Performance and Quality

Chapter 1

Setting the Strategic Direction

Chapter 2

Identifying Performance Improvement Opportunities

Chapter 3

Metrics

Chapter 4

Measuring and Monitoring

Chapter 5

Performance Reporting

Chapter 6

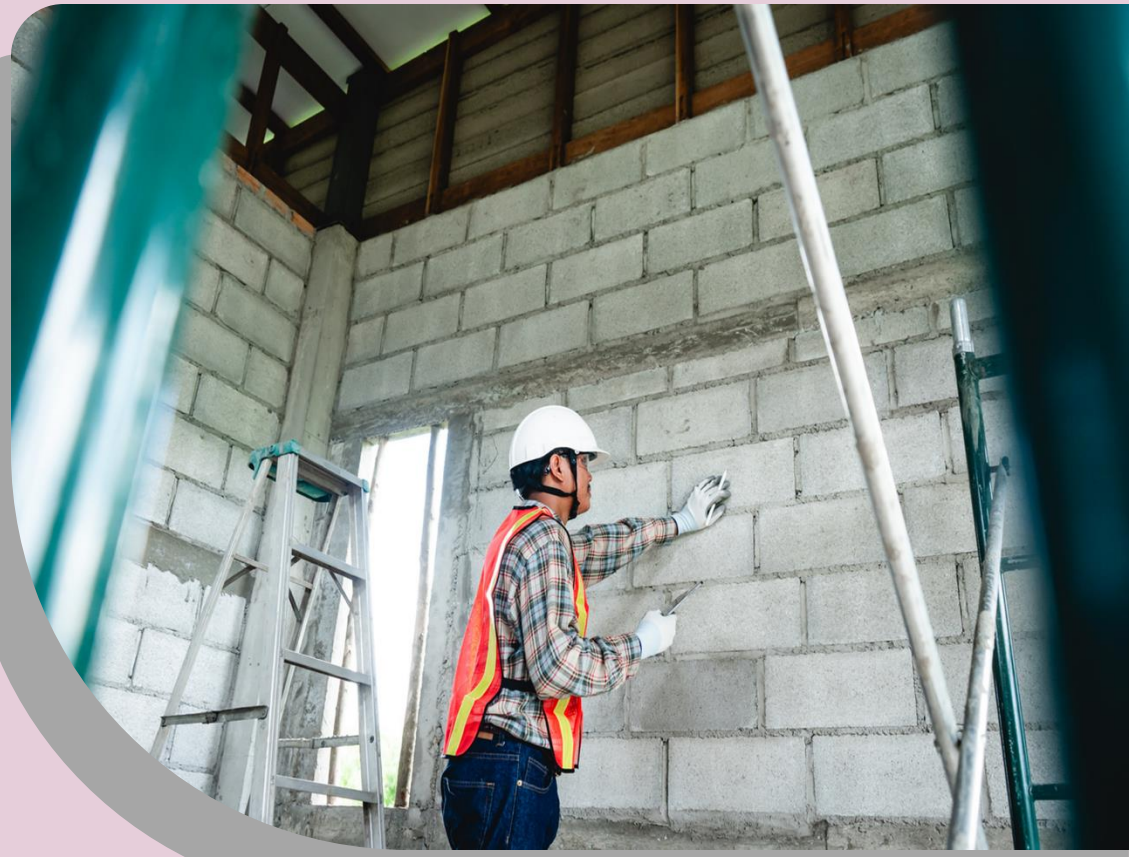
Facility Management Quality Fundamentals

Chapter 7

Quality Measures for the Facility Organization

Chapter 8

Quality Assessment of Facility Management Services



Chapter 1

Setting the Strategic Direction

Contents:

1-What is a Q M S ?

2-FM Model.

3-Life Cycle Model

Contents:

4-Developing an FM Strategic Plan

5-SP Overview Model for Facility

6-Aligning FM with the Demand

1-What is a Quality Management System

Quality Management System

Performance Management

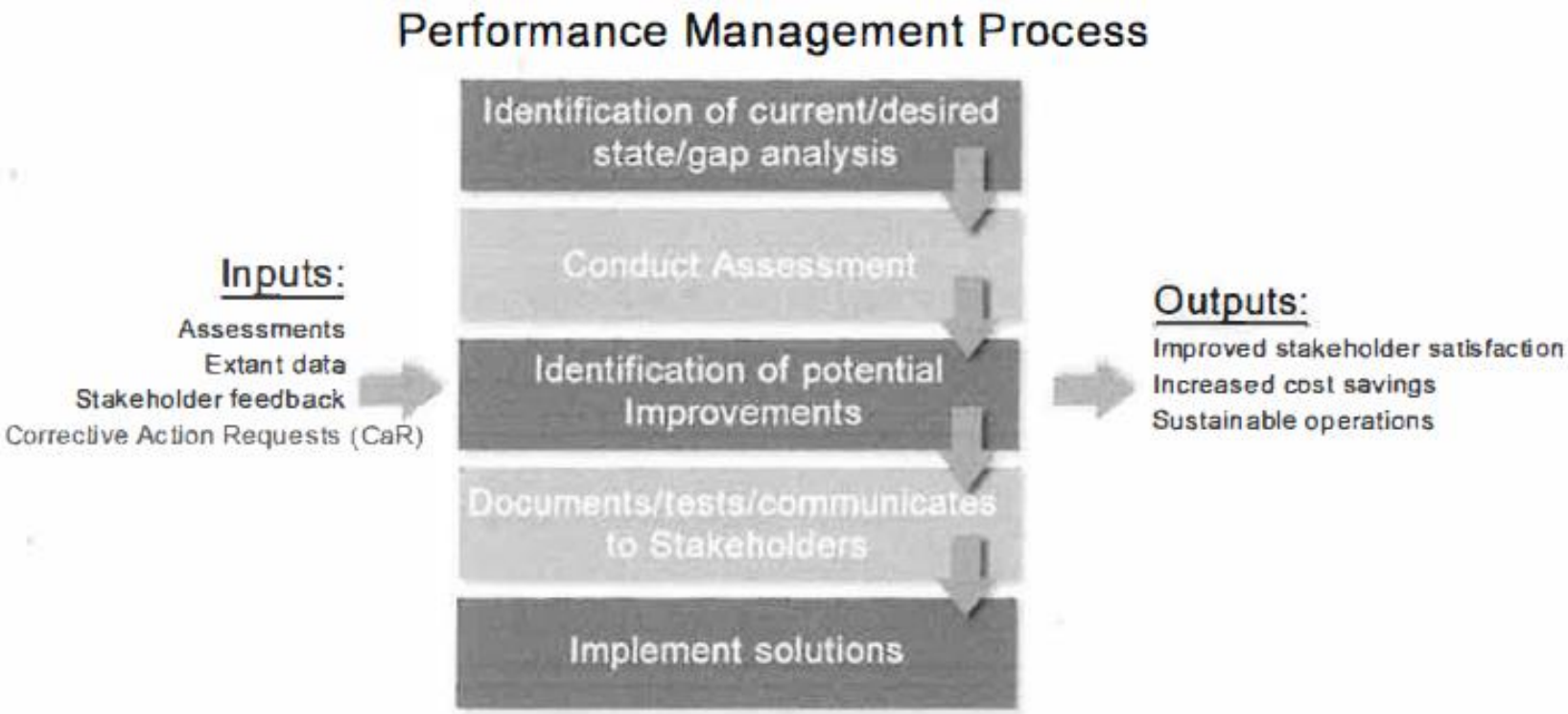


Figure 3 Performance Management Process

Performance Management

1-Documenting the Current State

2-Identifying Improvements

3-Assessments and Metrics

4-Resource Optimization

Performance Management

5-Sustainability

6-Testing and Communication

7-Solution Implementation

2-FM Model.

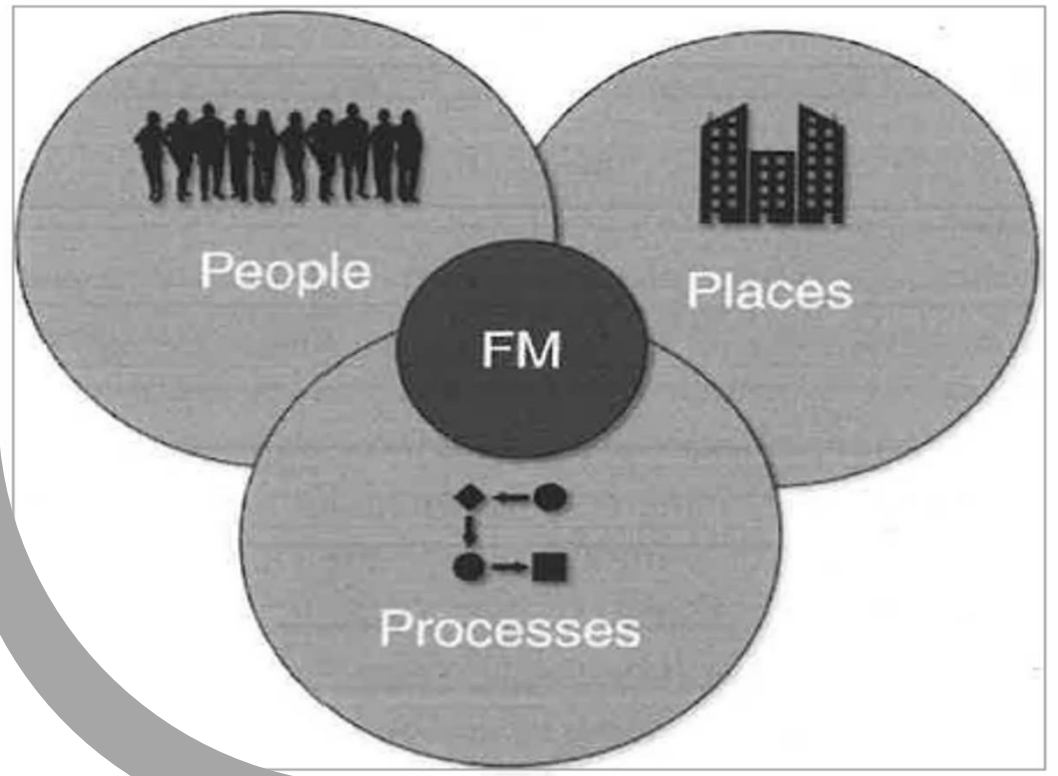
2-FM Model

1-People

2-Places

3-Processes

4-Technology



3-Life Cycle Model

3-Life Cycle Model

1- Input

2- Processes

3- Output

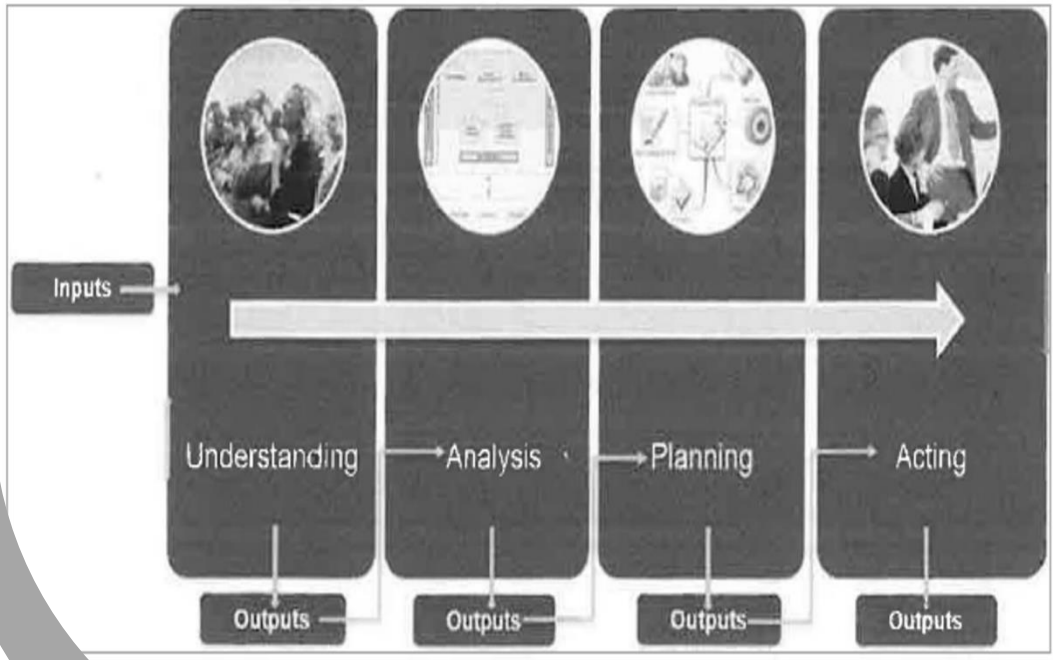


Figure 5 The Life Cycle Model

4-Developing an FM Strategic Plan

Strategic Life Cycle model

1-Understanding

2-Analysis

3-Planning

4- Action

A Starting Point

1-Understanding Phase

2-Analysis Phase

3-Performance Management

4- Tactical Outputs (facility's strategic plan)

5-The Strategic Planning Overview Model for FM

The Strategic Planning Model:

1-Strategic Alignment

2-Understanding

Organizational Success

3-Performance Management

5-The Strategic Planning Overview Model for FM

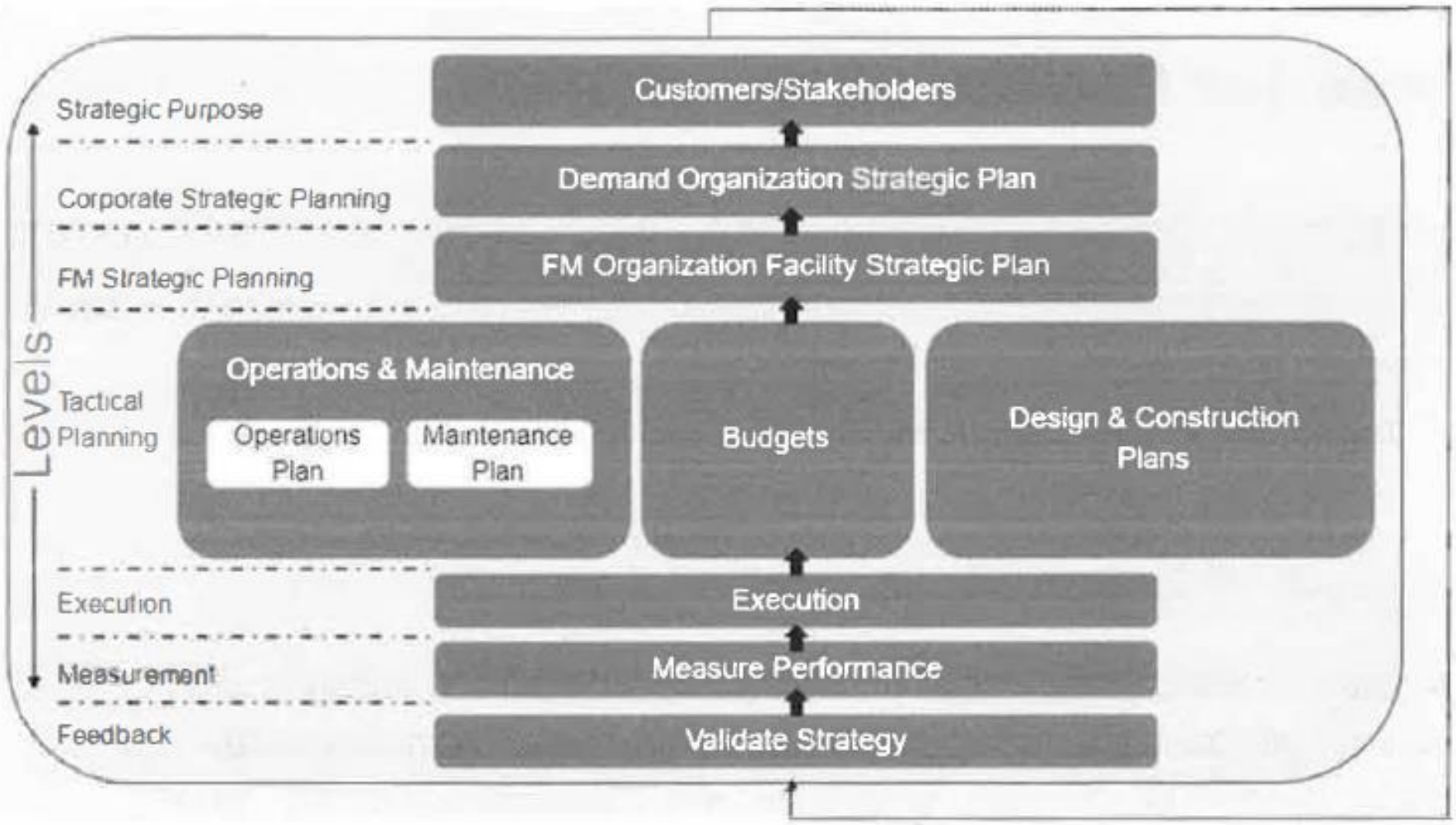


Figure 6 Strategic Planning Model

6-Aligning FM with the Demand Organization's Mission

6-Aligning FM with the Demand Organization's Mission

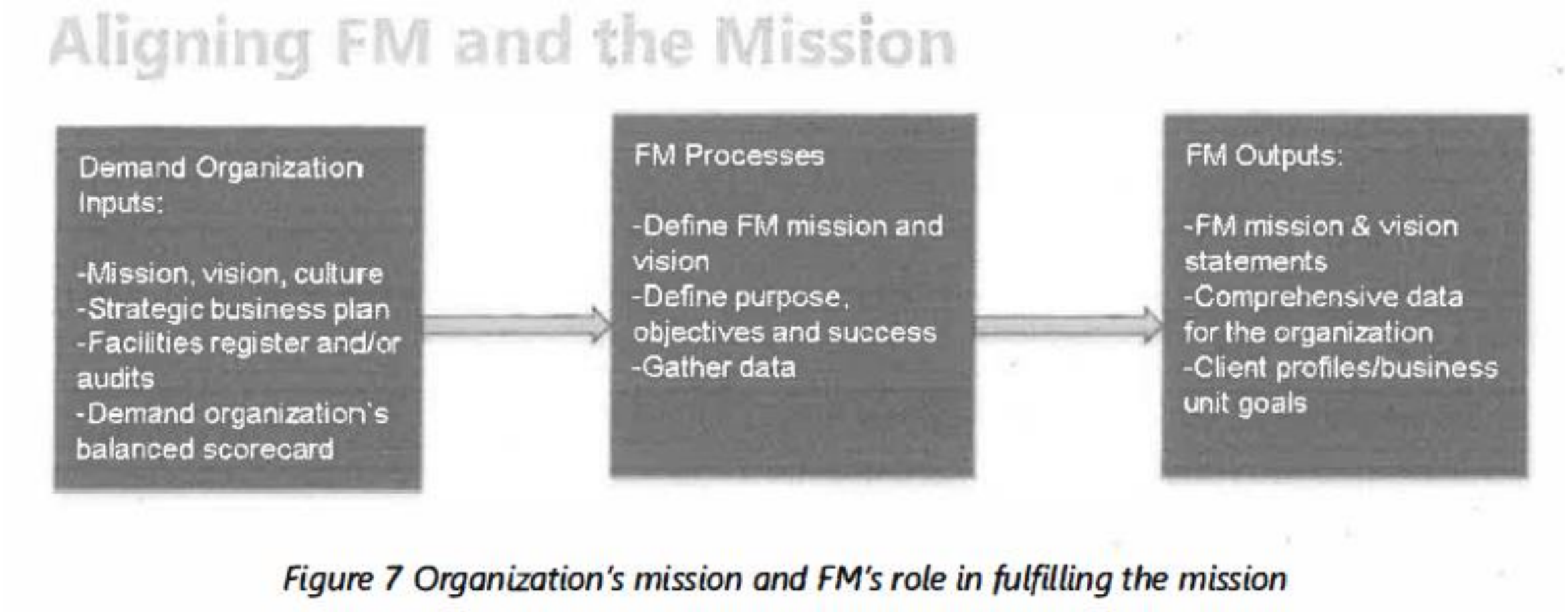


Figure 7 Organization's mission and FM's role in fulfilling the mission

Performance Management Considerations

Success drivers and translate to KPI

Understanding stakeholder needs

Chapter 2

Identifying Performance Improvement Opportunities

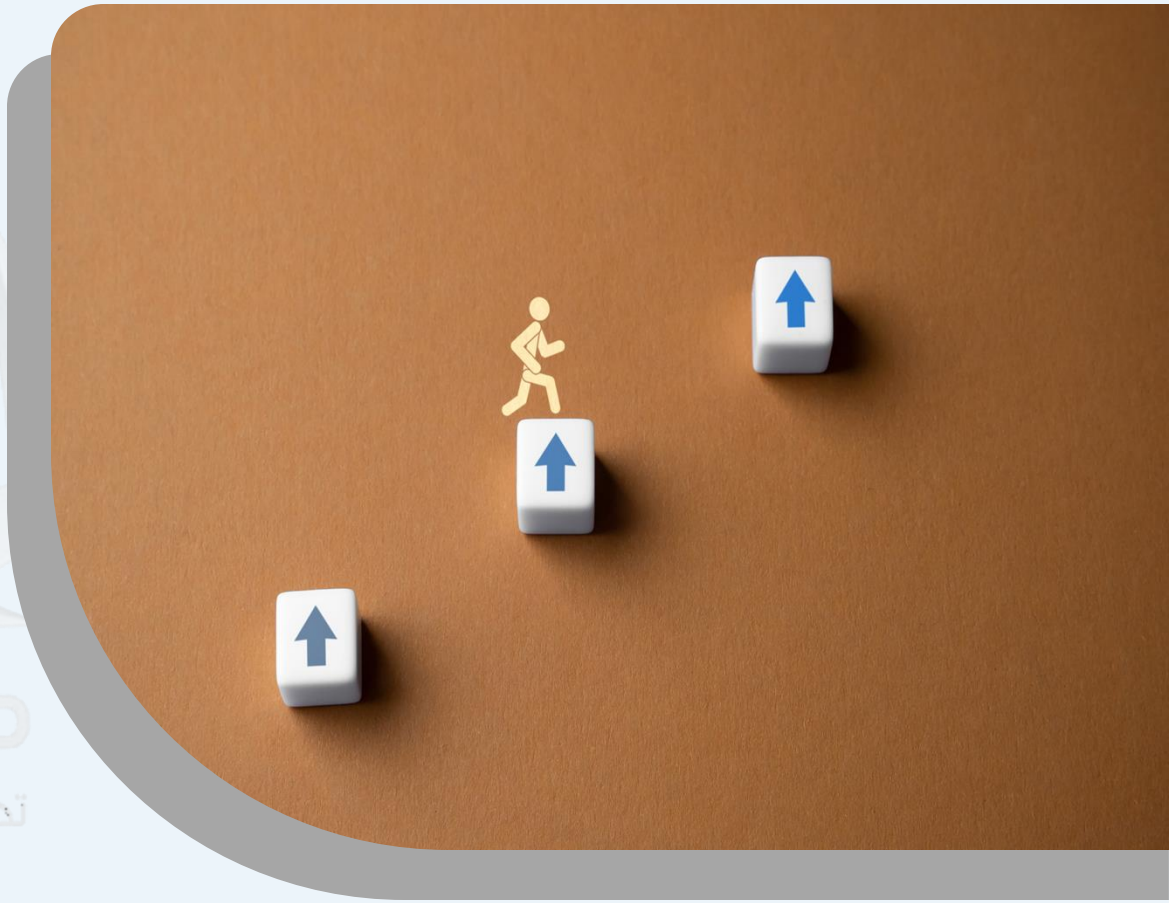
Contents

1- 3 Levels of Performance

2- The Assessment Model

3- Mapping a Process

1- Three Levels of Performance



1- Three Levels of Performance

1-Organizational Level

2-Process Level (Focus)

3-Performer (Job) Level

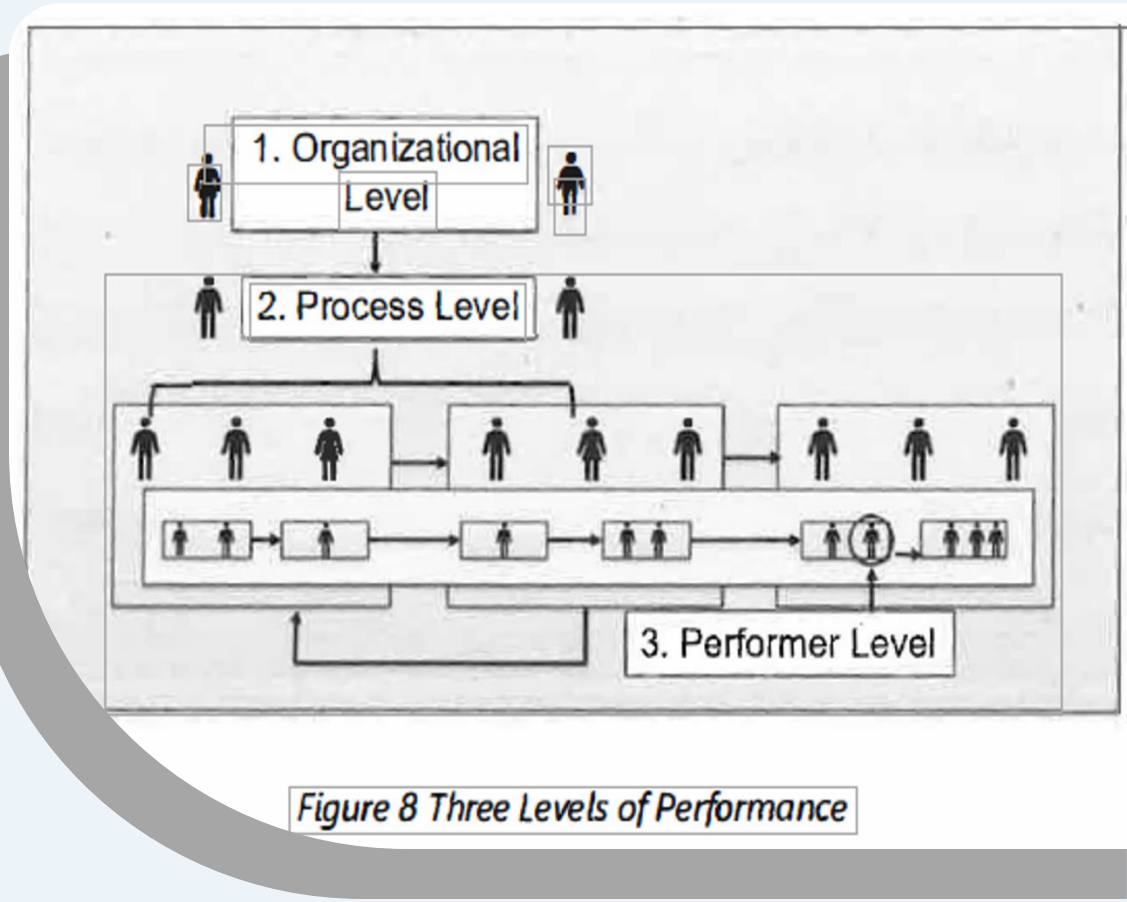


Figure 8 Three Levels of Performance

2- The Assessment Model

2- The Assessment Model

1-Define the Current State

2-Desired State

3-Gap analysis

2- The Assessment Model

4-Solutions

5-improvement opportunity

6-Using Corrective action

1-Define the Current State

Where are we right now?

Are the right processes in place?

What are the root causes ?

2-Desired State

Benchmarking

Right metrics

What values or targets ?

3-Gap analysis

Difference Between :

Current state

vs

Desired state

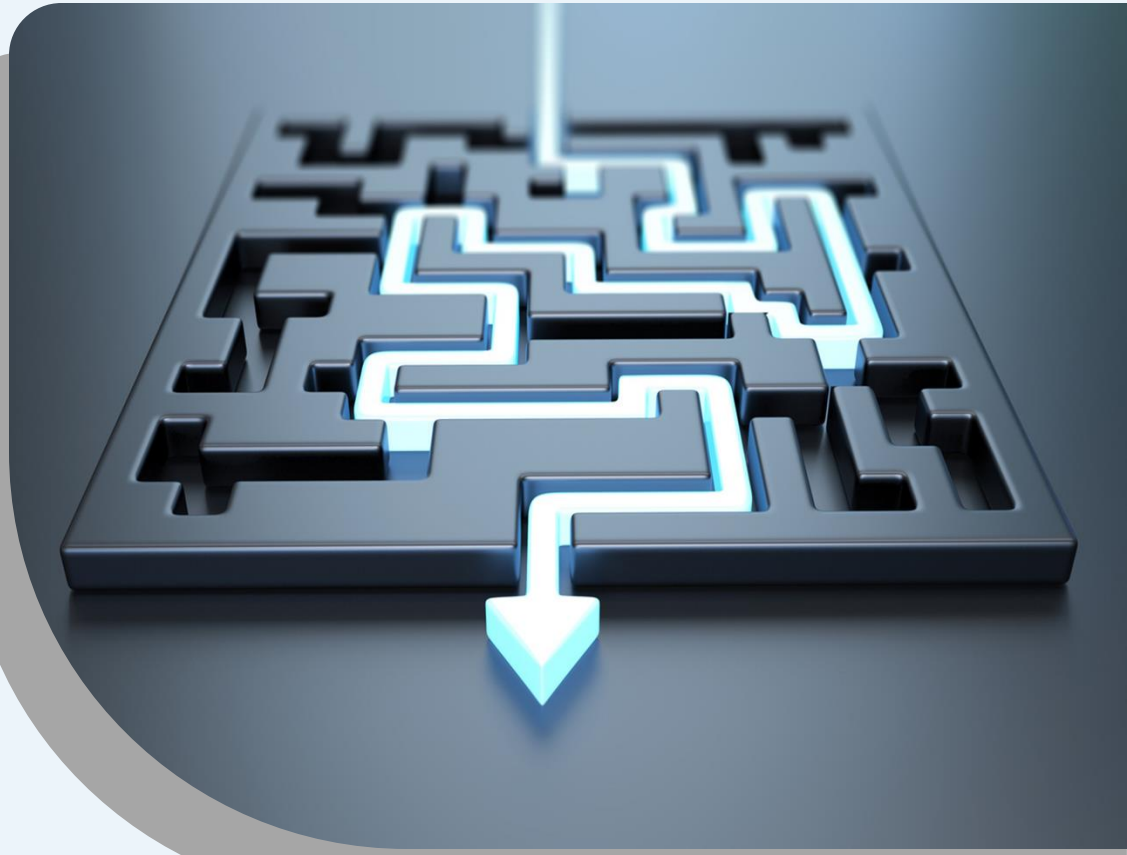
4-Solutions

How do we close the gaps?

What actions are required?

How actions implemented?

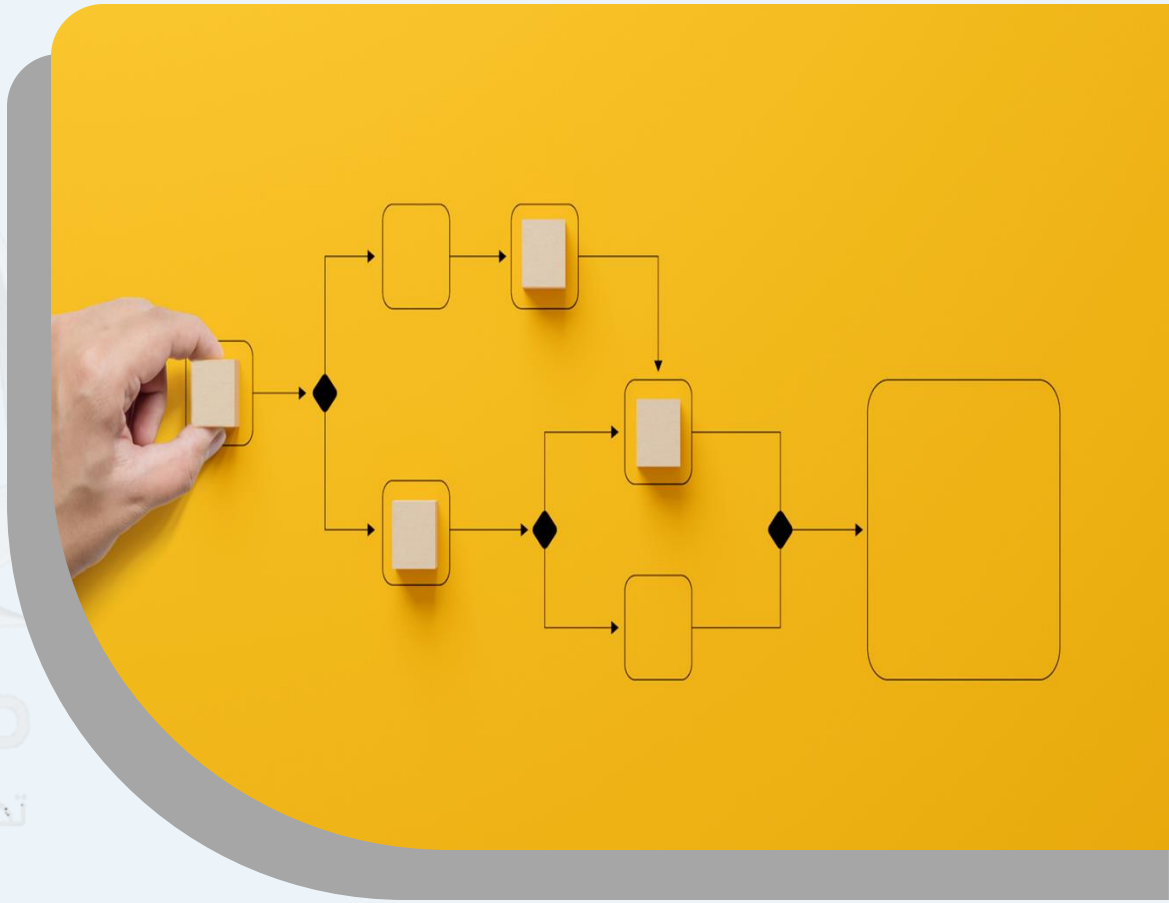
5-Identifying an improvement opportunity



6-Using Corrective/Preventative action reports

Quality Auditor

3- Mapping a Process



Benefit

1-Enhanced Understanding

2-Cross-Functional Integration

3-Identifying Issues

4-Brainstorming and Evaluation

Type of Process Mapping

1-"As-Is" Process Map

2-"Should-Be" or "To-Be" Process Map

3-Ideal Process Map

4-Cross-Functional Process Map

Places to measure

1-M1: Performer Level Metric

2-M2: Inter-Process Metric

3-M3: Output Metric

Places to measure

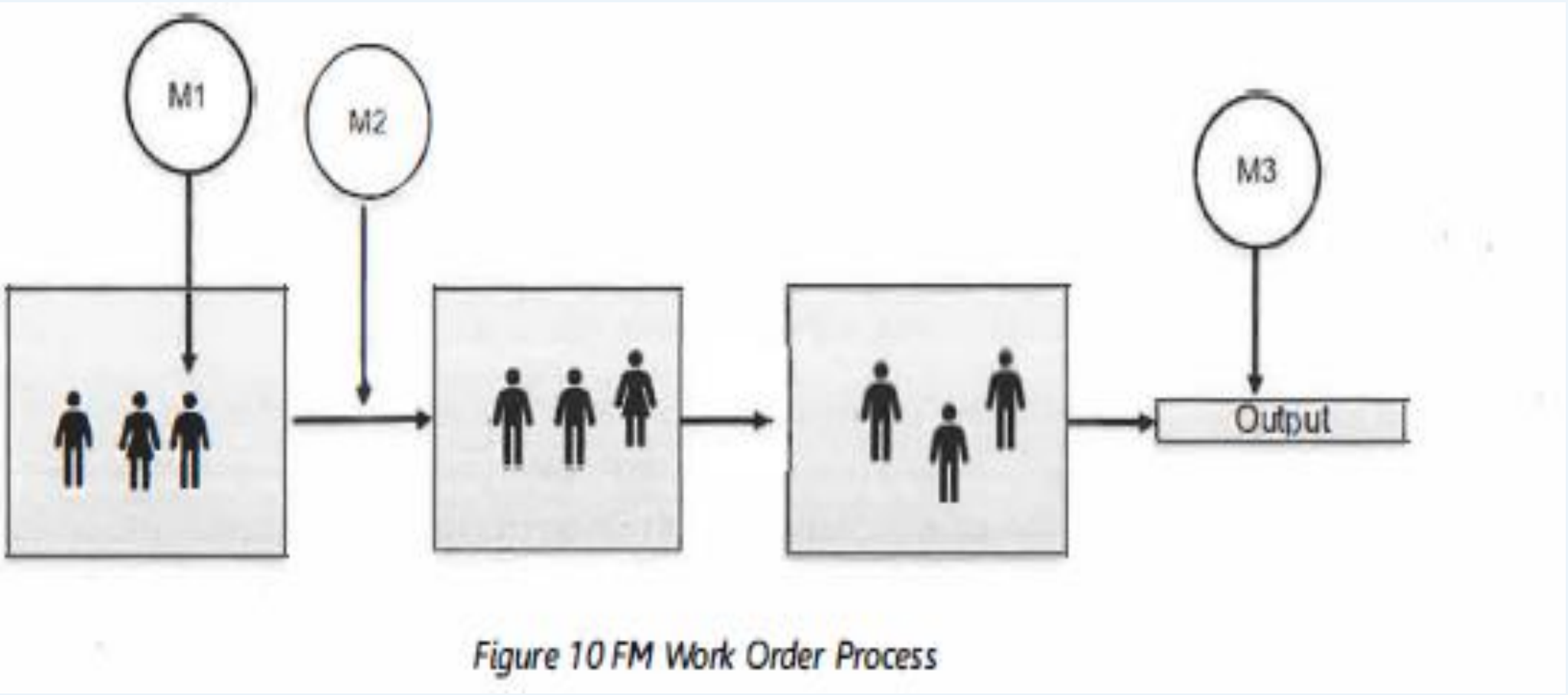


Figure 10 FM Work Order Process

Chapter 3

Metrics

Contents

Contents

1-Making Better Decisions with Data

Goal of performance Management

Improve decision-making to

maximize operational performance

To Support FM

1-Identify Critical Services

2-Define Performance Outcomes

3-Select Performance Metrics

ISO 41001

To Support FM

4-Aggregate Performance Data

5-Measure and Evaluate

Performance

1-Making Better Decisions with Data

VS

Why Merics Matter?

Show FM Value

Support Decision-Making

Enhance User Satisfaction

Why Merics Matter?

Show FM Value

Support Decision-Making

Enhance User Satisfaction

Types of Metrics

1-People Metrics

2-Customer Metrics

Balanced Scorecard (BCS)

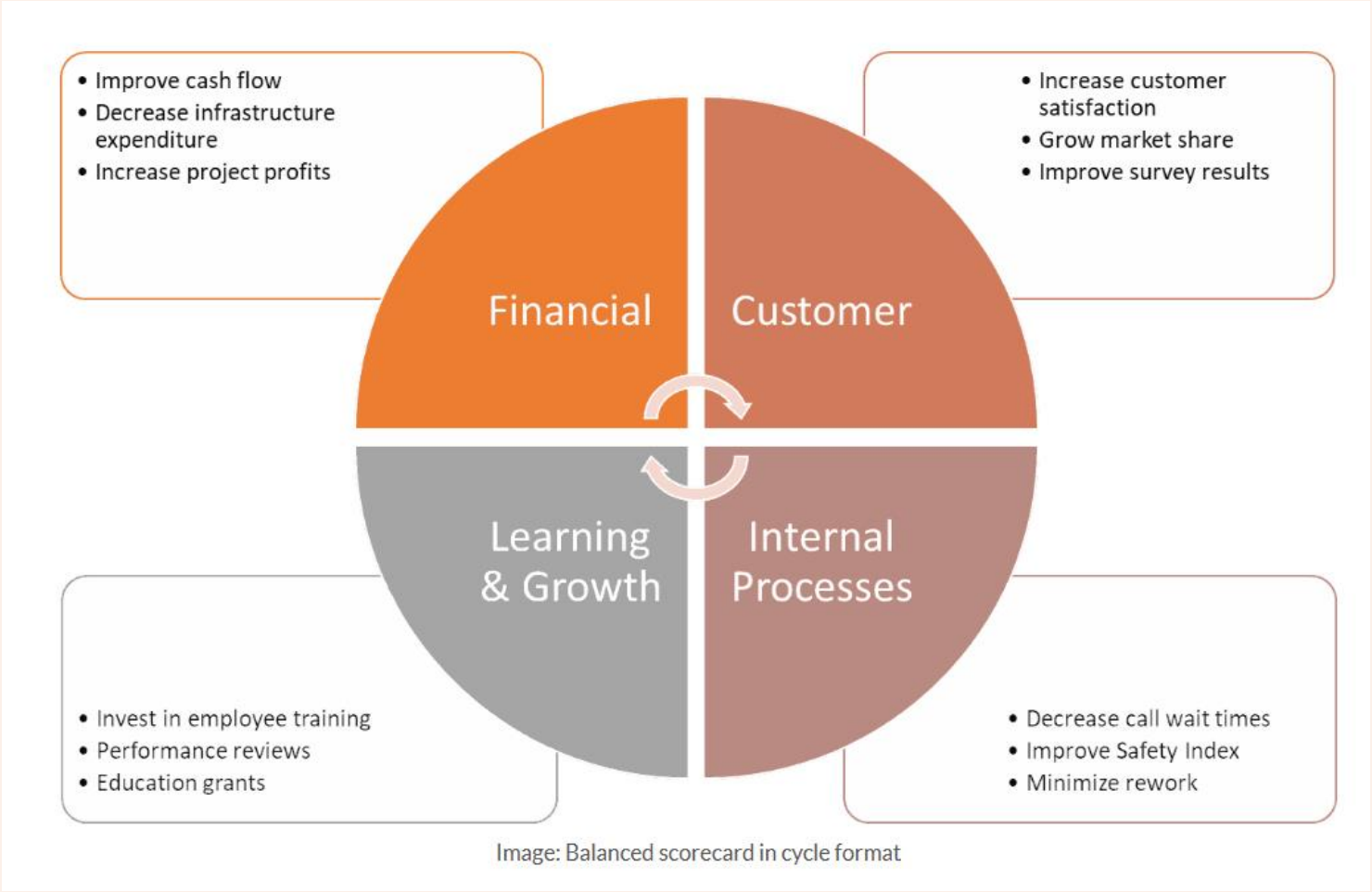


Image: Balanced scorecard in cycle format

Additional Models

1-Ideal Operating State (IOS)

Additional Models

2-Outcome-Based Performance

Management

Additional Models

3-ISO 41001:2018

Plan-Do-Check-Act

(PDCA) Cycle

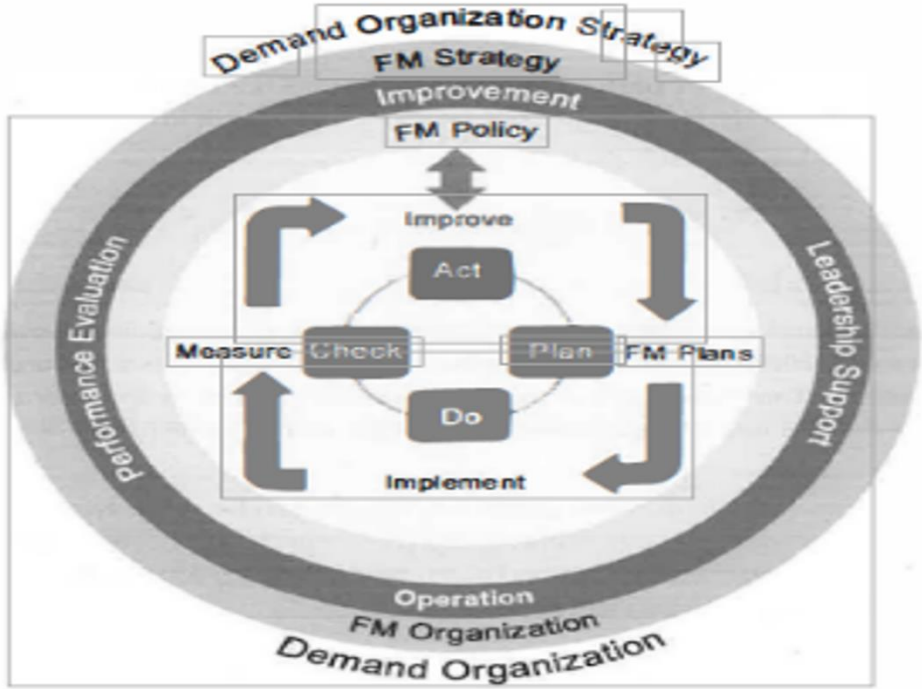


Figure 14 PDCA Cycle

2-Establishing Metrics and Measuring What is important

2-Establishing Metrics and Measuring What is important

1-Facility Portfolio

2-Developing and Using Metrics

3-Linking to Business Goals

4-Access to reliable data

3-The Role of the Performance Management System

Identifying quality data

The right data at the right time

Challenges

1-Quality & Complexity of Data

2-Available Resources

3-Data Variances

4-Multiple Data Sources

Barriers

1-Competition for Funding

2-Competing Priorities

3-Perception of FM as Overhead

4-Relationship of Metrics to FM Characteristics.

4-Relationship of Metrics to FM Characteristics.

1-Physical Characteristics

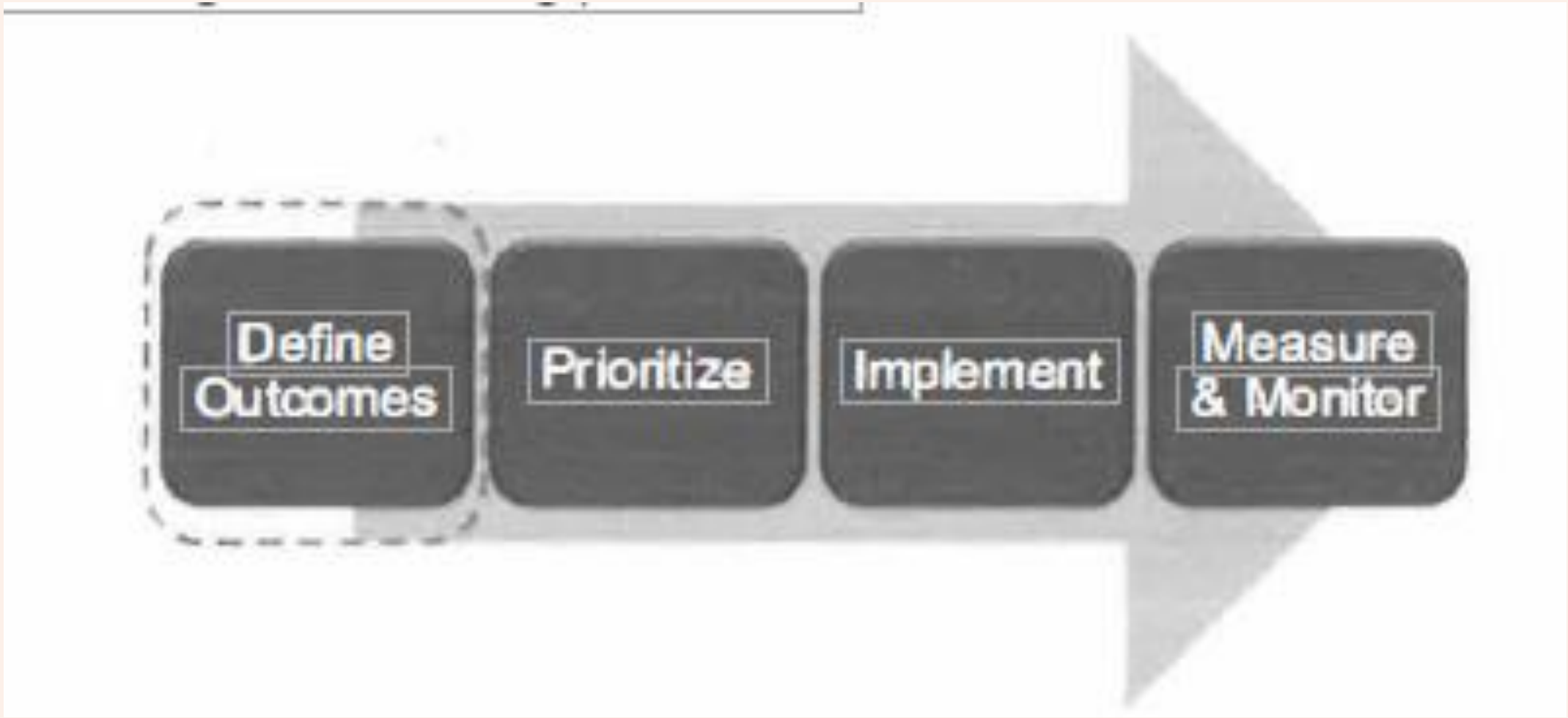
2-Financial Characteristics

3-Functional Characteristics

4-Survey based data

5-Steps to Establish Metrics and Measure Performance

5-Steps to Establish Metrics and Measure Performance



5-Steps to Establish Metrics and Measure Performance

1-Defining Desired Outcomes

2-Prioritization

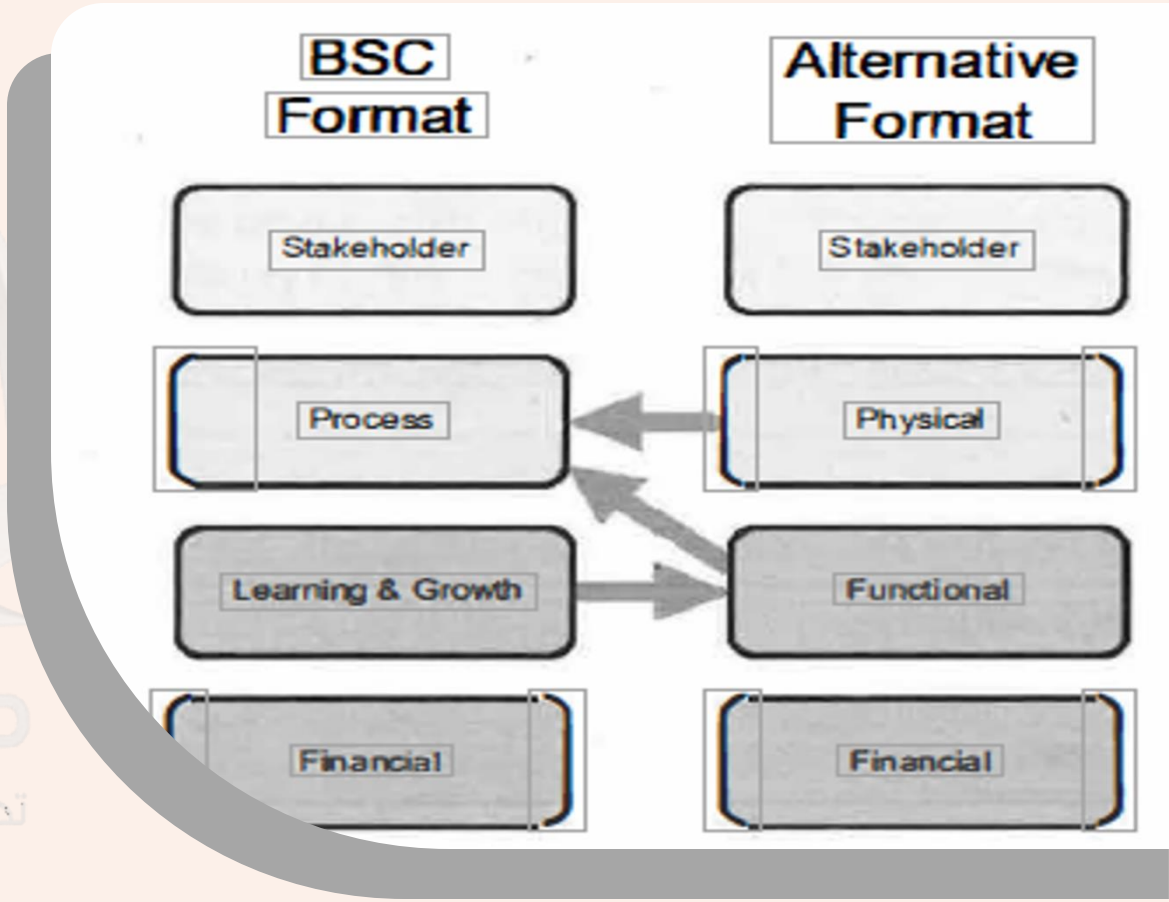
3- Implementation

4-Monitor and Measure

6-How to Choose the Right Metrics to Monitor, and How to Focus On Trend

Choosing the Right Metrics

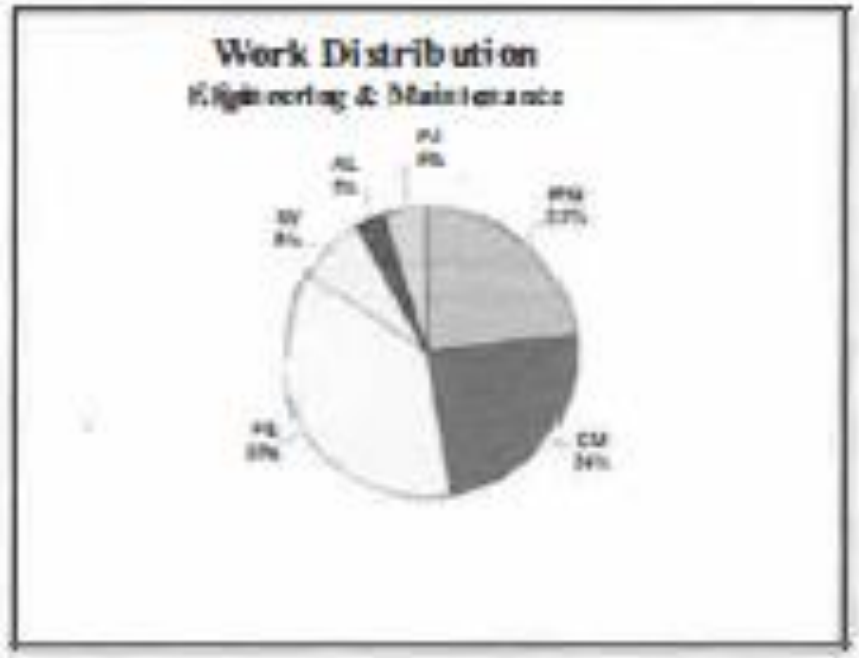
Performance Reporting



6-How to Choose the Right Metrics to Monitor, and How to Focus On Trend

Functional Metrics Example

ZONE A	Inventory			Preventive Maintenance					
Equipment Type	Qty	Annual LH	Total LH	PM Frequency					PM ID
				W	M	Q	SA	A	
8.0 MECHANICAL SYSTEMS									
8.1 Heating Systems									
Unit Heater - Gas-Fired	26	1,240	32.26				✓	✓	UHX-1
Unit Heater - Electric	14	1,240	17.36				✓	✓	UHE-1
Expansion Tank	27	8,448	12.96					✓	EXP-1
Air Separator/Tank	31	8,448	13.82					✓	ASP-1
Boiler	3	12,528	25.09		✓	✓	✓	✓	BLR-1
Boiler Feed Pump (In-Line)	2	1,760	2.520				✓	✓	PMP-1
Heat Pump	16	3,536	57.37			✓	✓	✓	HPM-1
MAU (Make-Up Unit)	4	2,640	8.24			✓	✓	✓	MAU-1
VAV Boxes w/ Water Re-Heat	276	1,252	334.51			✓	✓	✓	VAV-2



6-How to Choose the Right Metrics to Monitor, and How to Focus On Trend

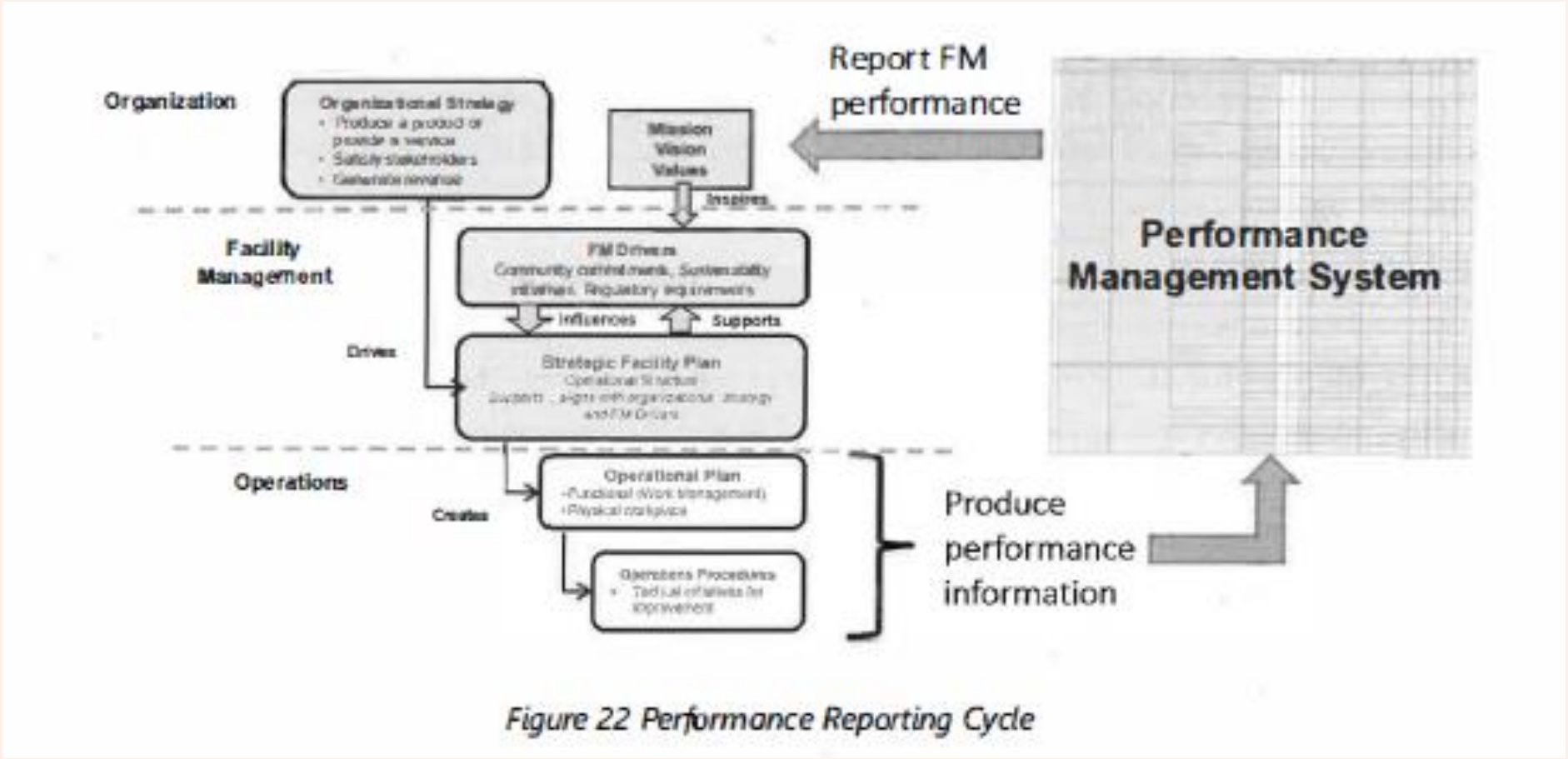


Figure 22 Performance Reporting Cycle

Performance Reporting Cycle

Chapter 4

Measuring and Monitoring

Contents

1-what needs to be monitored

2-Where to look for data

1-Determining what needs to be monitored and measured

1-Determining what needs to be monitored and measured

Total Cost of Ownership (TCO)

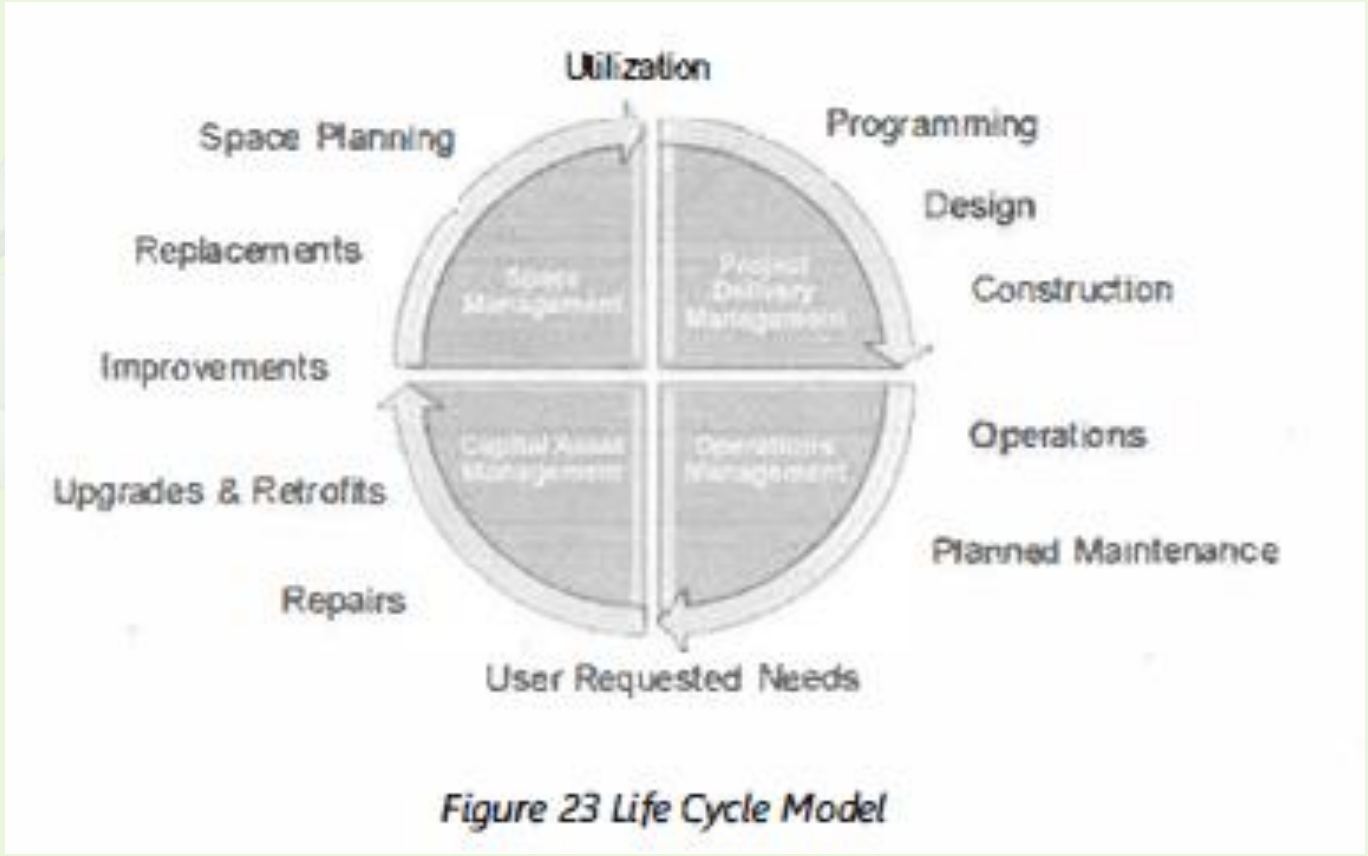


Figure 23 Life Cycle Model

1-Determining what needs to be monitored and measured

Service Criticality

Strategic Importance

Cost Relevance

Impact on Decision-Making

Aggregate Data Collection

Risks and opportunities

Frequency of service

Time needed for data acquisition

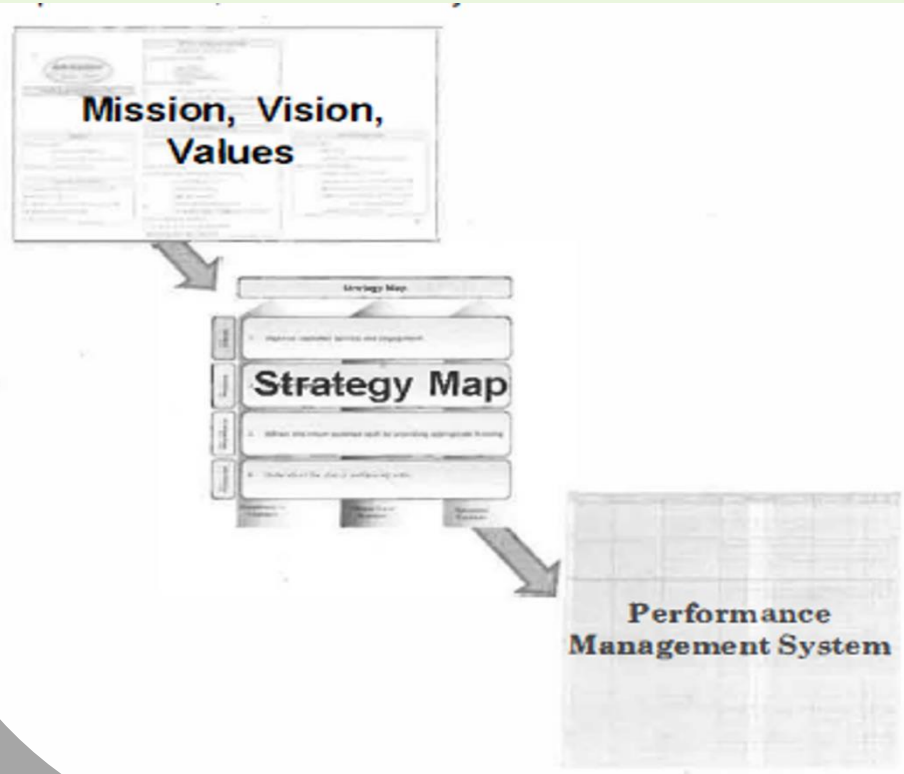


Figure 24 Aggregate Data

2-Where to look for Data

2-Where to look for data

Multiple Systems

CAFM

CMMS

IWMS

BIM

2-Where to look for data

Service Providers

Tactical Level

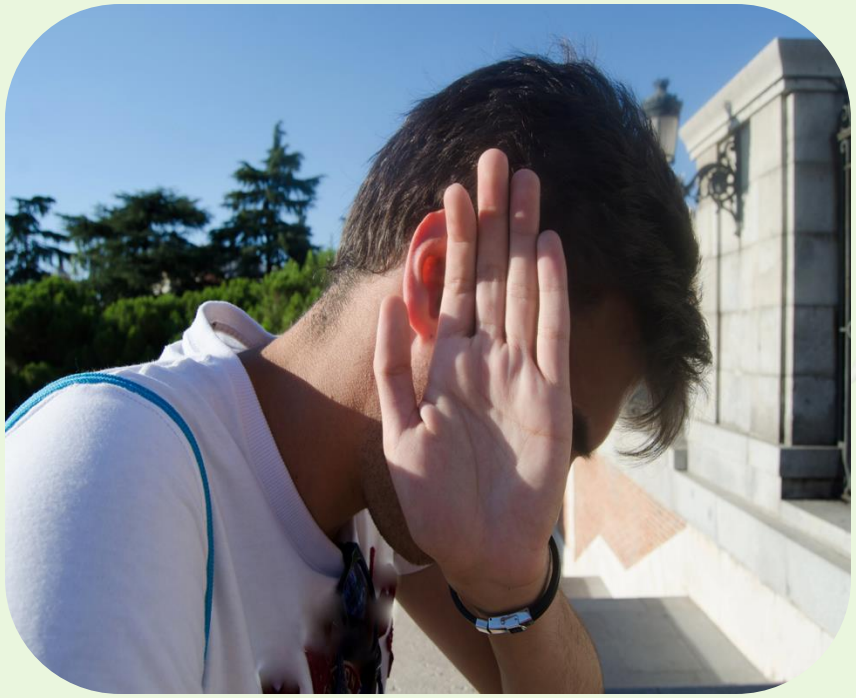
Operational Level

Return on Investment (ROI)

Quantifiable Costs

Intangible Costs

2-Where to look for data



VS

Cost Avoidance

Cost Savings

Chapter 5

Performance Reporting

Content

Tracking Performance

Tracking Performance

Balanced Scorecard and Strategic Objective	Measurement	Target	Information Provided	CMMS	Priority	Type Metrix	KPI Level
1-Customer Perspective							
						outcome	1 , 2, 3
						Process	
2-Process Perspective							
3-Finance Perspective							
4-Learining and Growth							

Tracking Performance

Balanced Scorecard and Strategic Objective
1-Customer Perspective
1-Establish a proactive customer service Programe
2- Develop partnerships with customer for Mutual Success
3- Implement effective customer service feedback
2-Process Perspective
3-Finance Perspective
4-Learining and Growth

Tracking Performance

Measurement
1-Emergenct Response time
2- On-site Supervisor Time
3-Customer Satisfaction

Tracking Performance

Target		
G	Y	R
Less than 15min	15-30 min	More then 15min
More than 65%	40-60%	Less than 40%
More then 95%	90-95%	Less than 90%

Tracking Performance

Information Provided
Measure of Time to respond to emergencies
Measure of Supervisor interation with cust.
Survey Result of Completed CM WOs

Tracking Performance

Input / Data Required
WO Generation Time and Time To Site
Time Sheet for field Supervsion time
Customer Satisfaction Survey Data

Tracking Performance

CMMS	Priority	Type Metrix	KPI Level
	3	Outcome	2
	1	Process	2,3
	2	Outcome	2
	1	Outcome	3
	3	Process	2

Tracking Performance

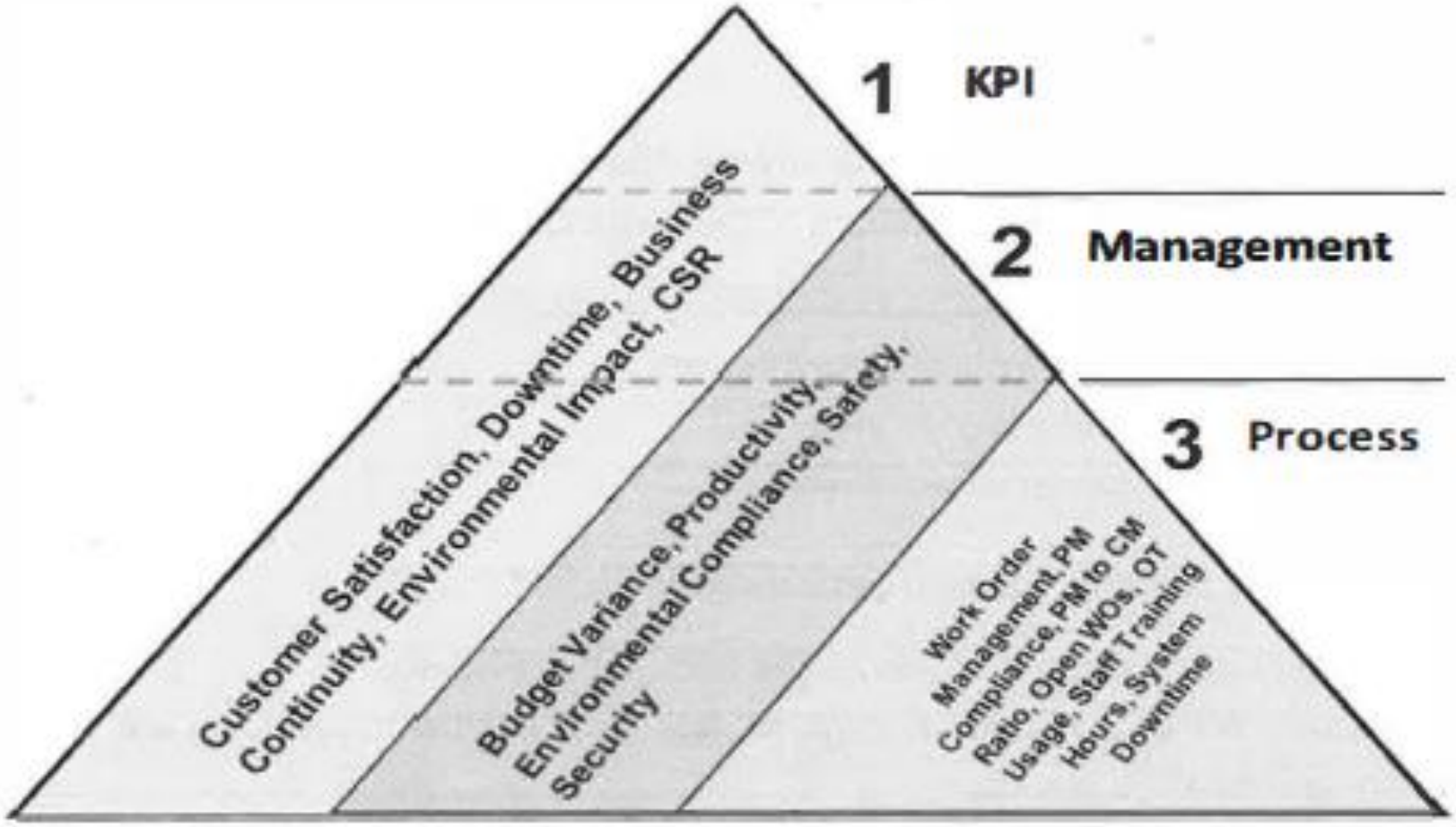


Figure 33 KPIs and Performance Measures

Chapter 6

Facility Management Quality Fundamentals

Contents

Contents

1-The Evolution of Quality

Ancient Developments

1450 BC (Ancient Egypt)

1046 BC – 256 BC (China)

5th – 15th Century (Middle Ages, Europe)

Industrial Revolution(1760–1920)

1785: Honore Blanc

1910: Frederick Taylor

1920: Walter Shewhart

Quality Standardization (1981 – 2018)

Motorola introduced Six Sigma

Quality Stander (ISO 9000)

MB National Quality Award

2018: ISO 41001

2-The Goal of Quality Facility Management

2-The Goal of Quality Facility Management

FM enhance quality by

1-High Accuracy

2-Compliance with Standards

3-Customer Satisfaction

2-The Goal of Quality Facility Management

FM is measured through

Internal and external audits

Defining service levels

Evaluating Satisfaction

Benchmarking

2-The Goal of Quality Facility Management

Quality in FM is improved through

Systematic process improvement

Understanding expectations

Innovating service delivery

Applying best practices

3-Systems Thinking

Applying in FM

Interrelated toward a single aim

Changes in one area can affect the entire system

Challenges

Nonlinear Nature

Complex Interdependencies

Benefits

Differentiate

Reduce costs

Close competitive gaps

Enhance customer satisfaction

Chapter 7

Quality Measures for the Facility Organization

Contents

Contents

Contents

Contents

Importance of Metrics in FM

Tracking specific indicators

Improvements in FM quality

Metrics justify decisions

1-The Importance of Metrics

Why Metrics Are Essential?

Assess organizational effectiveness

Guide strategic decisions

accountability and justification

2-Measuring What Matters

Effective FM Metrics

Stakeholder Needs

Relevance to Customers

Align with Strategic Plan

Avoid the Data Trap

Guidelines for FM Metrics

Clear & Objective

Aligned with Business Goals

Relevant & Targeted

Data-Driven

Guidelines for FM Metrics

Efficient & Meaningful

Time-Oriented

Regularly Reviewed

Guidelines for FM Metrics

Efficient & Meaningful

Time-Oriented

Relevant & Targeted

Data-Driven

Common FM Quality Metrics

Accuracy

Efficiency

Reliability & Responsiveness

Satisfaction

Timeliness

3-Standards

Standards in FM

1-Conformance Standards

2-Consensus Standards

Key Standards in FM

1-ANSI

2-ASHRAE

3-ASTM

4-BSI

Key Standards in FM

5-CEN

6-Data Exchange Standards

7-IFMA/BOMA Standards

8-ISO 9000 / ISO 9001:2008

4-Distinctions between

Standards,

Codes,

Practices,

Best Practices and Protocols

4-Distinctions between Standards, Codes, Practices, Best Practices and Protocols

VS

Standards

Codes

4-Distinctions between Standards, Codes, Practices, Best Practices and Protocols

Practices

Best Practices

Protocol

4-Distinctions between Standards, Codes, Practices, Best Practices and Protocols

Standards & Codes

→ Regulatory Compliance

Practices & Best Practices

→ Operational Excellence

Protocols → Process Consistency

5-Quality Data and Facility Performance

5-Quality Data and Facility Performance

Key Data Collection & Analysis

Tools

1-Benchmarking

2-Problem Statements

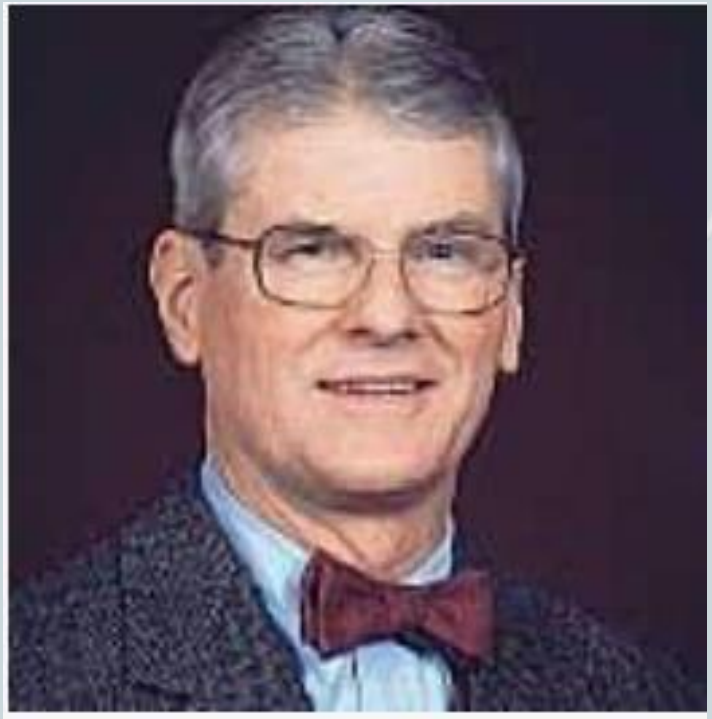
3-Gap Analysis

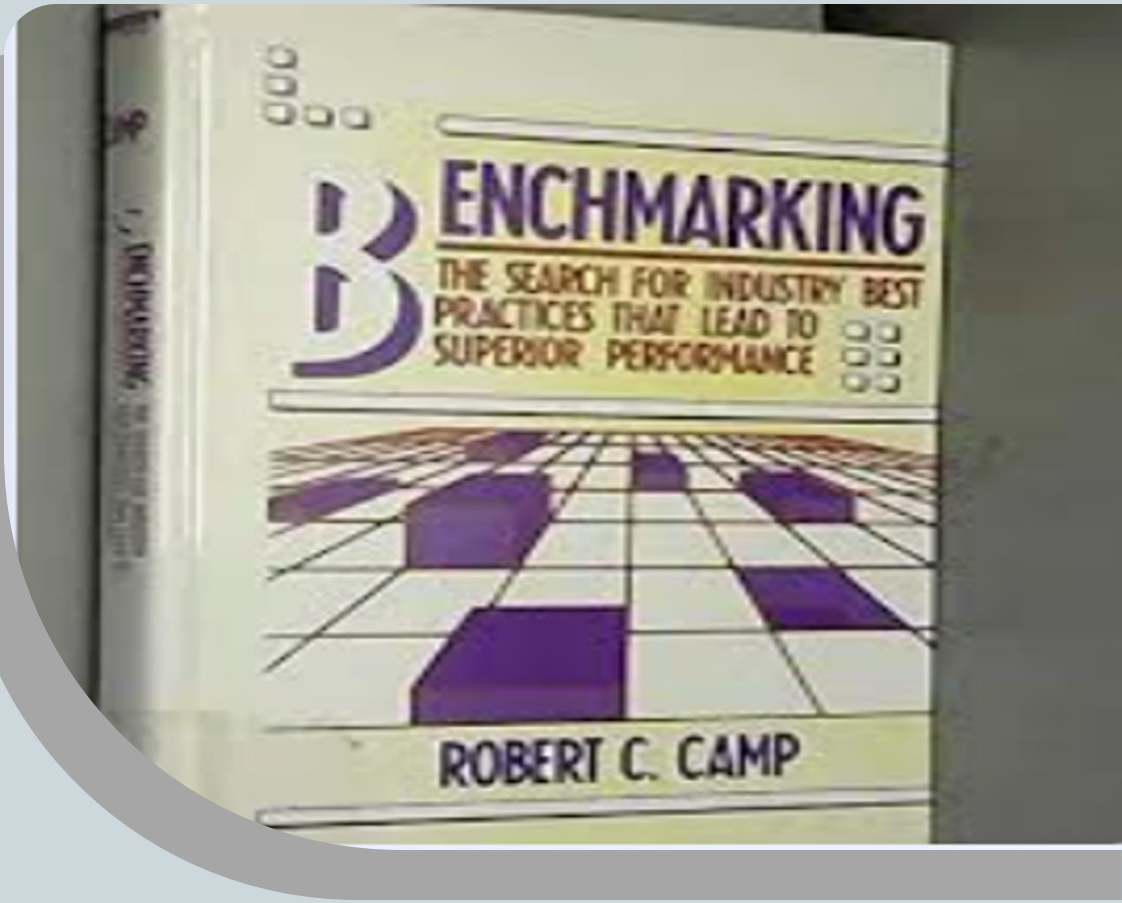
Key Data Collection & Analysis Tools

4-Quality Tools

5-Basic Statistical Analysis

Benchmarking History





Robert C. Camp's

5-Quality Data and Facility Performance

1-Benchmarking

1-Internal

2-External

3-Competitive

4-Generic

5-Quality Data and Facility Performance

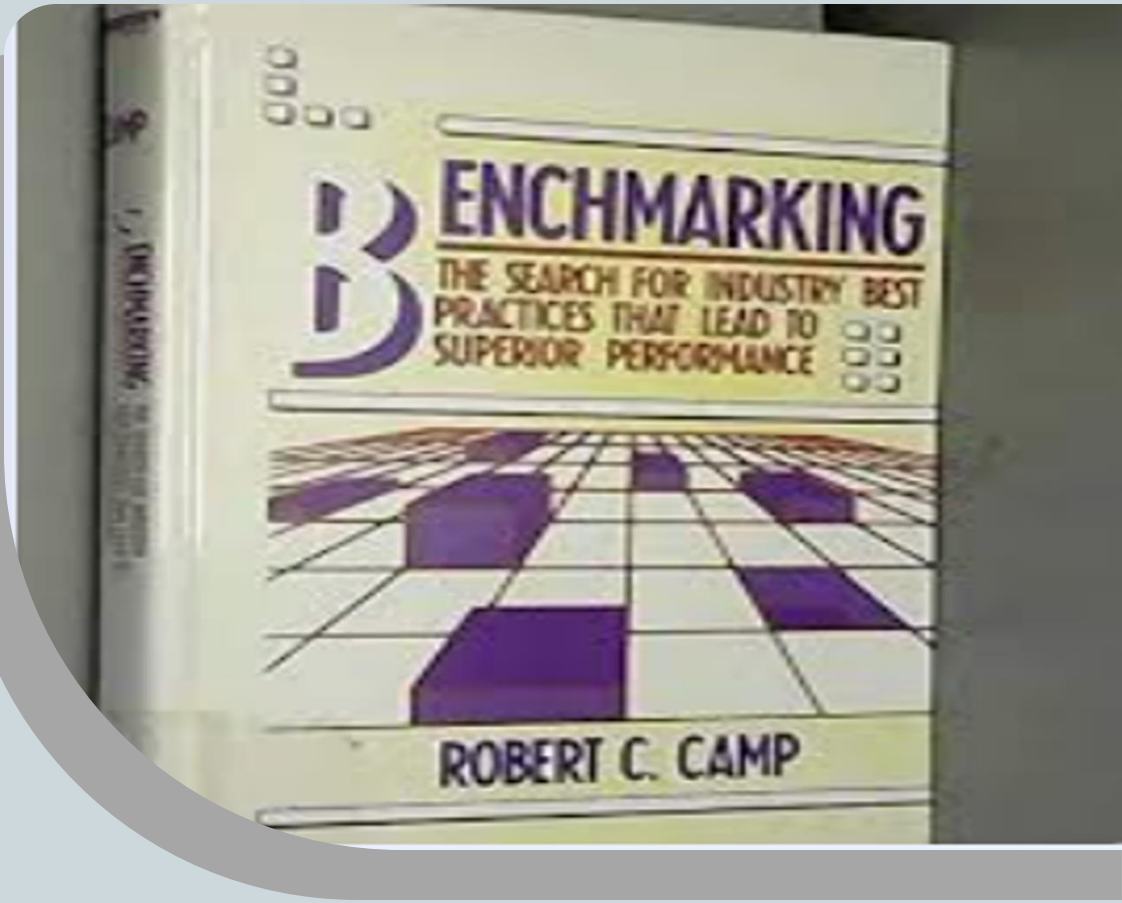
Core Steps

1-Identify processes

2-Identify organizations

3-Collect and analyze data

4-Apply best practices



Key Benchmarking Resources in FM

1-IFMA

2-EN 15221-7 (European Standard)

Purposes of FM Benchmarking (EN 15221-7)

1-Identifying Improvement Opportunities

2-Resource Allocation Decisions

3-Best Practice Identification

4-Budget Review & Planning

2-A good problem statement

1-Creates Common Understanding

2-Facilitates Collaboration

3-Reduces Miscommunication

4-Saves Time and Resources

5-Quality Data and Facility Performance

Cycle time

Finance

Engineering

Purchasing

Facility Management

3-Gap analysis

Difference between current performance and goals

5-Quality Data and Facility Performance

Steps

1-Define the gap

2-Identify root causes

3-Analyze contributing factors

4-Develop improvement strategies

Example

Objective	Current State	Desired State	Gap
Retain building value	FCI= 0.3	FCI= 0.15	0.15 or 50%

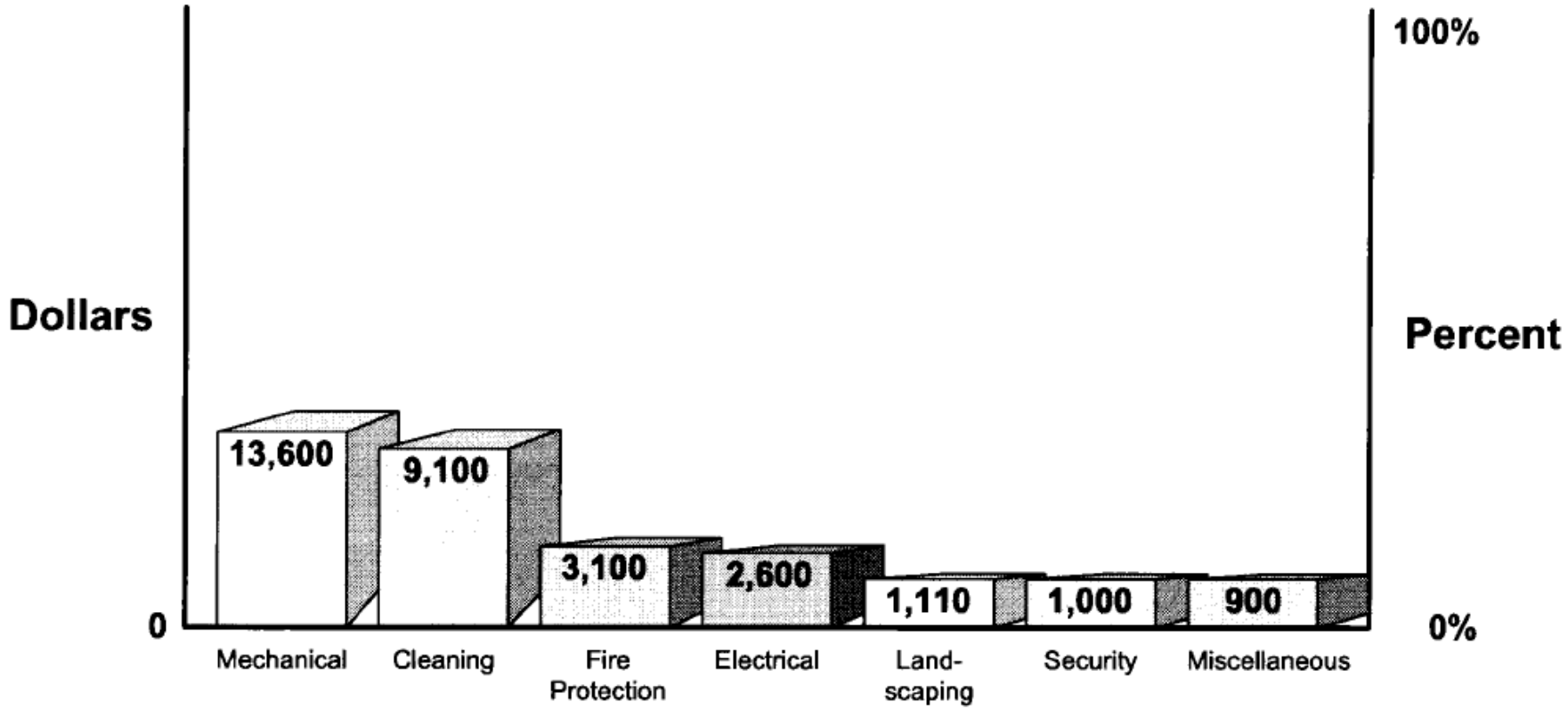
Gap Calculation: 0.3 - 0.15 = 0.15 (50% improvement needed)

6-Quality Control Tools

1-Pareto Chart

6-Quality Control Tools

Exhibit 5-17: Example of a Pareto Chart—Monthly Facility Expenses by Category



2-Check or Tally Sheet

Track production process

Identify defective items

Determine defect causes

Verify process completion

2-Check or Tally Sheet

Priority Classification	Day of the week					
	Mon.	Tues.	Wed.	Thurs.	Fri.	Total
Emergency	x	x	x	xx	xxx	8
Urgent	xx	xxxx	xx	x	xxx	12
Routine	xxxxxx	xxxxxx	xx	xxxxxxx	xxxxxxx	28
Total	9	11	5	10	13	48

Figure 38 Sample Check Sheet

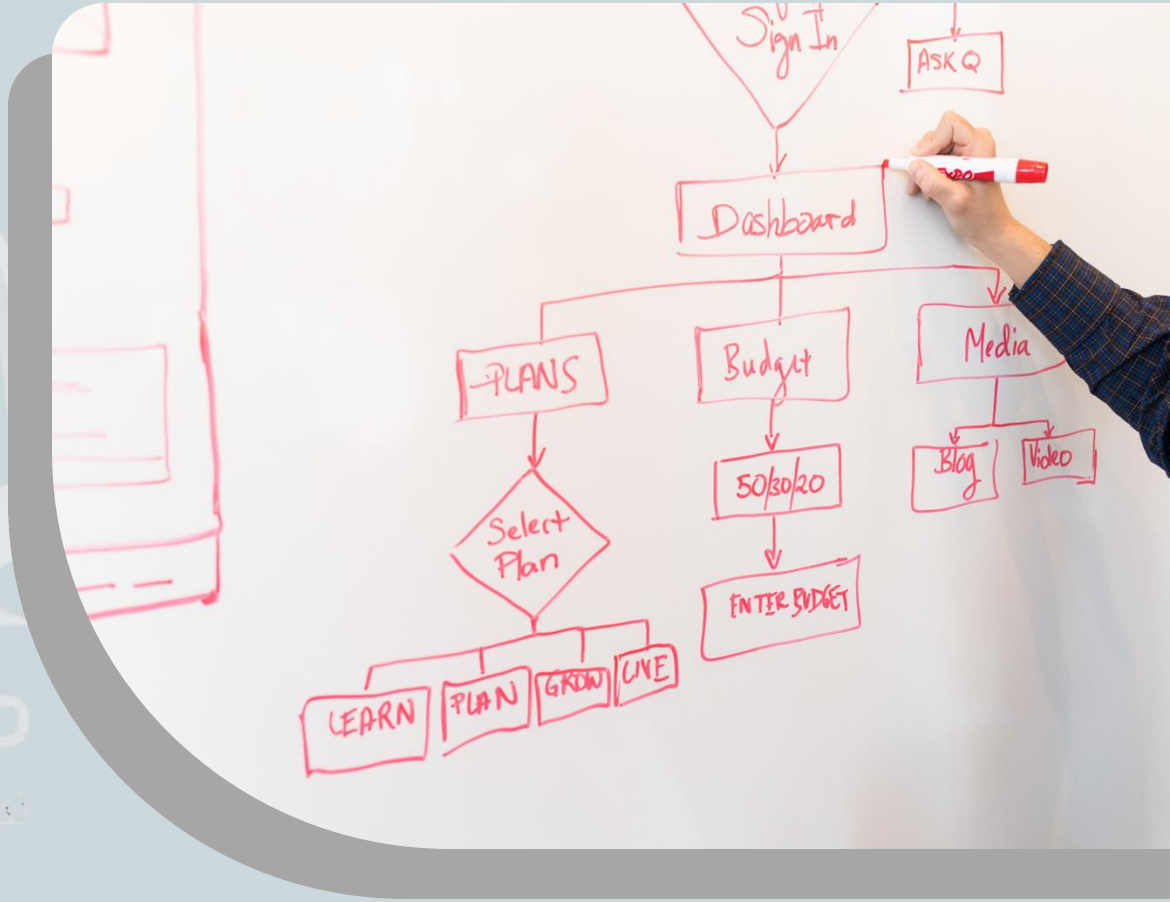
3-Flowcharts

Providing a clear picture

Clarifying roles

Standardizing process

Areas for improvement



6-Quality Control Tools

Steps

1-Define the process

2-Identify key steps

3-List steps in order

Symbol-Name	Description of Use
Rounded corner rectangle used for the beginning and ending of a process.	Shows the first and the last step in the process flowchart. The symbol may be labelled with start, begin, stop or end.
Rectangle is used for a step within the process or an activity in the process.	Shows a single step or activity in a process, including a brief description of the step or activity inside the rectangle.
A diamond is used for a Decision within the process or an activity in the process.	Indicates a point where an outcome of a decision determines what the next step will be. The path taken depends on the answer to the question. There can be multiple outcomes. Often there are just "yes" or "no" paths.
A parrallellogram is used for a data symbol or input/output shape.	Indicates that information is coming into the process from outside or leaving the process. For example, customer database records.
This is a stored data symbol.	Shows a step that results in information being stored.
Document Symbol	Represents any type of hard-copy input or output that results in a document such as a report or a record.
Connectors	These lines connect the steps in the activities and show the direction of the process flow in sequence. The arrowhead represents the direction.
The circle represent a connector Symbol.	A small circle indicates the next or previous step is somewhere else on the drawing. This is useful in large flowcharts were there is a need to break a flow line to continue elsewhere. Reference page numbers may be included for easy location of connectors if the flowchart is on multiple pages.

Figure 39 Standard Flow charting Symbols

6-Quality Control Tools

Steps

4-Use appropriate symbols

5-Connect steps with arrows

6-Validate the flowchart

Symbol-Name	Description of Use
Rounded corner rectangle used for the beginning and ending of a process.	Shows the first and the last step in the process flowchart. The symbol may be labelled with start, begin, stop or end.
Rectangle is used for a step within the process or an activity in the process.	Shows a single step or activity in a process, including a brief description of the step or activity inside the rectangle.
A diamond is used for a Decision within the process or an activity in the process.	Indicates a point where an outcome of a decision determines what the next step will be. The path taken depends on the answer to the question. There can be multiple outcomes. Often there are just "yes" or "no" paths.
A parrallellogram is used for a data symbol or input/output shape.	Indicates that information is coming into the process from outside or leaving the process. For example, customer database records.
This is a stored data symbol.	Shows a step that results in information being stored.
Document Symbol	Represents any type of hard-copy input or output that results in a document such as a report or a record.
Connectors	These lines connect the steps in the activities and show the direction of the process flow in sequence. The arrowhead represents the direction.
The circle represent a connector Symbol.	A small circle indicates the next or previous step is somewhere else on the drawing. This is useful in large flowcharts were there is a need to break a flow line to continue elsewhere. Reference page numbers may be included for easy location of connectors if the flowchart is on multiple pages.

Figure 39 Standard Flow charting Symbols

6-Quality Control Tools

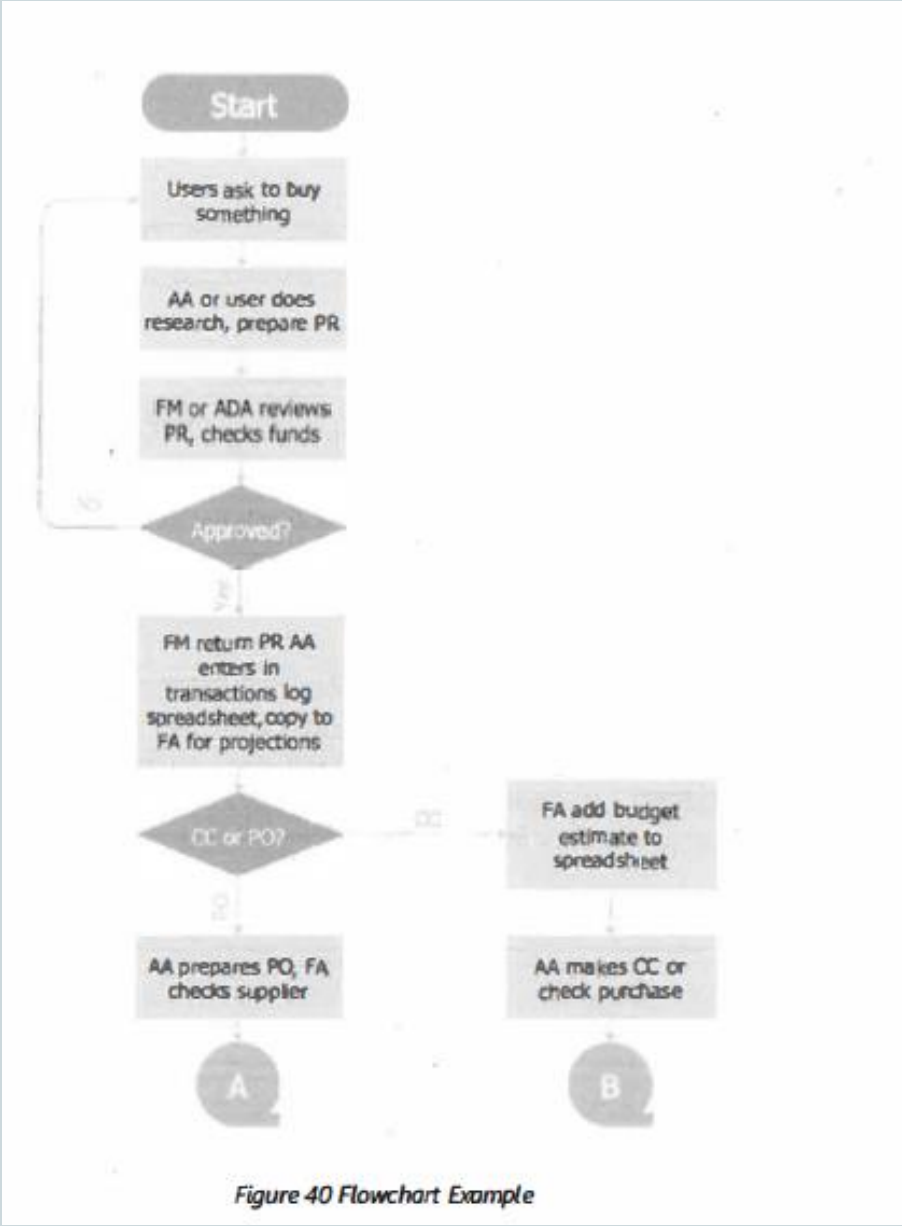


Figure 40 Flowchart Example

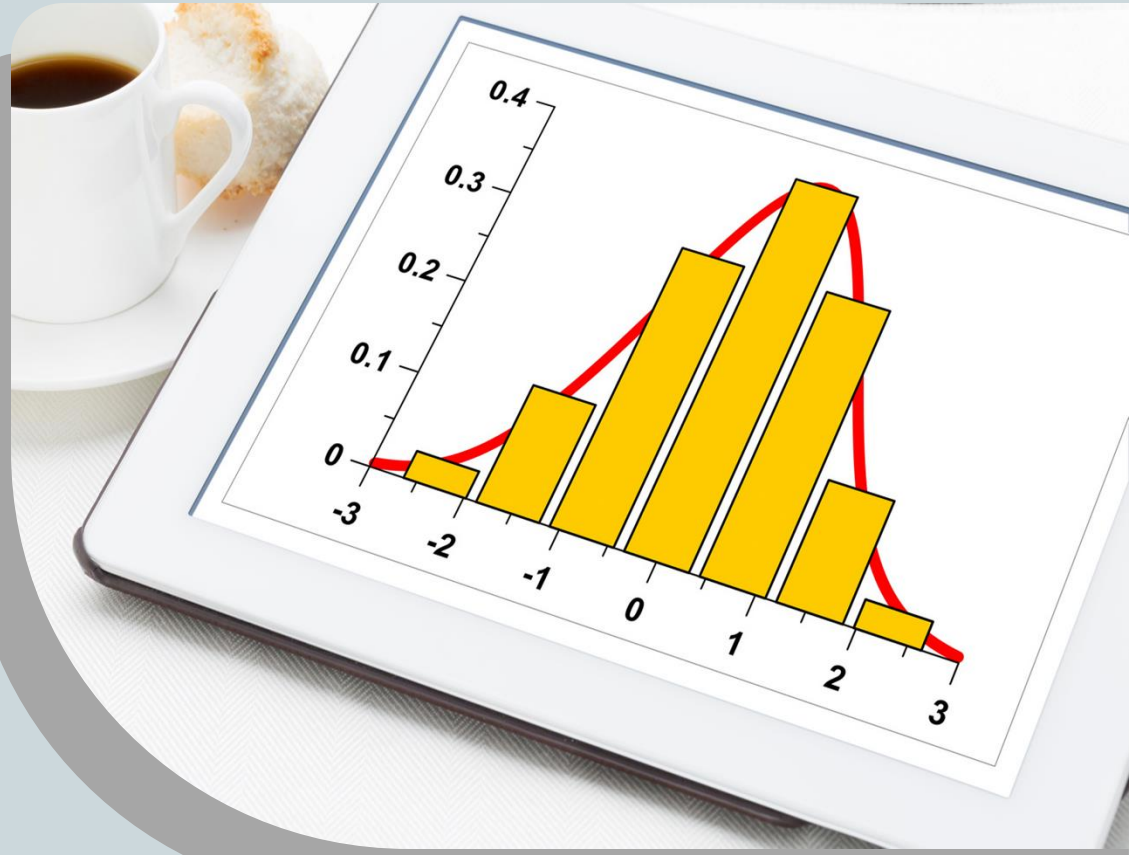
4-Histograms

Identify patterns and variations

Detect changes over time

Visualize process behavior

Guide improvement efforts



4-Histograms

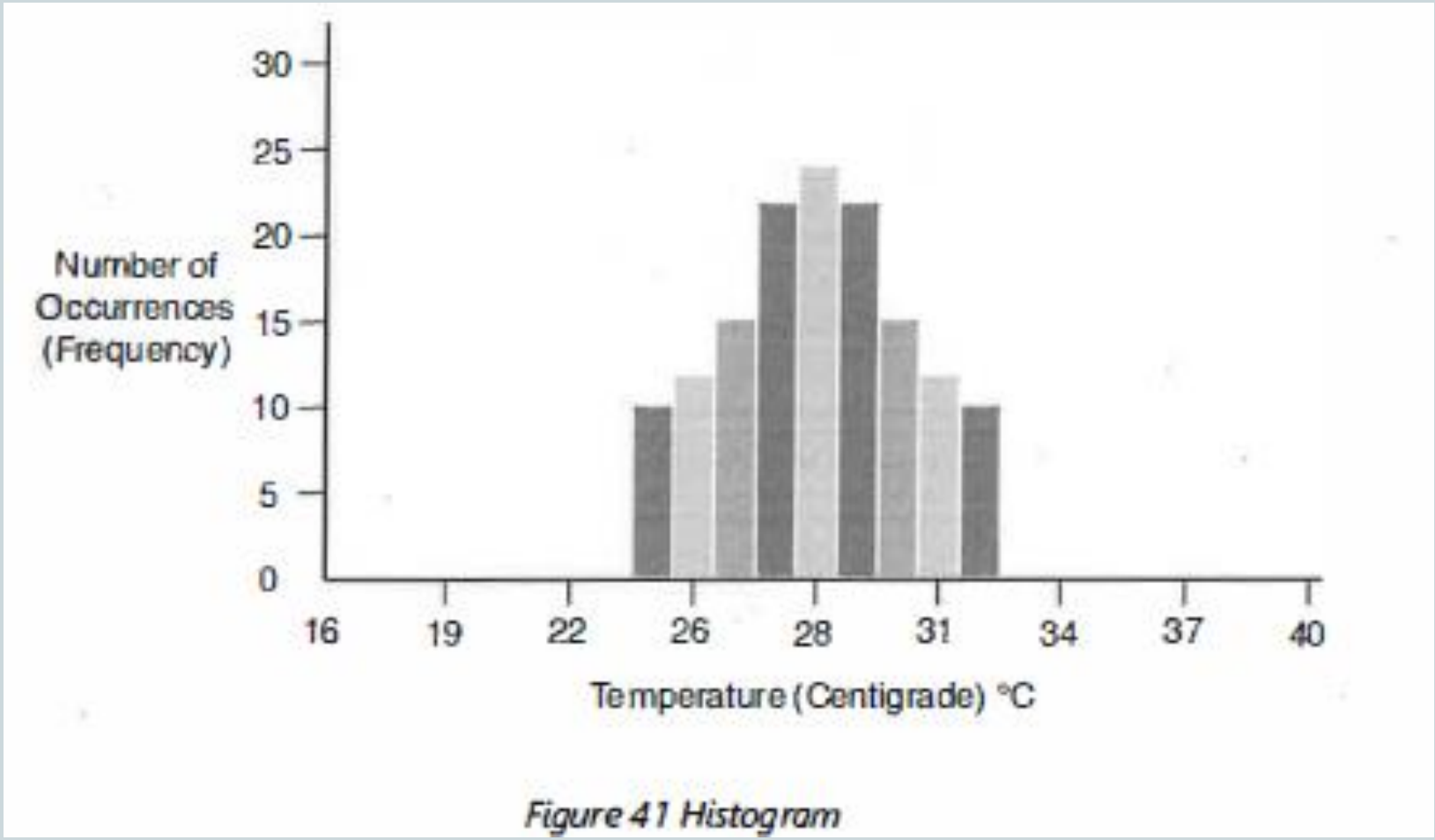


Figure 41 Histogram

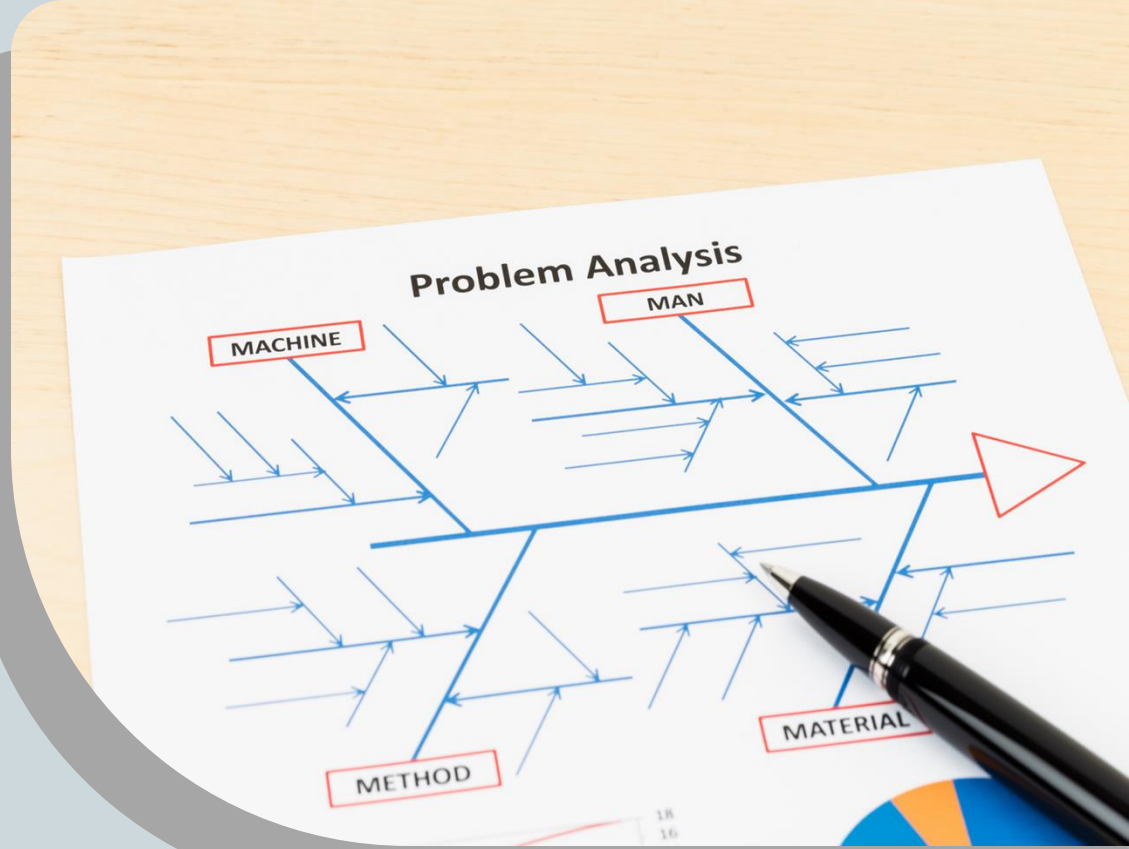
4-Cause-and-Effect Diagram

1-People

2-Plant

3-Policies

4-Procedures



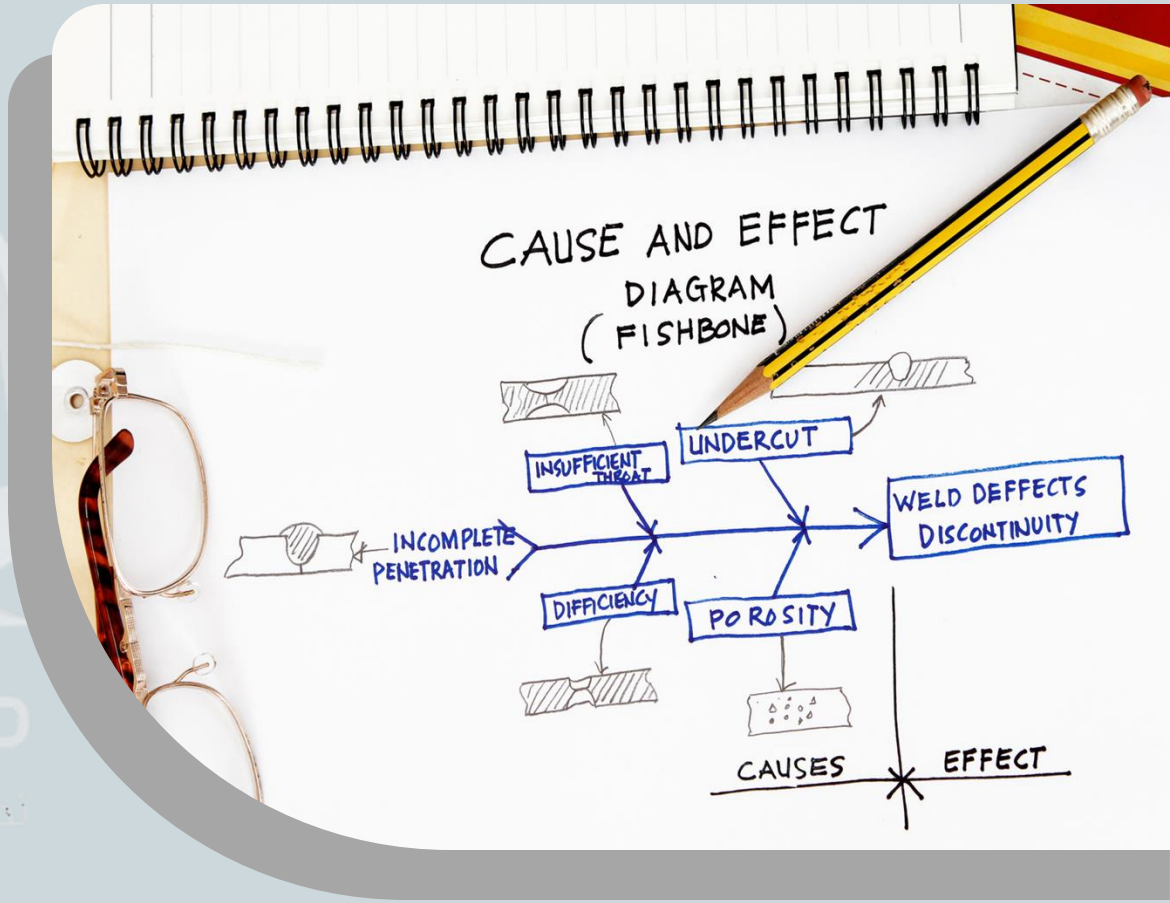
4-Cause-and-Effect Diagram

Steps

1-Identify the problem

2-Map out potential causes

3-Analyze causal relationships



4-Cause-and-Effect Diagram

Figure 43 Cause-and-Effect Diagram

5-Five Whys

1-Identify the problem

2-Ask “why” five times

5-Five Whys

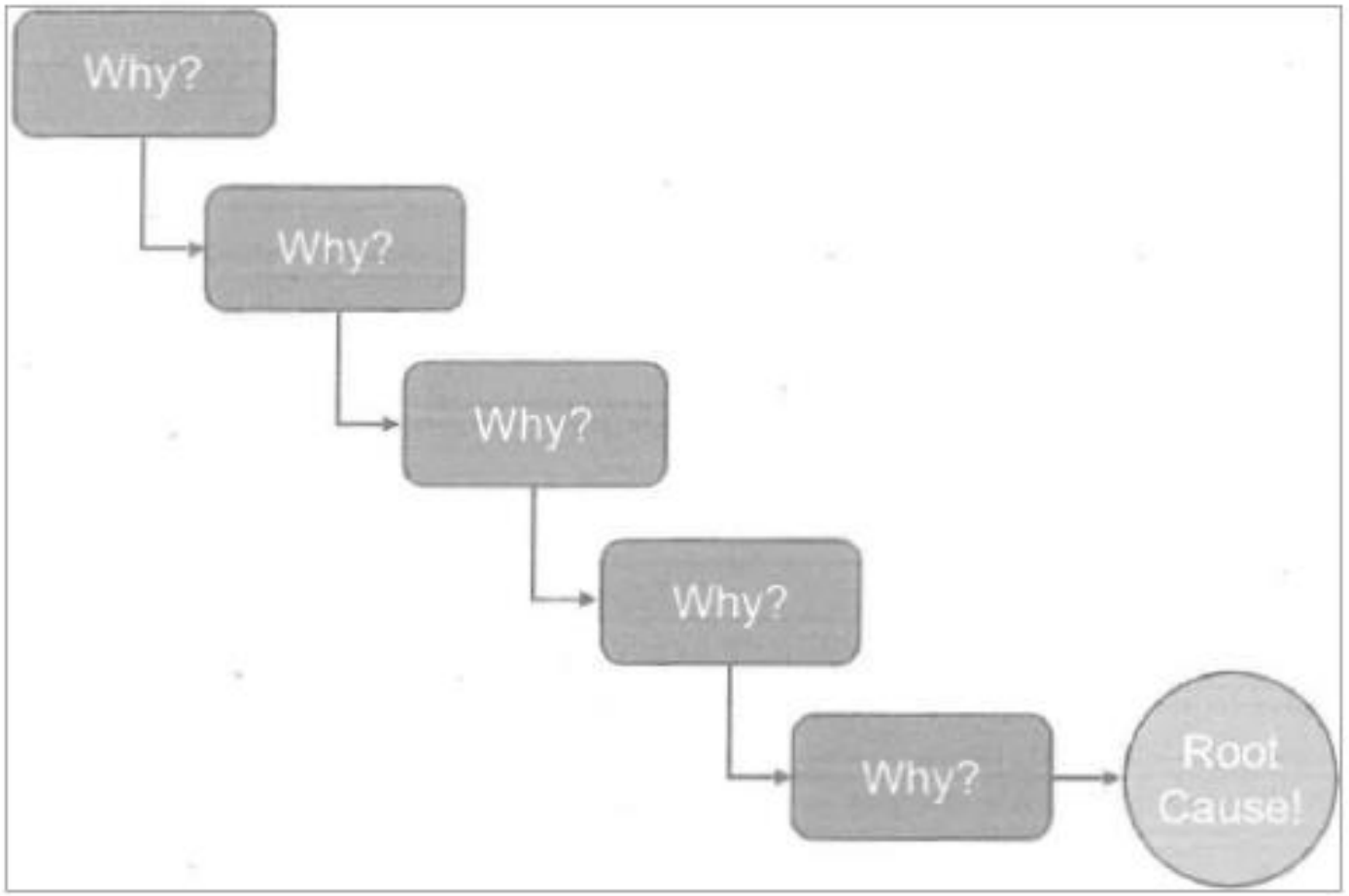


Figure 44 Five Why's Diagram

7-Quality Management Processes

7-Quality Management Processes

1-PDCA Cycle

1-Plan

2-Do

3-Check

4-Act

7-Quality Management Processes

1-PDCA Cycle

Figure 46 PDCA Process

2-DMAIC Model

1-Define

2-Measure

3-Analyze

4-Improve

5-Control

8-Basic Statistics

Measures of Central Tendency

1- Mean (Average)

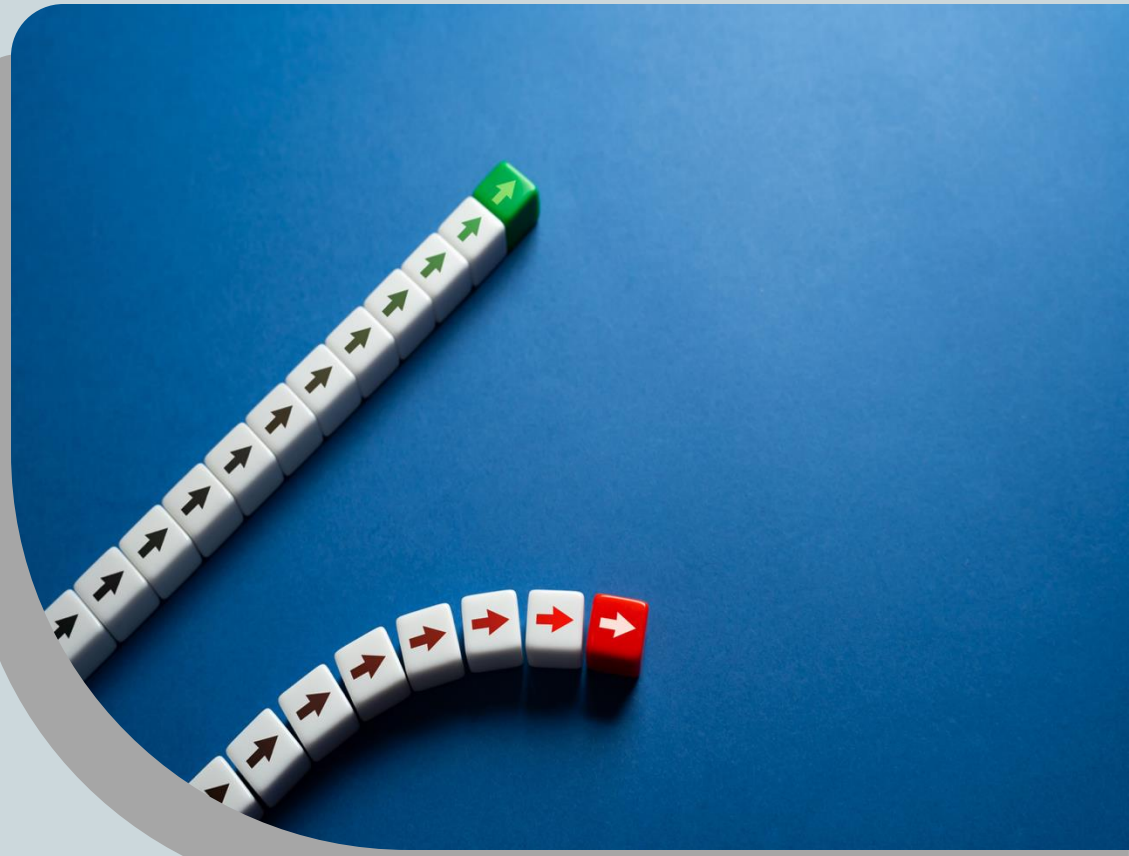
2-Median (Middle Value)

3-Mode (Most Frequent Value)

8-Basic Statistics

Rang

Standard Deviation



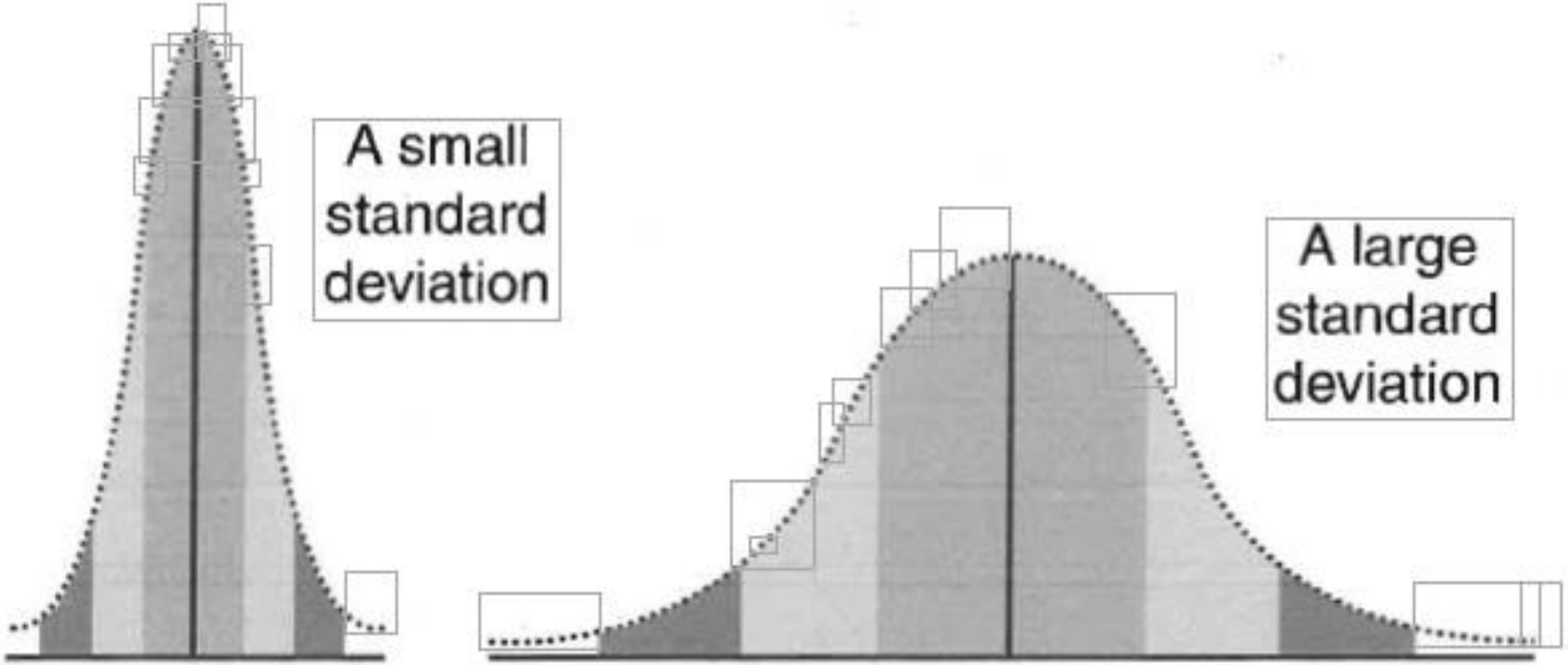


Figure 49 Standard Deviation

Run chart

Plots measurement data over time

Displays a central reference line

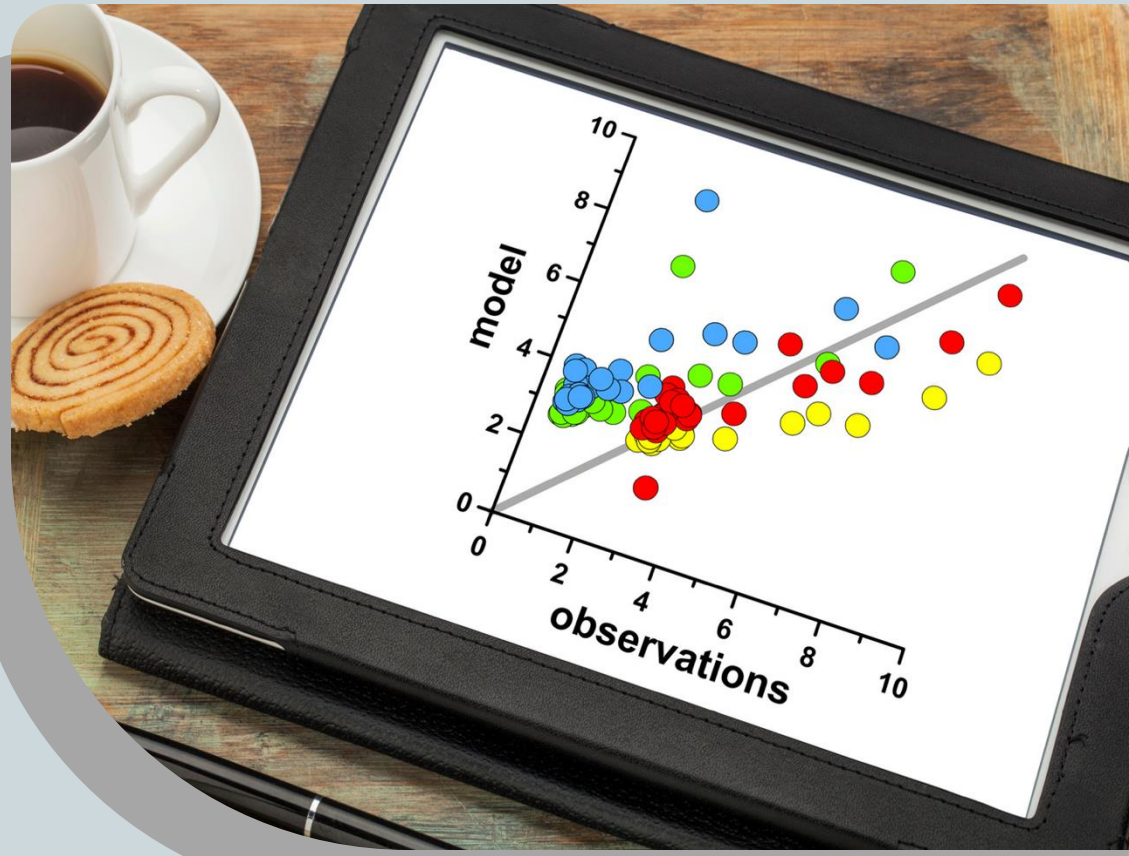
Helps identify variations

Correlation Analysis

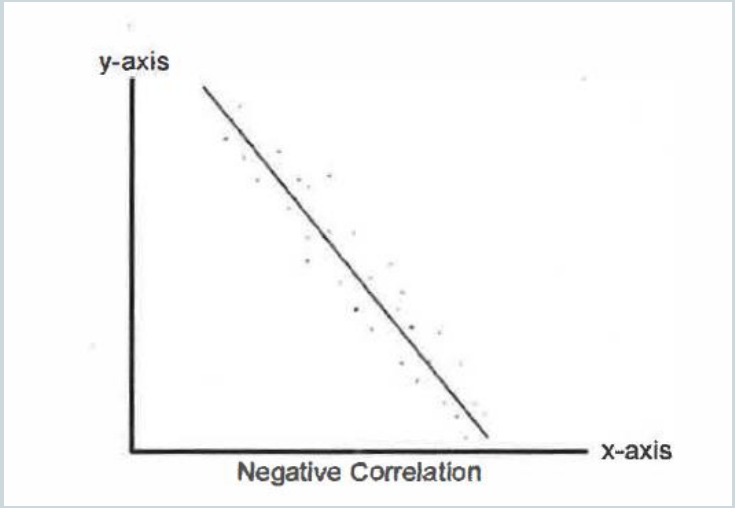
1-Positive Correlation

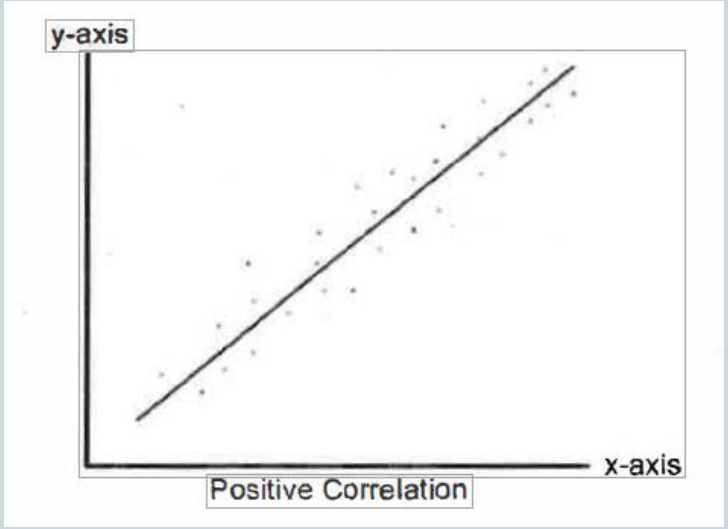
2-Negative Correlation

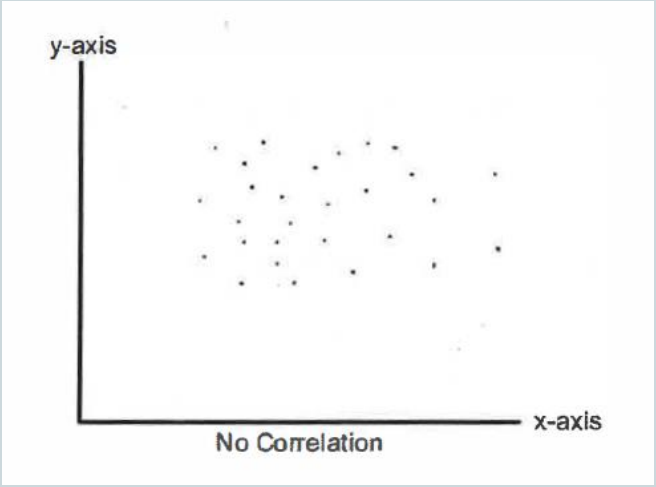
3-No Correlation



8-Basic Statistics







9-Leading and Lagging Indicators.

9-Leading and Lagging Indicators.

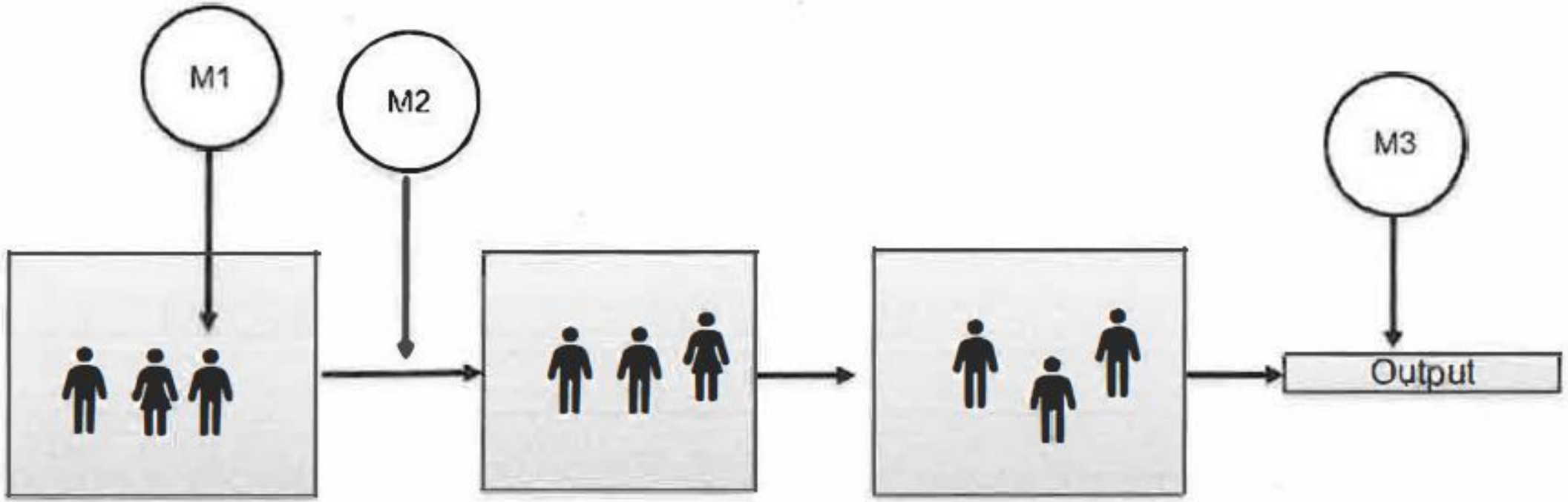
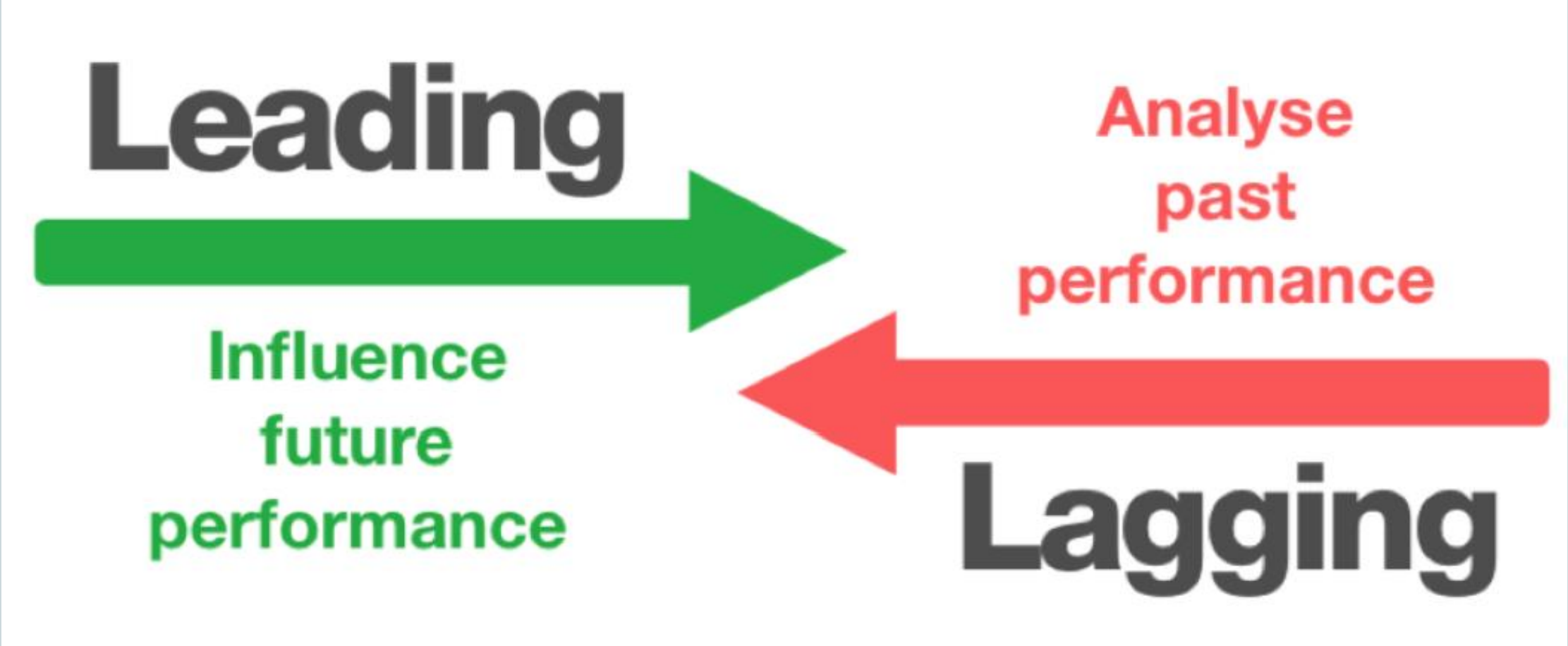


Figure 51 Types of Metrics

9-Leading and Lagging Indicators.



10-FM Internal Audits

10-FM Internal Audits

1-Facilities Audit

2-Space Audit

3-Financial Audit

4-Energy Audit

Steps of an FM Audit

1-Prepare and Plan

2-Conduct the Audit

3-Report the Findings

4-Take Corrective Actions

Caution

Faults & Irregularities

An audit should not be conducted for the sole purpose of finding irregularities and faults. During an audit, evidence may uncover deficiencies and the need for improvement, but the audit should establish whether processes are effective.

Inspection

An audit should not be used as an inspection.

Communication

An auditor needs to practice effective communication.

Scope

The purpose and scope of an audit must be clearly defined. If purpose and scope are inadequately defined, the audit results may be worthless.

11-Service Specifications

1-Prescriptive (Input)

2-Performance-Based

3-Output-Based

Input - Based Contracts

Hyprid Contracts

Output - Based Contracts

Factors in Selecting Type

1-Value of Service

2-Relevant Regulations

3-Maturity

Factors in Selecting Type

4-Technical Complexity

5-Impact of Service Failure

6-Ease of Measuring

Service Level Agreements

1-Service Definition

2-Access & Resources

3-Cost & Conflict Resolution

4-Complaint Handling & Performance Tracking

11-Service Specifications

SLA Element	Content Examples
Scope of work/Service specifications	Standard services Nonstandard services Terms of the services to be provided (where and frequency) Change provisions Delays Warranties
Performance tracking and reporting	Key personnel How services will be monitored Benchmarks, targets, and metrics to be utilized Service level reporting
Other administrative elements	Service review meetings Description of service to be provided to customer Description of how and when customer can access that service

12-Key Performance Indicators Defined

12-Key Performance Indicators Defined

Steps

1-Define FM Objectives

2-Select Relevant Metrics

3-Determine Key Deliverables

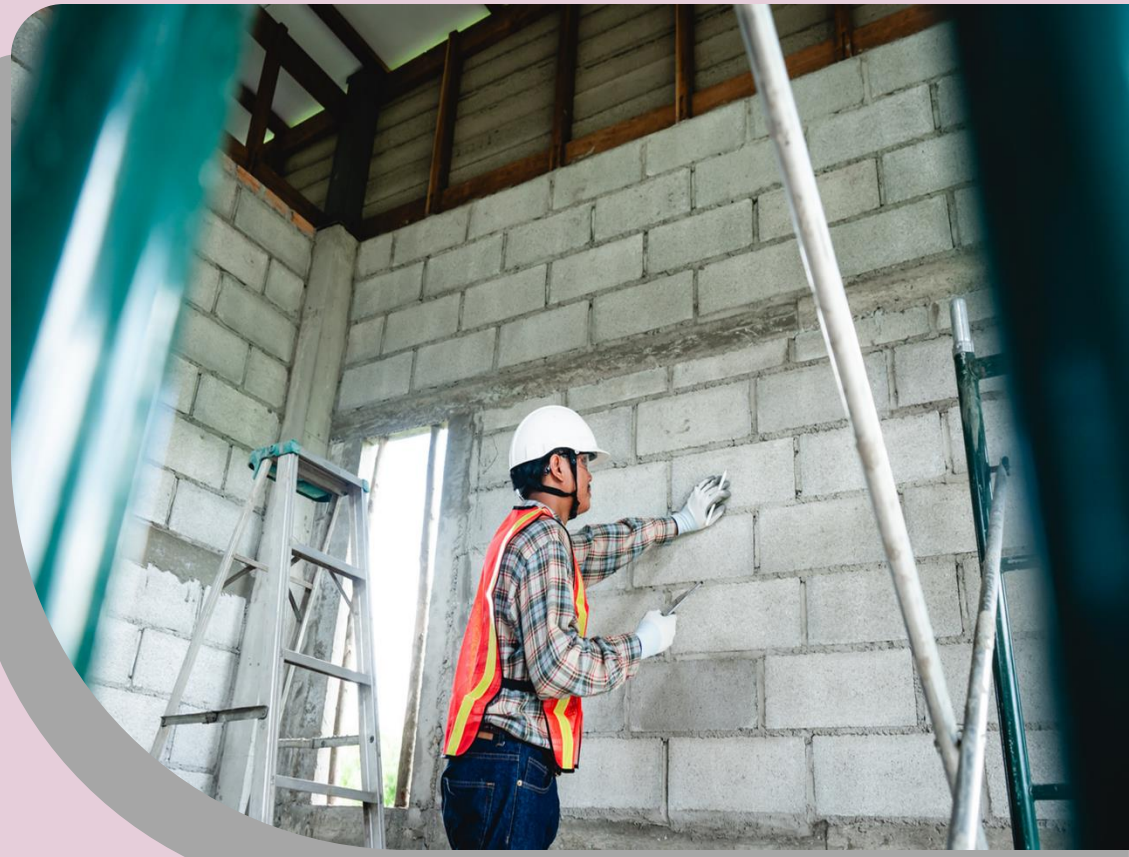
4-Implement Measurement Systems

12-Key Performance Indicators Defined

Effective KPI

Chapter 8

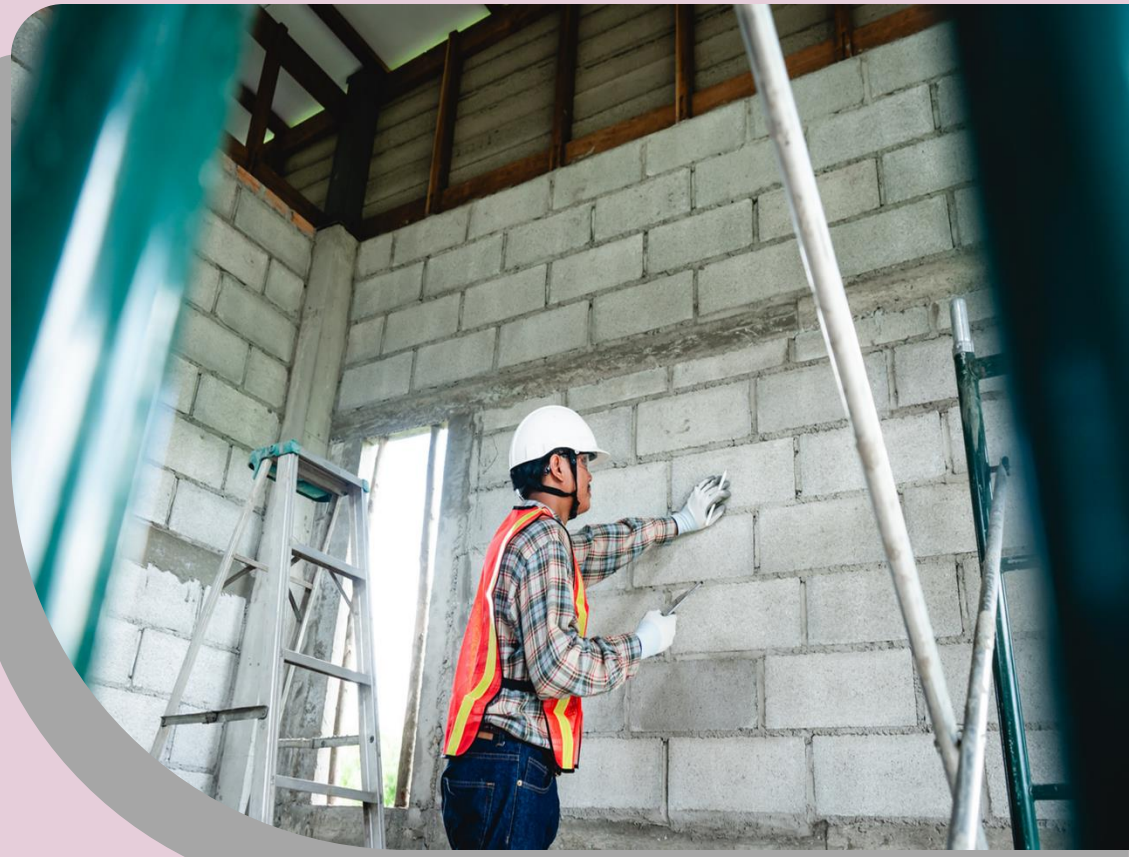
Quality Assessment of Facility Management Services



Contents

1-Measuring Customer Satisfaction

2-Analyzing Customer Feedback



1-Measuring Customer Satisfaction

1-Measuring Customer Satisfaction

Qualitative Measures

Quantitative Measures

1-Measuring Customer Satisfaction

Qualitative Tools	Quantitative Tools
Flow Chart	Pareto chart
Cause and Effect Diagram	Check sheet
Surveys	Control Chart
Focus Groups	Histogram
Interviews	Basic Statistical Tools

Table 9 Qualitative vs. Quantitative Measures

1-Measuring Customer Satisfaction

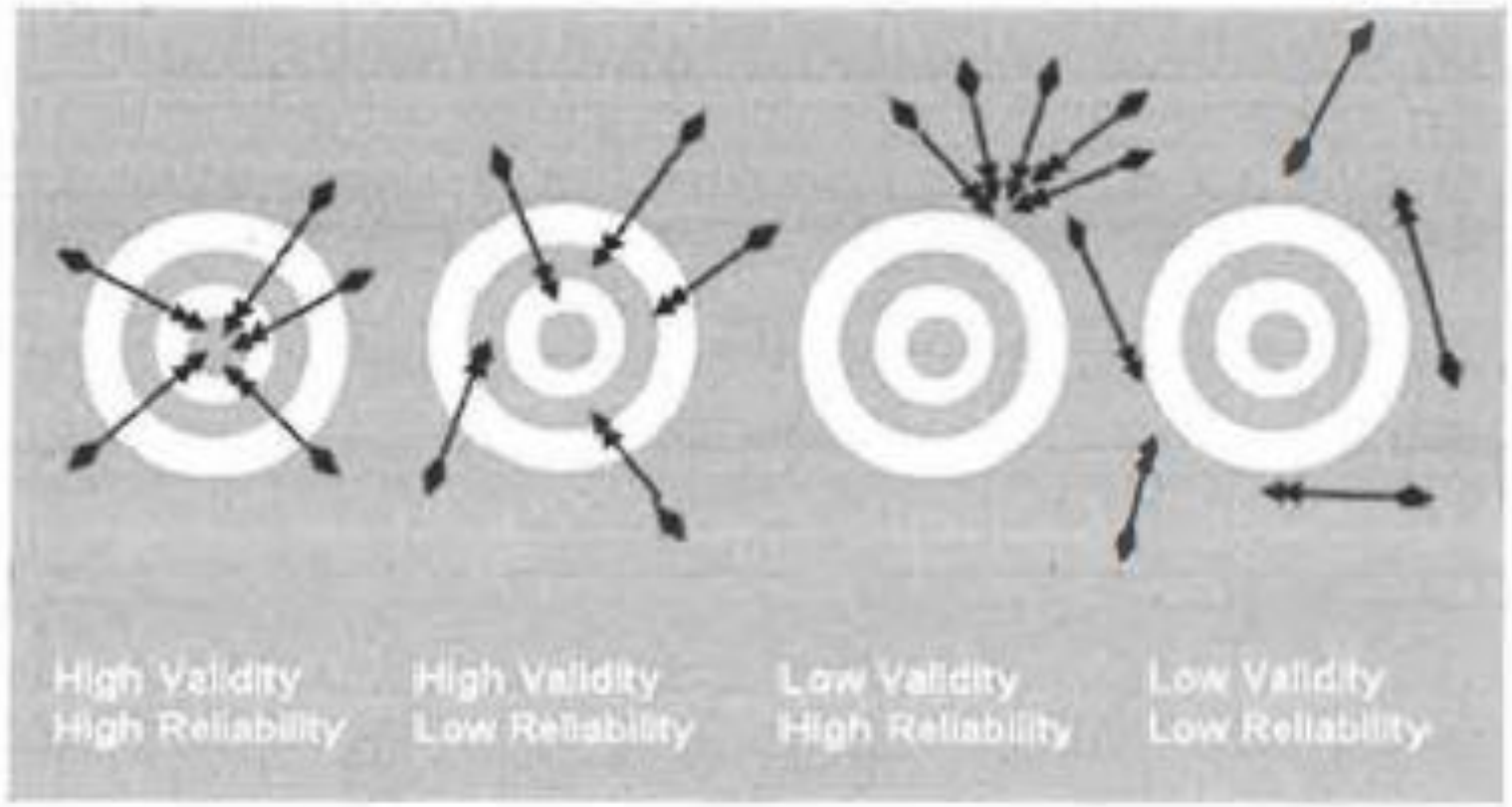


Figure 53 Validity versus Reliability

Reliability (Consistency) VS Validity (Accuracy)

1-Measuring Customer Satisfaction

Complaint Management

Automated Tracking

Enhanced Analytics

Improved Reporting

Supports Continuous Improvement

1-Measuring Customer Satisfaction

Interviews

understand customer perceptions

and service expectations

1-Measuring Customer Satisfaction

Focus Group

1-Measuring Customer Satisfaction

Sampling

1-Measuring Customer Satisfaction

Survey

1-Measuring Customer Satisfaction

Srvey Designing

1-Type of information

2- appropriate question

3-Ensure clarity

4-Conduct a pilot test

1-Measuring Customer Satisfaction

Survey questions

1-Open-Ended Questions

2- Close-Ended Questions

1-Measuring Customer Satisfaction

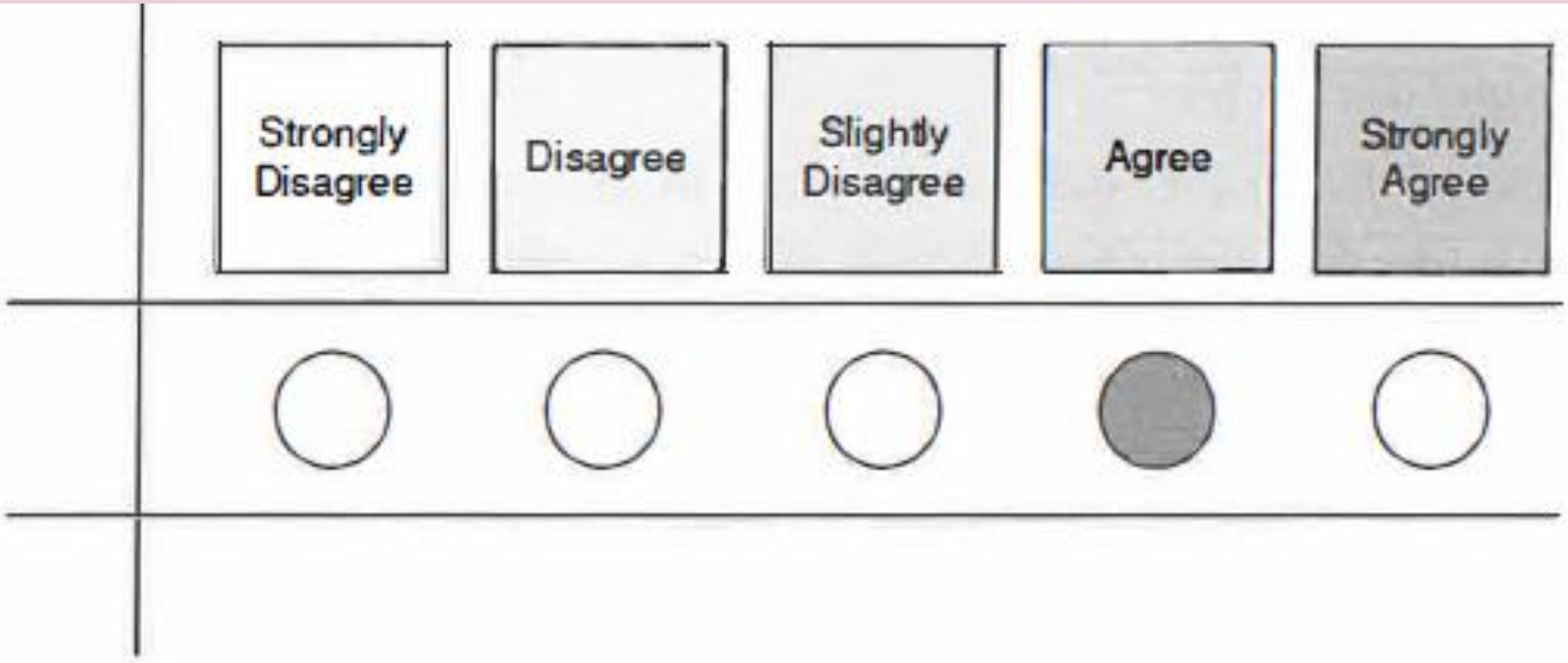


Figure 54 The Likert Scale

Likert Scale

1-Measuring Customer Satisfaction

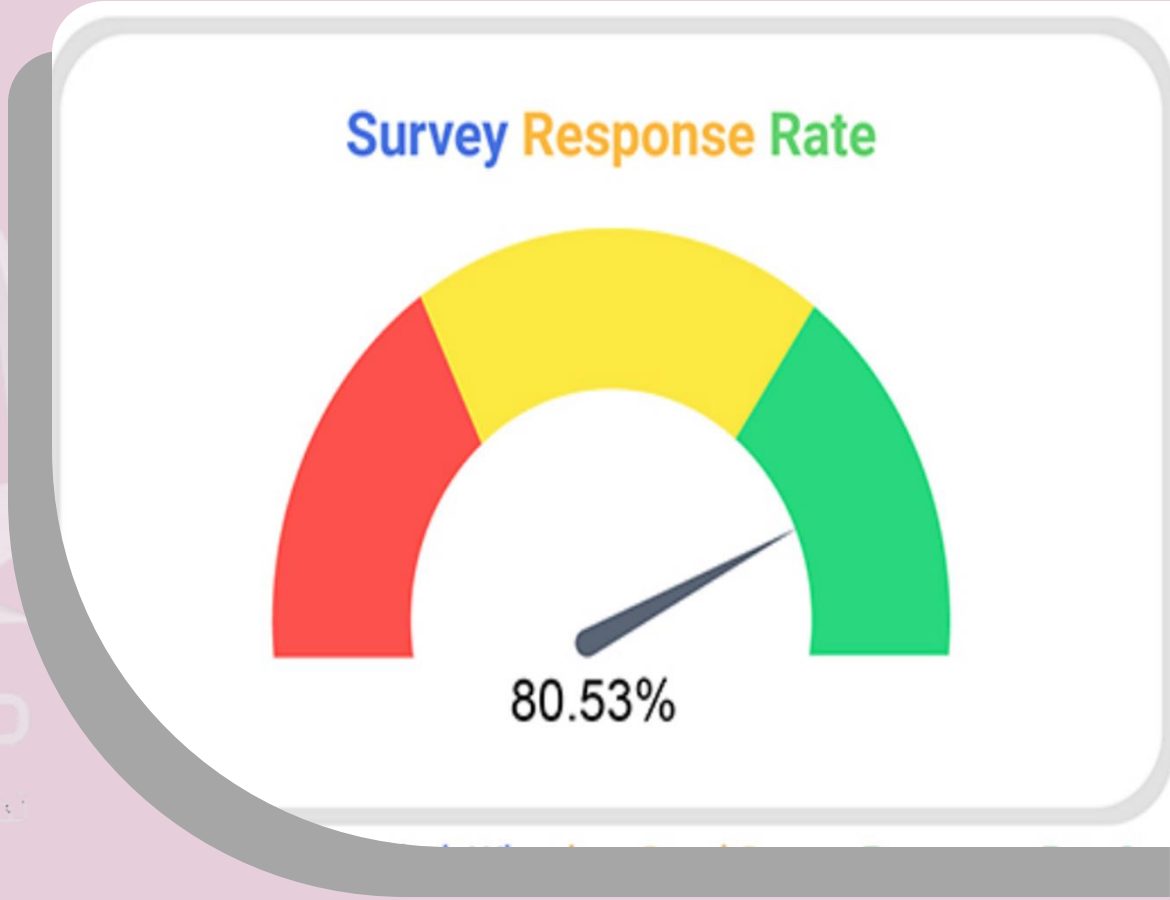
Given 100 points, how would you allocate them across the following outdoor recreation areas? Allocate points based on how important the area is to you. Total points should add up to 100.	
	Points
1. Walking trails	
2. Bicycling paths	
3. Jogging paths	
4. Sports courts	
Total	100 points

Table 15 Forced Allocation Scale Example

Order Ranking

1-Measuring Customer Satisfaction

Response rate



1-Measuring Customer Satisfaction

Walk-throughs and observations

2-Analyzing Customer Feedback

2-Analyzing Customer Feedback

Survey data

1-Data Preparation

2-Descriptive Statistics

3-Inferential Statistics

2-Analyzing Customer Feedback

Analyzing data

Statistical Computation

Error Checking

Ranking & Comparison

2-Analyzing Customer Feedback

Communicating Result

Honest & Open Communication

Audience-Centered Approach

Ranking & Comparison

Big-Picture Perspective

2-Analyzing Customer Feedback

Acting on

Customer Feedback

2-Analyzing Customer Feedback

Continuous Improvement

1-Identify Areas for Improvement

2-Analyze Current Performance

3-Implement Solutions

4-Monitor and Adjust