Root Cause Analysis in Utilities: The Art and Science of Knowing Why

Abstract

The Utility Industry is facing new regulations, changes in public perception and emerging market opportunities. Drivers of change include aging infrastructure, opportunities for decarbonization, the need for sustainability, cyber-security and moving towards green energy.

Understanding why things happen is a fundamental management skill. For anyone who is challenged to manage data quality, business processes, or people and organizations, finding root causes is an essential skill. Understanding why is the key to knowing what to do – the core of sound decision making. But cause-and-effect relationships are elusive. Real causes are often difficult to find so we settle for easy answers. This leads to fixing symptoms rather than to solving problems, and to little or no gain where opportunity is abundant.

Root cause analysis is the alternative to easy answers. Looking beyond the apparent and obvious to find real causes brings insight and sows the seeds of foresight. Through this course you will discover the art and science of knowing why. Learn to apply linear thinking, lateral thinking, systems thinking, and critical thinking – independently and in combination – to get to the core of even the most vexing problems.

You will learn how to:
- Recognize and avoid logical fallacies
- Identify and distinguish between correlation, coincidence, and cause
- Perform fast and light causal analysis using the "5 whys" technique
- Explore linear cause-and-effect chains with fishbone diagramming
- Describe complex cause-effect networks with causal loop models
- Challenge and refine linear and loop models with lateral and critical thinking techniques
- Apply root cause analysis to effectively manage quality, processes, and organizations

Geared to:
- Business managers, decision makers, analysts and other analytics consumers seeking to understand how to improve process performance
- Operational excellence and digital transformation professionals working to reduce waste, improve performance and implement sustainable solutions
- Everyone who needs to improve their understanding of what forces are driving the results being measured in displayed in dashboards and scorecards
- Everyone who uses data to develop strategies and implement business improvement solutions

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Detailed Outline

Module 1 – The Nature of Cause and Effect
- Definitions and Distinctions
  - Correlation
  - Correlation vs Causation
  - Coincidence
  - Confounding Variables
  - Influence
  - Complex vs Complicated
- First Look at Cause-Effect Models
  - Five Why's
  - Fishbone Diagrams
  - Causal Loop Models
- Cause and Effect Misconceptions

Module 2 – Root Cause Analysis Concepts and Principles
- The Purpose of Root Cause Analysis (RCA)
  - Root Cause Analysis
  - Root Cause
  - Root Cause Criteria
- The Process of RCA
  - Five Steps of RCA
  - Problem Description
  - Data Gathering
  - Causal Modeling
  - Root Cause Identification
  - Recommendations
  - Practical Application
- Beyond RCA
  - Implementation
  - Measurement and Monitoring
  - Unintended Consequences
  - Unresolved Consequences

Module 3 – Basic Causal Modeling Techniques
- The Five Why's Method
  - Drill Through the Symptoms
  - Five Why's
    - Data Quality
    - Business Analysis
    - Data Quality and Business Impact
    - Team Process
    - Tools

- Fishbone Diagramming
  - Classification and Hierarchy
  - Data Quality
  - Business Analysis
  - Process
  - Problem Framing
  - Main Branches
  - Templates
    - MORT
    - Balanced Scorecard
    - Manufacturing
    - Services
    - Organizational Management
    - Public or Private Sector
  - Tips and Techniques
  - Branch Causes
    - MORT
    - Balanced Scorecard
- Finding Root Causes
- Recommendations
- Diagram Layering
- Example
  - Fishbone Analysis
  - Fishbone Diagram
- Tools and Technology
- Combining Five Why's and Fishbone Diagrams

Module 4 – Complex Causal Modeling Techniques
- Systems Thinking Concepts
  - Rethinking Cause and Effect
  - Systems Thinking
  - Basic System Construct
  - Direction of Influence
  - Opposite Direction of Influence
  - Feedback Loops
  - Loop Polarity
  - Reinforcing Loops
  - Balancing Loops
  - Summary of Systems Thinking Concepts
- Causal Loop Modeling
  - Nodes and Links
  - Feedback Loops
  - Time and Delays
  - Gaps and External Variables
  - Side Effects

- Multiple Loops
- Model Scope
- Intersection Nodes
- Modeling Tips
- Causal Loop Example

Module 5 – Verifying Cause and Effect Conclusions
- Nonsense and Logical Fallacies
  - Short Reasoning Exercise
  - Nonsensical Reasoning
  - Nonsense and Distortion
  - Seeing What We Want to See
  - Logical Fallacies
    - Relevance
    - Components
    - Ambiguity
    - Omission
    - Thinking Styles
- Critical Thinking
  - Facts and Logic
  - Bias of Facts and Logic
  - Evidence and Assumptions
  - Reference and Conclusions
  - Mental Models
    - Testing Assumptions
    - Testing Inference
  - Example of Critical Thinking
  - Critical Thinking and Causal Models
- Lateral Thinking
  - Example of Lateral Thinking
  - Challenging
  - Disproving
  - Provocation
  - Random Input