Process Analysis and Improvement

TOPIC 6 | MIB2307 OPERATIONS MANAGEMENT

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What You Will Be Able to Do Today

1

Map Processes

Map a business process using standard process mapping symbols

2

Calculate Metrics

Calculate cycle time, throughput time, and process efficiency

3

Identify Waste

Distinguish value-added activities from waste (non-value-added)

4

Find Bottlenecks

Identify bottlenecks and propose improvement opportunities

5

Ethics Reflection

Reflect on the ethical tension between efficiency and worker well-being.

Process Analysis—The Big Picture

Definition

Systematic examination of how work flows through a series of steps to produce an output for a customer.

The Fundamental Question

Does every step in this process **CREATE VALUE** for the customer?

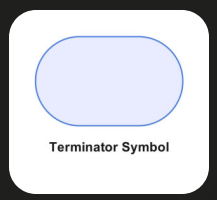
A process is only as strong as its weakest step—the **bottleneck**.

Why It Matters in International Business

- **Cost & Satisfaction:** Inefficient processes cost money, time, and customer satisfaction
- **Cross-Cultural Operations:** Require understanding process variation across diverse contexts
- **Sustainable Operations:** Demand waste reduction, not just speed

Process Mapping—Standard Symbols & Notation

Standard Flowchart Symbols

Symbol	Visual	Meaning
Oval / Terminator		Start / End point
Rectangle		Activity or Task
Diamond		Decision point (Yes/No branch)
Arrow		Direction of flow
Parallelogram		Input / Output
Circle		Connector (continues on next page)

Process Mapping — Standard Symbols & Notation

Benefits of Process Mapping

Reveals Complexity

Uncovers hidden redundant steps

Finds Bottlenecks

Identifies improvement opportunities

Shared Understanding

Aligns diverse international teams

Improvement Foundation

Basis for Lean, Six Sigma, and BPR

Case Example—Hotel Check-In Process (Bangkok)

Scenario: A 5-star hotel in Bangkok—mapping the guest check-in experience

Total Throughput Time

Approximately **16.5 minutes** from arrival to room orientation

Discussion Questions

- Which steps add value from the **GUEST's** perspective? Which are pure waiting?
- Which steps would the guest willingly pay for — and which would they prefer to eliminate?

Value-Added Analysis—Seeing Waste Clearly

Value-Added (VA)

The customer **WOULD** pay for this step; it transforms the product or service toward what the customer wants.

Non-Value-Added (NVA) / Waste

Customer would **NOT** pay for this; adds cost and time with no benefit.

Target: Maximize VA%, minimize NVA%—this is the essence of Lean thinking.

The 8 Wastes—DOWNTIME Framework

1

Defects

Rework, errors, returns

2

Overproduction

Making more than needed

3

Waiting

Idle time between steps

4

Non-utilized Talent

Ignoring worker skills and ideas

5

Transportation

Unnecessary movement of materials

6

Inventory

Excess stock tying up capital

7

Motion

Unnecessary movement of people

8

Extra Processing

Doing more than the customer requires

Measuring Process Performance — The Essential Metrics

Cycle Time (CT)

Time to complete ONE unit at a single process step

Formula: CT = Available Time ÷ Required Output

Throughput Time (TPT)

Total time from start to finish across ALL steps including waiting

Formula: TPT = Sum of all step times + all waiting times

Process Efficiency (%)

How much of the total time is actually adding value

Formula: Process Efficiency = (Value-Added Time ÷ Total Throughput Time) × 100

Capacity Utilization (%)

How fully a resource is being used

Formula: Utilization = (Actual Output ÷ Design Capacity) × 100

Bottleneck

The step with the **LONGEST cycle time** — it limits the entire system's output rate

World-Class Benchmark

World-class operations typically achieve process efficiency **greater than 80%**

Worked Example—Finding the Bottleneck

Scenario: A food packaging company needs to produce 500 units per shift (8-hour shift = 480 minutes)

Required Cycle Time Calculation

Required CT = 480 ÷ 500 = **0.96 minutes per unit (57.6 seconds)**

Analysis

Sealing takes **60 sec** but required CT is only **57.6 sec** — this station cannot keep up.

Actual Achievable Output

480 minutes × (60 sec/60) = only **480 units per shift**, NOT 500.

Action: Focus ALL improvement effort on the sealing station first — nothing else will increase total output.

Process Step Times vs. Required Cycle Time

Step	Activity	Time (sec)	Status
1	Filling	45 sec	✅ Within CT
2	Sealing	60 sec	🔴 BOTTLENECK
3	Labeling	30 sec	✅ Within CT
4	Boxing	50 sec	✅ Within CT

Required Cycle Time	57.6 seconds
Bottleneck Step	Step 2: Sealing (60 sec)
Target Output	500 units/shift
Actual Achievable Output	480 units/shift
Output Shortfall	20 units/shift

Improvement Methodologies — Choosing the Right Approach

Lean Thinking — Eliminate Waste, Maximize Flow, Respect People

- **5S:** Sort, Set in Order, Shine, Standardize, Sustain
- **Value Stream Mapping:** End-to-end process visibility
- **Kaizen:** Continuous incremental improvement involving all workers

Six Sigma (DMAIC) — Reduce Variation and Defects

Define → Measure → Analyze → Improve → Control

Theory of Constraints (TOC) — Focus on the Bottleneck

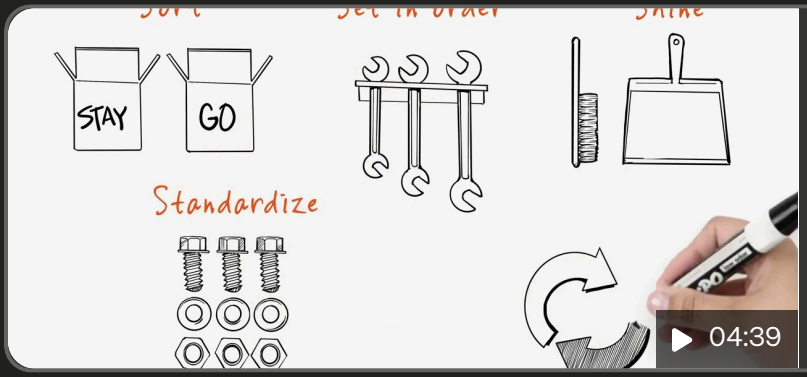
Identify → Exploit → Subordinate → Elevate → Repeat

Business Process Reengineering (BPR)

Radical redesign for dramatic improvement in outdated processes

Choosing the Right Tool: Use Lean for waste, Six Sigma for variation, TOC for constraints, BPR for outdated processes

5s of Lean Thinking

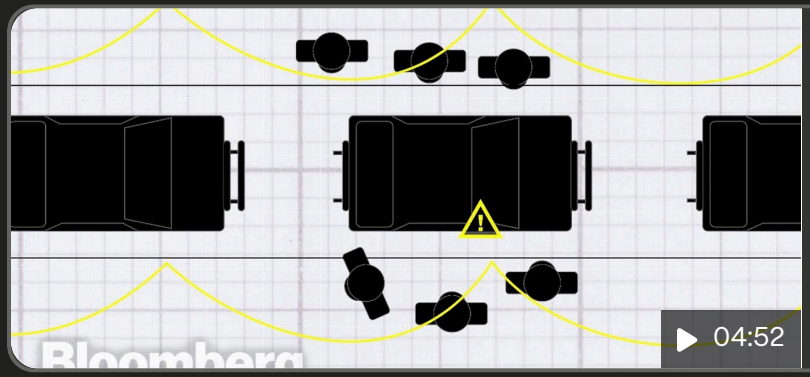


YouTube

5S of Lean Mindset

What is 5S? 5S is a systematic form of visual management utilizing everything from floor tape to operations manuals. It is not just about cleanliness or organization; it is...

How Toyota Created Lean Thinking



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How Toyota Changed The Way We Make Things

The Japanese Car Company is a corporate behemoth – but it's done much more than just give us Corollas or Land Cruisers. It's changed the way the world makes...

METHODOLOGY

Six Sigma — Reducing Variation and Defects

Six Sigma is a data-driven methodology targeting no more than 3.4 defects per million opportunities (DPMO). The higher the sigma level, the fewer the defects.

The DMAIC Framework

Define — Identify the problem, customer requirements, and project goals

Measure — Collect data on current process performance

Analyze — Find root causes of defects and variation

Improve — Implement and test solutions

Control — Sustain the gains with monitoring systems

Key Facts

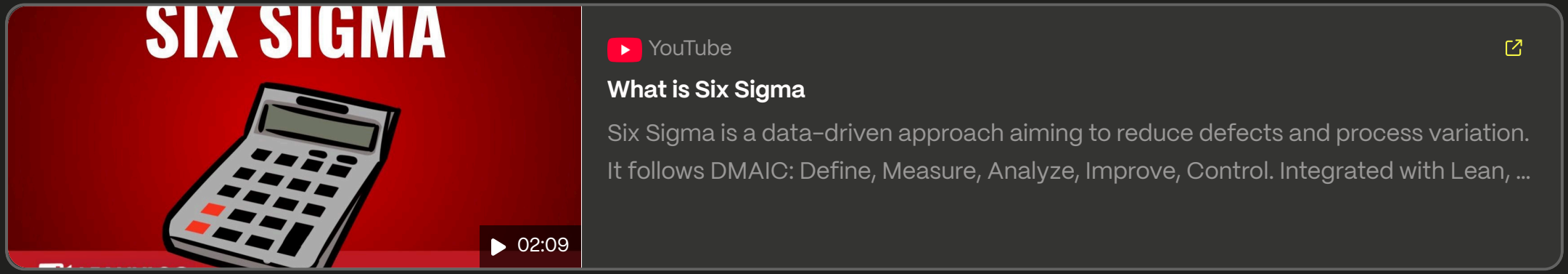
Origin — Developed by Motorola (1986), popularized by GE under Jack Welch

Belt Levels — Yellow → Green → Black → Master Black Belt

Focus — Reducing variation, not just speed; heavily statistics-driven

When to Use — Quality and consistency problems (use Lean for waste, Lean Six Sigma for both)

What is Six Sigma



Six Sigma in a Pizza restaurant

YouTube

DMAIC Six Sigma example– pizza restaurant / six sigma example / DMAIC...

Are you trying to understand, how DMAIC works? See this easy example on pizza family restaurant. To set up consultation with me click here:...

Lean Six Sigma

YouTube

What is Lean Six Sigma

Lean Six Sigma integrates Lean and Six Sigma to enhance performance by eliminating waste and reducing variation. It improves efficiency, quality, and...

The Ethical Dimension — Efficiency vs. Worker Wellbeing

The tension every operations manager must navigate: Efficiency focus leads to faster processes and lower costs — but can also cause work intensification, stress, burnout, and unsafe conditions.

Real-World Examples

Amazon Warehouses

Workers subjected to extreme productivity tracking metrics

Bangladesh Garment Workers

Under fast-fashion delivery pressure with unsafe conditions

Healthcare Staff

Facing impossible patient-to-staff ratios

Toyota's "Respect for People" Principle

> Workers are not machines. Sustainable efficiency comes from engaging their intelligence, creativity, and problem-solving ability — not just their physical labor.

Before Implementing ANY Process Change, Ask:

1. Does this improvement affect worker safety or dignity?
2. Were workers consulted and involved in the redesign?
3. Are efficiency gains shared fairly with the people doing the work?

SDG 8: DECENT WORK AND ECONOMIC GROWTH

Activity 3—Process Mapping Workshop (In-Class)

Select ONE scenario (groups of 3–4 students):

Option A Coffee shop—order to customer delivery	Option B Hotel housekeeping—room turnover between guests
Option C University student enrollment process	Option D E-commerce—order placed to parcel delivered

Your Group Must Complete ALL of the Following:

1. **Draw the Process Map**
   Current state—minimum 8 steps using correct symbols

2. **Label Each Step as VA or NVA**
   Value-added or non-value-added classification

3. **Ethics Reflection**
   Do your improvements affect worker well-being? How did you address this?

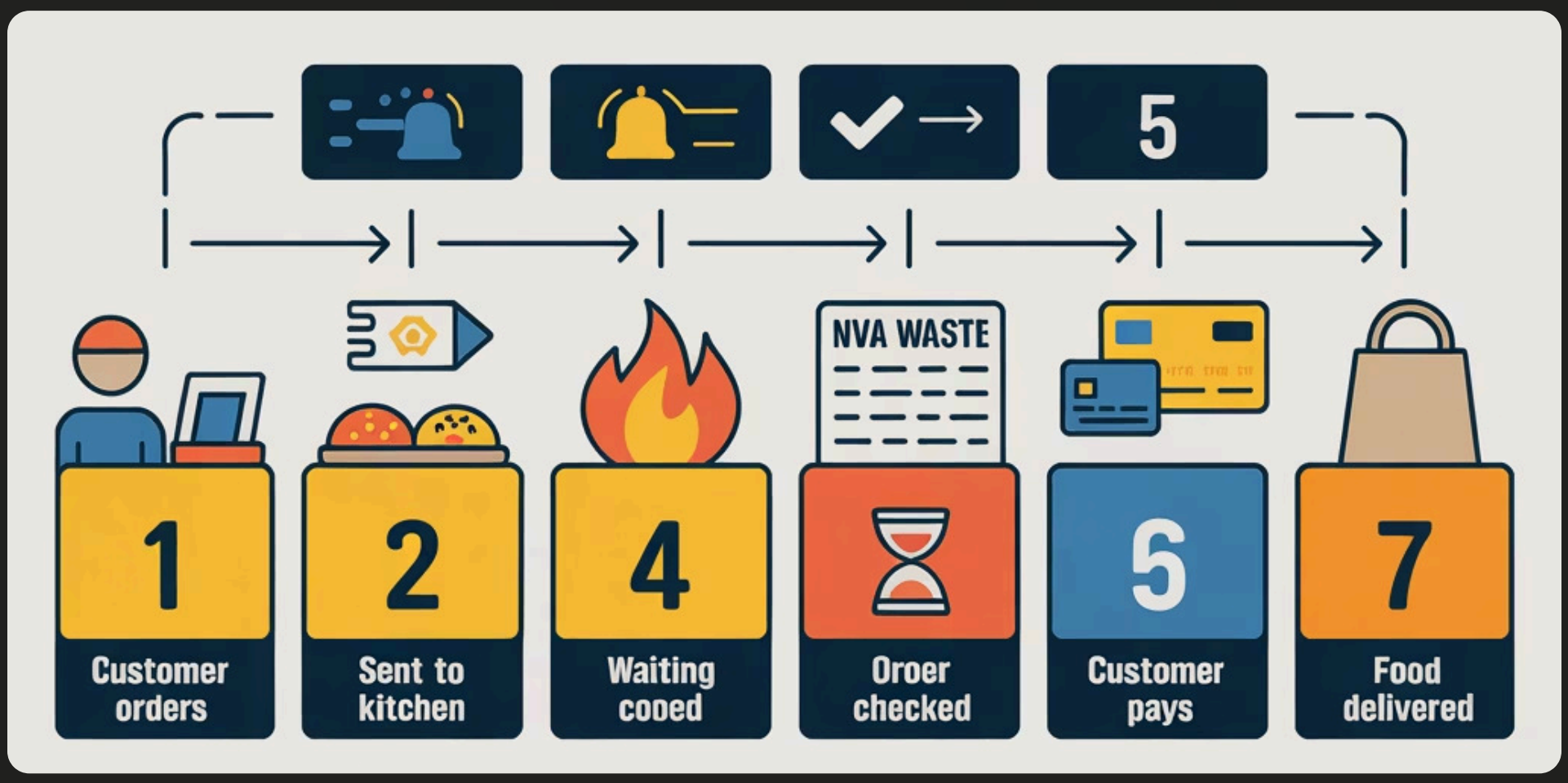
Deliverable: Process map diagram + 1-page written analysis | **Due:** End of class session

WORKED EXAMPLE

Worked Example—Fast-Food Order Fulfillment

Let's apply process mapping and value-added analysis to a common scenario: a customer ordering and receiving food at a fast-food restaurant.

We will identify the key steps and their durations and categorize them as Value-Added (VA) or Non-Value-Added (NVA).



Customer Places Order

Customer communicates order to cashier/kiosk. **(VA)**

Order Sent to Kitchen

Order details transmitted to food preparation area. **(VA)**

Food Prepared & Cooked

Ingredients assembled, cooked, and portioned. **(VA)**

Food Awaiting Assembly/Pickup

Prepared food sits on warmer/rack until all items are ready. **(NVA - Waste)**

Order Assembled & Checked

All items gathered, condiments added, order verified for accuracy. **(VA)**

Customer Pays

Payment processed. **(VA)**

Order Handed to Customer

Final delivery of packaged food. **(VA)**

The **NVA (Waiting)** step highlights an area for improvement. Minimizing this wait time could significantly enhance customer satisfaction and process efficiency.

ETHICS

Ethics in the Fast-Food Workplace — Worker Well-Being

Behind every efficient process are real people. Here are the key ethical tensions operations managers must consider in a fast-food context.

Work Intensification

Efficiency pressures often force workers to operate at unsustainable speeds, increasing stress and error rates.

Surveillance via Timing Systems

Constant measurement of speed creates an environment of permanent performance surveillance for employees.

Health & Safety at Speed

Rushing food preparation significantly increases the risk of workplace injuries and compromises safety standards.

Muri (Overburden)

Intentional understaffing pushes individuals beyond a sustainable pace to meet aggressive cost-cutting targets.

Every operations decision is also a human decision. Efficiency without ethics is just exploitation.

Activity 3 Evaluation Rubric — CLO2 & CLO4

Criteria	Below (0–49%)	Meets (50–79%)	Exceeds (80–100%)
Process Map Accuracy	Incomplete or incorrect symbols; major steps missing	Correct symbols; main steps identified with minor gaps	Complete, accurate map with all inputs, outputs, and decision points
VA/NVA Analysis	Cannot distinguish value-added from waste	Correctly labels most activities with basic reasoning	Full justification using customer perspective; quantifies waste
Metric Calculation	Major errors in cycle time or efficiency calculations	Correct calculations with minor arithmetic errors; bottleneck identified	All metrics correct; bottleneck impact on total capacity explained
Ethics Reflection (CLO4)	No consideration of worker impact	Basic acknowledgment of worker wellbeing concerns	Thoughtful analysis balancing efficiency and dignity; references SDG 8

CLO2: Analyze & Evaluate

Demonstrated through process map accuracy, VA/NVA analysis, and metric calculation criteria

CLO4: Ethics & Character

Demonstrated through the ethics reflection criterion — balancing efficiency with worker dignity and referencing SDG 8

Week 6 — Key Takeaways

01

Process Mapping is the Foundation

You cannot improve what you cannot see — mapping is always the first step

02

Value-Added Analysis

"Would the customer pay for this step?" — ruthlessly eliminate what they would not

03

The Bottleneck Controls Everything

Always start improvement at the bottleneck — it limits the entire system's output

04

Process Efficiency Formula

VA Time ÷ Total Time — world-class targets exceed 80%

05

Match the Tool to the Problem

Lean, Six Sigma, and TOC offer different lenses for different problem types

06

Efficiency and Wellbeing Are NOT Opposites

The best operations engage people as problem-solvers, not just resources

Next Week — Week 7: Quality Management Systems — TQM, Six Sigma metrics, defect rates, DPMO, COPQ, and quality ethics