UNIT 4 — DIAGNOSING BROKEN PROCESSES

A **broken process** is not one that is slow once in a while — it is one that **systematically fails** to meet performance expectations in cost, time, quality, or consistency.

Before redesigning a process, BPR requires **diagnosis**, not guessing.

4.1 Bottlenecks (Advanced Understanding)

Definition (formal)

A **bottleneck** is any step in a process whose **limited capacity, long cycle time, or dependency constraints** restrict the overall throughput of the entire process.

Key idea:

> A process can only move as fast as its slowest step.

Types of Bottlenecks (important)

1. Capacity bottleneck

Occurs when demand > processing ability.

Example:
One approval manager handling 200 requests/day while others handle 500.

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2. Time bottleneck

Occurs when a step takes significantly longer than others.

Example:
Heating water in the tea process delays everything else.

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3. Resource bottleneck

Occurs due to lack of people, machines, or skills.

Example:
Only one trained staff member can operate a machine.

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4. Policy bottleneck

Occurs due to rules or approvals.

Example:
“All requests above X must be approved by director.”

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5. Information bottleneck

Occurs when data is unavailable, duplicated, or delayed.

Example:
Invoice cannot be processed because purchase order data is missing.

How to Identify a Bottleneck (Data-Driven)

1. **Queue buildup**
   Work piles up before one step.
2. **High utilization**
   One resource is always busy; others are idle.
3. **Longest cycle time**
   That step dominates total process time.
4. **Waiting time spikes**
   Large gaps between activities (seen in timestamps / process mining).

Example (Procurement)

If requisitions wait 3 days for approval but only 30 minutes for processing → approval is the bottleneck, not procurement staff efficiency.

Bottleneck vs Non-Bottleneck (5 Differences)

Aspect	Bottleneck	Non-Bottleneck
Capacity	Lowest	Higher
Impact on throughput	Limits system	No effect
Queue size	High	Low
Utilization	Near 100%	Variable
Improvement priority	First	Secondary

Typical Exam Question

Q. Why does improving non-bottleneck steps often fail to improve overall performance?
Because system throughput is constrained by the bottleneck. Improving faster steps only increases work-in-progress before the bottleneck without increasing final output.

4.2 Root Cause Analysis (RCA)

Definition

Root Cause Analysis is a structured approach to identify the **underlying causes** of a problem rather than treating its symptoms.

BPR cares about **causes**, not surface issues.

Symptom vs Root Cause

Symptom	Root Cause
Late deliveries	Poor scheduling logic
High defects	Inconsistent input quality
Long wait times	Approval dependency

Fixing symptoms leads to **temporary relief**, not improvement.

RCA Logic

Problem → Why? → Why again? → Until a controllable cause is found.

Example

Problem: Tea is late
Why? Heater slow
Why? Heater shared
Why? No capacity planning
→ Root cause: lack of equipment planning

Typical Exam Question

Q. Why is root cause analysis critical before redesign?
Because redesigning based on symptoms risks fixing the wrong issue. RCA ensures that improvements target the true drivers of inefficiency rather than superficial effects.

4.3 Fishbone (Ishikawa) Diagram

Definition

A **Fishbone Diagram** visually categorizes possible causes of a problem to ensure **systematic cause identification**.

It answers:
“What could possibly be causing this problem?”

Standard Fishbone Categories (must know)

1. **People**
   Skills, training, coordination, motivation
2. **Process**
   Sequence, handoffs, rework, rules

3. **Machines**
   Equipment, tools, technology
4. **Materials**
   Inputs, availability, quality
5. **Measurements**
   Metrics, data accuracy, KPIs
6. **Environment**
   Layout, space, noise, physical constraints

(Some models also add **Management** or **Policy**.)

Example: Tea Delivery Delay

- People: staff coordination, speed
- Machines: slow water heater
- Materials: missing cups/spoons
- Process: receipt → payment → service order
- Measurement: no tracking of service time
- Environment: crowded counter

Why Fishbone is powerful

- Prevents tunnel vision
- Encourages team thinking
- Supports Six Sigma measurement later
- Converts intuition into structure

Fishbone vs 5 Whys (4 Differences)

Aspect	Fishbone	5 Whys
Structure	Broad	Linear
Purpose	Explore causes	Drill down
Use case	Complex problems	Simple problems
Output	Cause categories	Single root cause

Typical Exam Question

Q. How does a fishbone diagram support process improvement?
It organizes potential causes into structured categories, ensuring that people, process, technology, and environment factors are all examined before selecting improvement actions.

4.4 The 5 Whys Technique

Definition

The **5 Whys** is a questioning method that repeatedly asks “Why?” to uncover the root cause of a problem.

How it works

Problem → Why? → Why? → Why? → Why? → Why?

You stop when:

- The cause is actionable
- Further “why” adds no value

Example

Problem: Order delayed
Why? Approval slow
Why? Manager unavailable
Why? Only one approver
Why? Policy requires senior approval
→ Root cause: policy design

Strengths

- Simple
- Fast

- No data tools needed

Limitations

- Depends on honesty
- Can oversimplify
- Not suitable for complex systems alone

Typical Exam Question

Q. When is 5 Whys insufficient?
When problems have multiple interacting causes, in which case tools like fishbone or data analysis are needed.

4.5 Pareto Analysis (80/20 Rule)

Definition

Pareto Analysis is based on the principle that **a small number of causes account for most of the problem**.

Often phrased as:

> 80% of problems come from 20% of causes.

How Pareto Works

1. List causes
2. Measure frequency or impact
3. Sort from largest to smallest
4. Focus on top contributors

Example

Out of 100 late orders:

- 60 due to approvals
- 20 due to missing materials
- 10 due to staff absence
- 10 due to system issues

→ Focus first on approvals.

Why BPR Uses Pareto

- Prioritizes improvement
- Avoids spreading effort thin
- Supports data-driven decisions

Pareto vs Fishbone (4 Differences)

Aspect	Pareto	Fishbone
Nature	Quantitative	Qualitative
Focus	Priority	Exploration
Output	Ranked causes	Cause map
Data required	Yes	Optional

Typical Exam Question

Q. How does Pareto analysis support decision-making?
It identifies the most impactful causes of inefficiency, allowing organizations to focus resources on areas that yield the highest improvement.

4.6 Value Chain Analysis (Porter)

Definition

Value Chain Analysis examines how activities within an organization contribute to **customer value** and **competitive advantage**.

Two Types of Activities

Primary Activities

- Inbound logistics
- Operations
- Outbound logistics
- Marketing & sales
- Service

Support Activities

- Infrastructure
- HR management
- Technology
- Procurement

Why it matters in BPR

- Identifies which activities truly add value
- Helps decide what to redesign, outsource, or eliminate
- Supports “core vs non-core” decisions

Example

Taco Bell (conceptually):

- Core: food preparation, branding
- Non-core: raw cooking → outsourced

(You won’t be examined on Taco Bell details, but the logic applies.)

Value Chain vs Process Mapping (4 Differences)

Aspect	Value Chain	Process Mapping
Level	Strategic	Operational

Focus	Value creation	Flow efficiency
Scope	Organization-wide	Process-specific
Decision	What to do	How to do it

Typical Exam Question

Q. How does value chain analysis support BPR?
It helps identify which activities contribute most to customer value and competitive advantage, guiding decisions on redesign, outsourcing, or elimination of non-core activities.

UNIT 4 — Consolidated Exam Question Bank

1. Define a bottleneck and explain its impact on throughput.
2. Identify different types of bottlenecks with examples.
3. Explain root cause analysis and its importance in BPR.
4. Describe a fishbone diagram and its categories.
5. Compare fishbone and 5 Whys.
6. Explain Pareto analysis and its use in prioritization.
7. What is value chain analysis and how does it aid redesign?
8. Why must diagnosis precede redesign in BPR?