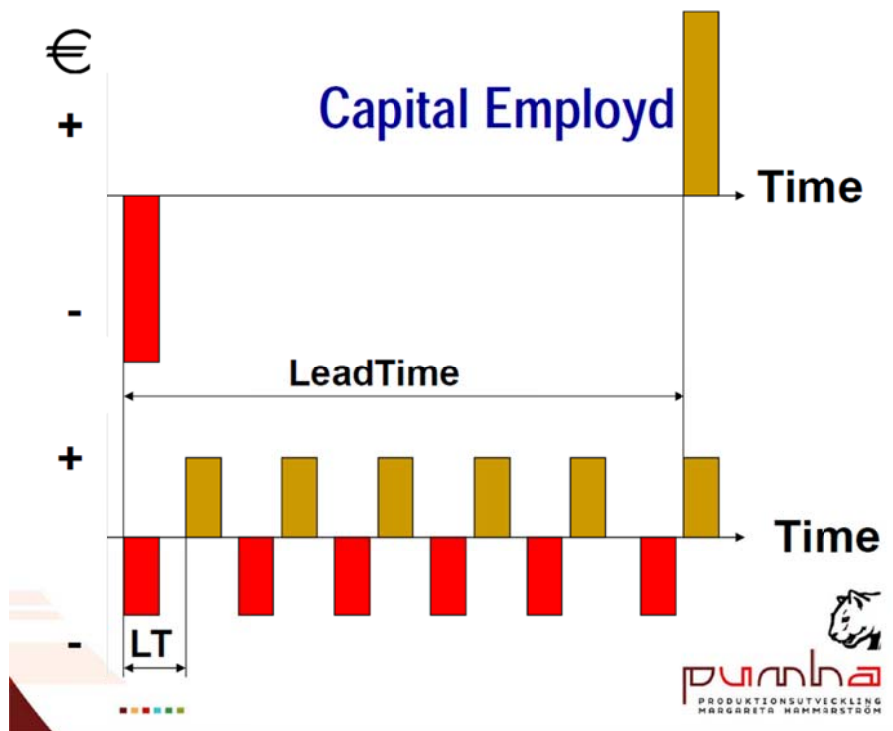
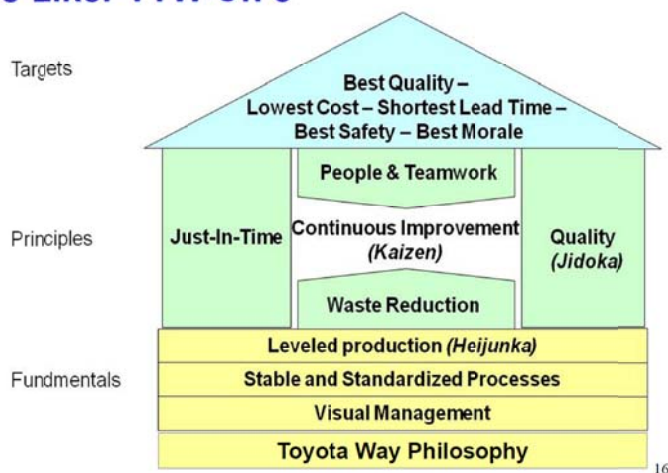


Study Questions KPP202 part 2, additional to [Study Questions for literature and lectures, rev1.](#)

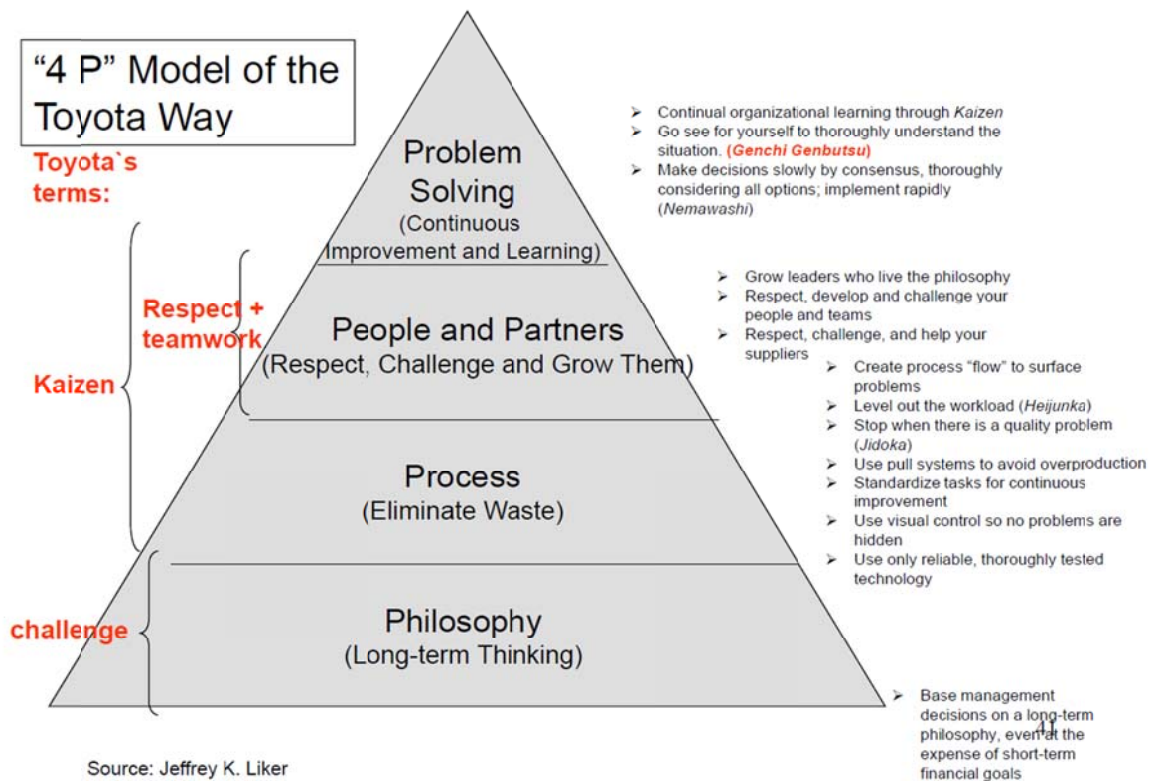


Le2 Margareta H: Explain the point of this PP and how it relates to push/pull in production. 5p.

The House – Toyota Production System, see Liker TTW Ch 3



Le 3a Anders H: Explain in detail all parts of the House and how each part impacts the Toyota Production System. 10 p.



Le 3b,c Anders H: Prepare to be able to: Describe the “4P” Model of TTW. Overall view 5p. In detail 10p.

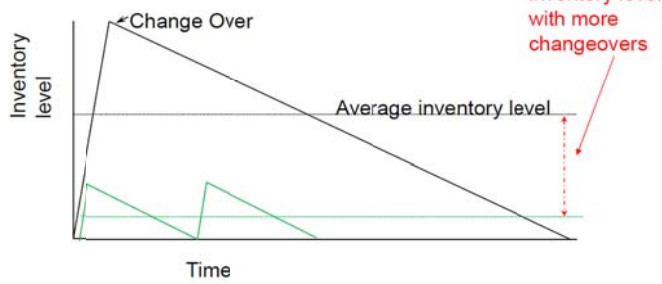
Why **Focus on Flow**?

“If some problem occurs in one-piece-flow manufacturing then the whole production line stops. In this sense it is a very bad system of manufacturing. But when production stops everyone is forced to solve the problem immediately. So team members have to think, and **through thinking, team members grow and become better team members and people.**”

-Teruyuki Minoura, former President,
Toyota Motor Manufacturing, North America

Le 3 d Anders H: Prepare to be able to, in own words and with own examples, motivate why to focus on Flow. Also include economic aspects, cost of storing and other waste, the Japanese See aspect. 10p.


Why Quick Change Over?



The more often we changeover, the more our inventory levels decrease. This helps accomplish our goal of waste elimination.

Makes e.g. capital available for other possibilities.

Le 3e Anders H: Prepare to be able to describe why there is need for Quick Change Over in Lean. To make figure that illustrate and text that explains. 5p.



Why do value stream mapping?

- Helps you see the sources of waste in your value stream, also in between different processes
- The connection between information and material flows is shown
- Allows everyone to see the value stream through the same lens
- Provides a common language for talking about manufacturing processes and discussing improvement opportunities
- Supports the design process for future production flows
- An action plan can be created taking into account the whole process

VSM describe opportunities to impact business performance aligning with VPS customer focus

Delivery & Time

- On time in full (Delivery accuracy)
- Increased Order Responsiveness (Flexibility)
- Reduced lead times

Cost

- Reduced inventory costs
- Reduced transportation costs
- Reduced production costs

Quality

- Increased product quality
- Increased component quality
- Reduce obsolescence/shelf life

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Le 4a Jessica B: Prepare to be able to describe why to do VSM in Lean. To make text that explains. 5p. To make an example of an VSM chart and calculation based on case facts given in the examination question. 10p.

A current state VSM is created in 7 steps

Determine customer requirements
Draw process steps
Gather process data
Gather inventory data
Determine material flows
Draw information flows
Calculate lead time

- Draw customer
- Add data boxes
- Draw each process in order of process flow
- Draw inventories between processes
- Collect and add process data
 - > Cycle times
 - > Process times
 - > Machine uptime
 - > Changeover time
 - > Batch size
 - > No of shifts
 - > Etc.
- Inventory, FIFO or supermarket
- Count/estimate level of
 - > Raw material
 - > WIP
 - > FG
- Calculate stock turns
- Delivery receipt frequency
- Customer delivery frequency
- Determine whether flow is push or pull
- Draw push arrow as needed
- Add production control information from/to customers and suppliers
- Add information arrows internally and externally
- Do the calculations
 - > Lead time
 - > Processing time
 - > Value adding time

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Le 4b Jessica B: Prepare to be able to describe the method and steps of VSM in Lean. 5p.

Step 7: Calculate lead time

Determine customer requirements
Draw process steps
Gather process data
Gather inventory data
Determine material flows
Draw information flows
Calculate lead time

- Draw the trace along the bottom of the diagram
- Calculate inventory lead times and add these to the trace together with process times
- Calculate value adding time (%)

$$\frac{\text{Sum of processing time}}{\text{Sum of manufacturing lead time}} = \text{value adding ratio of the time the product spends in the factory}$$
- Look at the details of the trace to find the worst contributors to lead time
- If mapping a product family: Choose the longest component stream in the product family and calculate total processing time and lead time for that product

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Step 7: Exercise in calculating lead time

Determine customer requirements
Draw process steps
Gather process data
Gather inventory data
Determine material flows
Draw information flows
Calculate lead time

- Takt time = available time per shift / customer demand per shift
 $2700 \text{ sec} / (18400 \text{ pcs} / (20 \text{ days} \cdot 2 \text{ shifts})) = 60 \text{ sec}$ (1 item is finished each 60 sec)
- Inventory lead time = takt time * inventory
 $60 \cdot 1840 = 110400 \text{ sec}$, which is equal to 30.2 h
- Inventory lead time (days) = inventory lead time (h) / available hours per day
 $30.2 / (7.7 \text{ h} \cdot 2 \text{ shifts}) = 2 \text{ days}$

Troughs are 'floor-to-floor' time

The sum of machine + manual processing time including curient + waste float. Do not divide the time by the number of parts unless the part can be produced, e.g., oven curing 200 parts for 24 hours. It is a processing time of 24 hours, not 7.2 min

Peaks show the inventory lead time!

Customer demand	18400 pcs/month
Working days/month	20 days
Available time/day	15.4 hours (2 shifts)
TAKT	60 seconds
Inventory	1840 pcs (1200+640)
Inventory lead time (sec)	110400 sec (1840*60)
Inventory lead time (h)	30.2 h (110400/3600 s)
Inventory lead time (days)	2 days (30.2 h/15.4 h)

Individual parts may be expedited, or left behind, but this gives an accurate calculation of total lead time

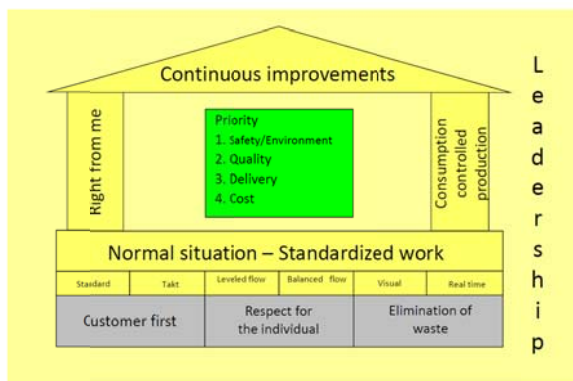
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Le 4c Jessica B: Prepare to be able to VSM calculations such as lead time, value adding time, in Lean. 5p

Le Antti Salonen all lectures:

Be prepared for several questions of 1-10p from Anttis lectures, up to one third of exam. Train all given examples for full understanding on home page [Calculation](#) and [Exercise OEE](#).

Scania's Produktion System



Le 9 a,b Christer O: Describe and explain in detail the parts of the Scania Production System, 5p.
Discuss why and how SPS differs from TPS. 10p.

Standardized work

- Make a standard
 - Understand the work
 - Clock the cycle time

Find the right pace for SAFETY and QUALITY.
Describe What, How and Why

Le 9 c Christer O: Be able to describe how to establish and implement standardized work in Lean. See also the course text book. 5p.

Counterarguments

- Only puts pressure on the employees.
- Only works on the car industry.
- Our business is unique.
- Moves the problems to suppliers.
- Only works on simpler products.
- This we have done before.

Le 10a Fernando D: Describe how you can cope and make response to counterarguments to Lean in your future work as a production engineer specializing as Lean coordinator. 5p.



What makes a customer happy?

- Shorter Lead-times
- Good Quality
- Low Prices
- Good Sales tools

But this comes with a cost...

- High Inventory/Capital
- High Flexibility, difficult to handle
- Stable and robust construction

Le 10b Fernando D: Describe the overall relationship between these aspects. 5p

Why is S&OP so important for the business?



Le 10c Fernando D: Describe why a holistic view including also Sales lead time improves the total lead time, thus giving a better position for your company in the market. Present an example and describe also in values of lead times. 5p

Volvo cars' environmental goals

- Zero environmental accidents
- solid and ground control
- climate and energy
- water footprint
- total waste management
- sustainable transport
- emission to air

Le 11 Sasha S: Give and describe the parts of Volvo Cars Environmental goals as described in the course and give three examples of how some of them relates to Lean. 5p.