Value Stream Mapping Basics
Learning Objectives

At the end of this module, you will be able to:

- Sketch a basic value stream map
- Demonstrate basic value stream analysis
- Recognize steps for process improvement using value stream mapping and analysis
Hot Dog Stand Process Map

How can Sasha and Andy improve their productivity to meet growing customer demand?

1. Take order
2. In order
   - 10. Set up

3. Get order
   - 11. Clean up

4. Put in bun, wrap, add fruit
5. Another dog?
   - Yes
     - 4. Put in bun, wrap, add fruit
   - No
     - 5. Another dog?
6. Out order
   - Yes
     - 7. Order OK?
   - No
     - 8. Add beverage

7. Order OK?
   - Yes
     - 8. Add beverage
   - No
     - 9. Deliver to customer

8. Add beverage
   - Yes
     - 8. Add beverage
   - No
     - 9. Deliver to customer

9. Deliver to customer
   - Yes
     - 8. Add beverage
   - No
     - 9. Deliver to customer

How can Sasha and Andy improve their productivity to meet growing customer demand?
Five Lean Thinking Fundamentals

- **Specify value**: Value is defined by customer in terms of specific products and services.
- **Identify the value stream**: Map out all end-to-end linked actions, processes and functions necessary for transforming inputs to outputs to identify and eliminate waste.
- **Make value flow continuously**: Having eliminated waste, make remaining value-creating steps “flow”.
- **Let customers pull value**: Customer’s “pull” cascades all the way back to the lowest level supplier, enabling just-in-time production.
- **Pursue perfection**: Pursue continuous process of improvement striving for perfection.

Value Stream Map (VSM)

- A tool used to improve a process by identifying added value and eliminating waste

- A process map that follows the value creation process
  - “strap yourself to the product (or service) and see where you go”

- A process map with data added
  - Times: processing, wait, cycle
  - Quality: number of rejects
  - Inventory
  - Resources
    - Number of people
    - Space
    - Distance traveled
  - Whatever else is useful for analyzing the process
Steps for Creating a VSM

1. Define customer value and the process
   - “Walk” the process to identify tasks and flows
   - Identify value-added and waste process steps

2. Create the “current state” VSM
   - Gather data on resources, time, quality for each step

3. Analyze map to determine opportunities for improvement
   - Identify bottlenecks and other flow impediments
   - Brainstorm actions to eliminate waste and add value

4. Create a “future-state” map to visualize the desired and realistic next state

5. Create action plans to move toward future state
Step 1: S&A Customer Value and Process Map

Current Demand
50 customers
100 hot dogs

Customer Value
Good food
Faster service

1- Take order

9 - Deliver to customer

8 - Add beverage

7 - Order OK?

6 - Out order

5 - Another dog?

4 - Put in bun, wrap, add fruit

3 - Get order
Cook dogs

2 - In order

10 - Set up

This process map follows the value creation process ✔
Value/waste assessed at each process step ✔
Step 2: Add Data

1- Take order
   T = 60 sec
   Qual = 100%

2 - In order
   T = 48 sec
   Qual = 100%

3 - Get order
   T = 30 sec
   Qual = 100%
   Cook dogs

4 - Put in bun, wrap, add fruit
   T = 110 sec
   Qual = 100%
   T = 44 sec
   Qual = 100%

5 - Another dog?
   T = 22 sec

6 - Out order
   T = 33 sec

7 - Order OK?
   Yes
   T = 11 sec
   Qual = 100%
   T = 30 sec
   Qual = 100%
   T = 10 sec
   Qual = 90%

8 - Add beverage
   Yes
   T = 48 sec
   Qual = 100%
   T = 60 sec
   Qual = 100%

9 - Deliver to customer
   T = 30 sec
   Qual = 100%

10 - Set up
    T = 48 sec
    Qual = 100%

11 - Clean up
    T = 48 sec
    Qual = 100%

Display of relevant data completes basic VSM
S&A Takt And Cycle Times

Takt time = Available time / Customer demand

Customer demand = 4hrs 60min / 50 customers = 4.8min = 288 sec

Cycle time (summed from previous data) = 7.4 min = 446 sec

Valid alternate calculation – assume setup/cleanup is done “when things are slow”

Takt time = Available time / Customer demand

Customer demand = 4hrs 50min / 50 customers = 4.0min = 240 sec

Cycle time (excluding set up & clean up) = 5.8 min = 350 sec

Cycle time > takt time, but two workers – can demand be met?
Step 3: Value Stream Analysis

- With your team, take 15 minutes to
  - Calculate the total
    - Value added time
    - Non value added time
    - Wait time
  - Calculate the total “touch time” that Sasha and Andy spend on a single order
- Be ready to report your answers to the class
Utilization and Capacity

VAT is only slightly over 50% ⇒ Opportunities for improvement

Available time = 4 hours = 240 min

Worktime: Touch time per order X number of orders
Sasha’s tasks: _____ /60 min X 50 cust. = _____ min
Andy’s tasks: _____ /60 min X 50 cust = _____ min

Utilization: Worktime / time available
Sasha’s: (_____ min / 240 min) X 100% = ____%
Andy’s: (_____ min / 240 min) X 100% = ____%

Capacity: Time available / touch time per order
Andy working at 100% = (240 min X 60) / _____ sec = ___
Utilization and Capacity

VAT is only slightly over 50% ⇒ Opportunities for improvement

Available time = 4 hours = 240 min

Worktime: Touch time per order X number of orders
Sasha’s tasks: 159 / 60 min X 50 cust. = 133 min
Andy’s tasks: 224 / 60 min X 50 cust = 187 min

Utilization: Worktime / time available
Sasha’s: (133 min / 240 min) X 100% = 55%
Andy’s: (187 min / 240 min) X 100% = 78%

Capacity: Time available / touch time per order
Andy working at 100% = (240 min X 60) / 224 sec = 64

We will consider complications like varying orders or irregularly spaced customers in the Variation Module
Summary - S&A Value Stream Analysis (VSA)

• Current production (50 customers) is a little below current capacity (64 customers) of Andy and Sasha
  • Process improvement needed to meet growing demand
• Andy and Sasha are both underutilized
  • But utilization is not balanced between them
• Cycle time of 7.43 min per customer (or even 5.8 min) too long
  • Should be able to shorten cycle time to meet demands of customers for faster service

Bottom Line
Sasha and Andy should implement process improvement for week 3 to meet growing demand!
Improvement Brainstorm

- Help Sasha and Andy figure what to improve
  - How can utilization be improved?
  - How can cycle time be reduced?
  - What has to be done to serve 75 customers?
  - What has to be done to serve 100 customers?
Brainstorm Bursts

1- Take order

9 - Deliver to customer

3 - Get order
   Cook dogs

8 - Add beverage

2 - Put in bun, wrap, add fruit

4 - Put in bun, wrap, add fruit

5 - Another dog?

6 - Out

7 - Order OK?
   Yes
   No

10 - Set up

11 - Clean up

Balance Work

NVA Inspection

Eliminate

Image by MIT OpenCourseWare.
Steps for Creating a VSM

1. Define customer value
2. Create a “current state” map
   - “Walk” the process to identify tasks and flows
   - Gather data on resources, time, quality for each
3. Analyze map to determine opportunities for improvement
   - Identify value-added and waste
   - Brainstorm actions to eliminate waste and add value
4. Create “future-state” map to visualize the desired state
5. Create action plans to move towards future-state
Why is VSM a Useful Tool?

• Helps visualize interactions and flows

• Shows linkages between information and product flows

• Provides a common language for talking about a process

• Helps to identify:
  • the constraint(s) - any resource whose capacity is less than customer demand;
  • wastes as well as their sources

Adapted from: M. Rother and J. Shook, Learning to See, Lean Enterprise Institute, 1998
Tips for Creating a VSM

• Involve entire team

• Actually walk the process - follow the material and information through the process, starting at the beginning

• Use Post-it notes and butcher paper

• Use symbols or icons that are meaningful to the process but common enough to be understood by all involved
"Industrial Strength" Example

Jefferson Healthcare Clinic - Current State Map

OVERALL CLINIC DATA
- Cost per visit - $125.39
- Contact Hours/day
- Avg. Pts per hour - 1.83
- Available hours per day - 67

PATIENT DATA
- Volumes - 131 visits/day
- Market share - Hospital 66.7%
- CNI
- Paper mix - commercial 36%
- Satisfaction - overall 74.4
- Volume by Diagnosis - See chart B

PATIENT DATA
- Blocked Hours – 67/day
- Contact Hours – 59/day
- Utilization 88%

OVERALL CLINIC DATA
- Blocked Hours – 67/day
- Cost per visit - $125.39
- Contact Hours – 59/day
- Avg. Pts per hour - 1.83
- Available hours per day – 67

Document delays – 30%
- Schedule on 1st call – 100%
- # of Pts on panel - 5998
- Days out for 1st visit – 3.75
- Days out by provider - See Chart C

Document delays – 2%
- Schedule on 1st call – 0%
- # of Pts on panel – 5997
- Days out for 1st 3rd visit – 2.75
- Days out by provider - See Chart C

ONS v1
- On-time starts – 37%
- Time by diagnosis – Chart C
- Volume by hour – Chart E

ONS v2
- No shows – 2%
- On-time starts – 37%
- Time by diagnosis – Chart C
- Volume by hour – Chart E

= PTFP Scheduling
= Hospital Services
= OPC Scheduling
= Patient
= JMPG Scheduling
= Patient on schedule
= Clinic flow (all sites)

Courtesy of Jefferson Healthcare, Port Townsend, WA. Used with Permission.
Additional Graphic Elements

“Swim Lanes” organize tasks by time and organization.

“Castle Wall” shows task and wait times.

Many ways to clarify the process and present data in easy-to-understand form.


Acknowledgements

Contributors

- Sharon Johnson – Worcester Polytechnic Inst.
- Jose Macedo – Cal Poly San Luis Obispo
- Hugh McManus – Metis Design
- Ted Mayeshiba – USC
- Earll Murman – MIT