TOTAL QUALITY MANAGEMENT

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Total Quality Management Application Process

The main steps in implementing Total Quality Management are understanding quality and commitment to quality.

Many organizations are skipping these stages and, ultimately, have difficulty overcome.

For this purpose, Johnson (1993) defined four specific steps that an organization should consider in its Total Quality Management practice.

Step 1: Understanding

1. Manager Leadership
2. Creating Vision
3. Process Control
4. Determining the Process Requirements
5. Determining the Equipment Requirements
6. Training (Quality Terms)
7. Determining Requirement

Total Quality Management Application Process

Step 2: Participation

1. Teaching Leadership
2. Creating Support Structure
3. Creating Goals
4. Determining the Important Requirements
5. Investigating Process Capabilities
6. Developing Training
7. Designing Quality Environment
8. Specifying Vision

Total Quality Management Application Process

Step 3: Commitment

1. Participant Leadership
2. Demonstration of Commitment
3. Developing Goals
4. Making the Change
5. Creating the Teams
6. Creating of Understanding System
7. Solving the Problems
8. Application of Suggestions
9. Strengthening the Quality Environment

Total Quality Management Application Process

Step 4: Acceptance

1. Empowering Leadership
2. Empowering Employees
3. Encouraging Teams Development
4. Defining Achievement
5. Achievement Award
6. Profit Advantage

Total Quality Management and Human Factor

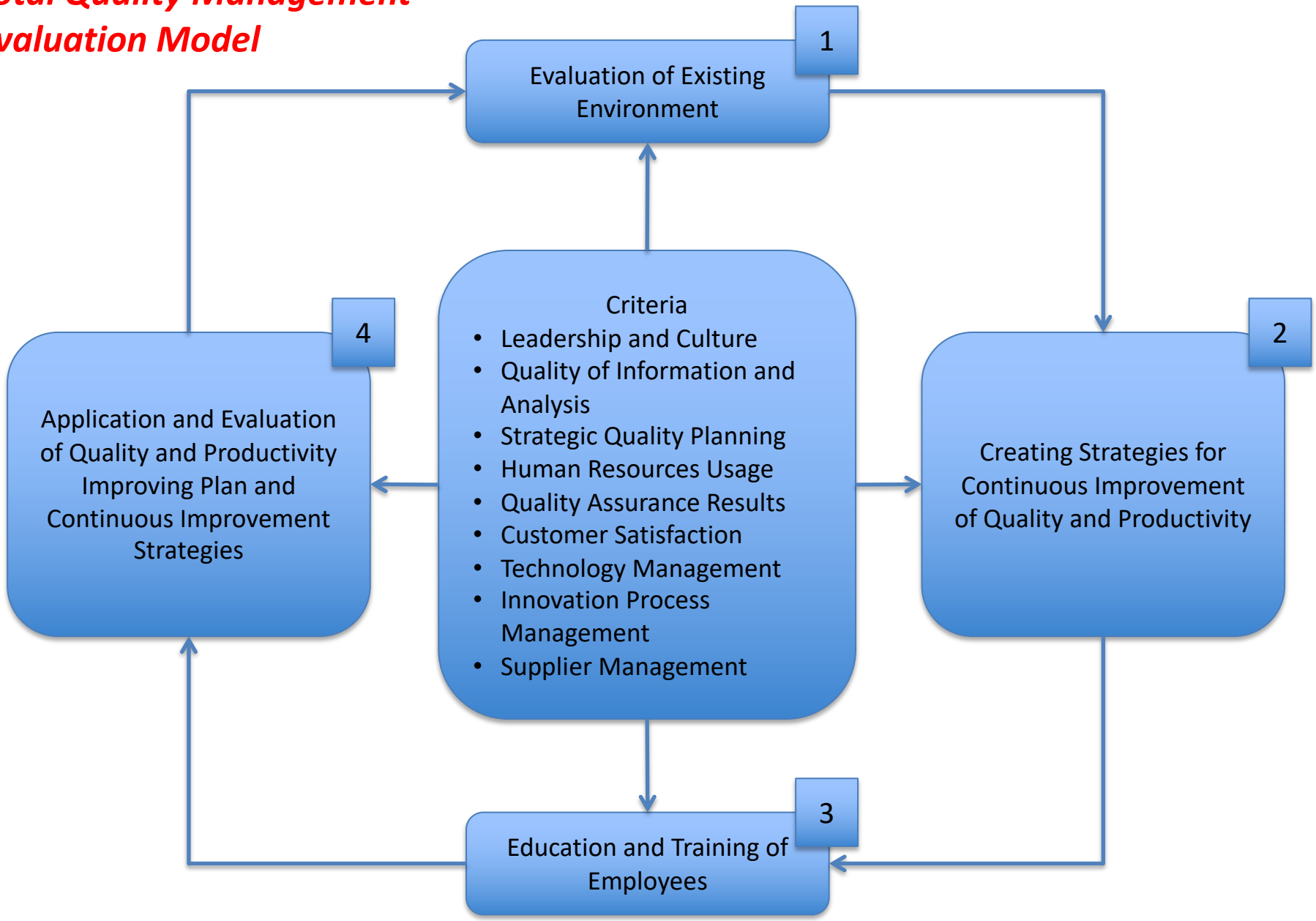
During total quality applications, human resource management has a number of aims to eliminate the defects and weaknesses. The management aims to reset the following:

- Material defects,
- Human defects,
- Time lost and consumed,
- Customer complaints,
- Number of lost customers,
- Loss and damage,
- Non-healthy working conditions,
- Problems that will crack things.

Total Quality Management Challenges in Practice

1. Lack of participation of management
2. The challenge of changing organizational culture
3. Faulty planning
4. Lack of continuous education and training
5. Incompatible organization structure and isolated employees and departments
6. Ineffective measurement techniques and difficulty of accessing data and results
7. Not giving importance to internal and external customers
8. Misuse of authority and teamwork

Total Quality Management Evaluation Model



A Case Study

An organization exists because of its customers. Customer satisfaction is a proof of successful TQM implementation and therefore finds high importance in quality system certification standards. Quality is defined from customer's perspective. TQM requires focus or both external as well as internal customers. Customer perception of quality depends on many aspects, such as performance, service, warranty price and reputation. Organizations need to set up a feedback mechanism for measuring level of customer satisfaction. Organizations must listen to each complaint, analyze root causes and take corrective and preventive action to resolve the same.

Q1. Is the main concern of most customers the price of the product/service?

Q2. Explain the importance of customer and customer services?

Q3. Explain customer code of ethics?

Q4. How does employee satisfaction relate to customer satisfaction?

DEFECTS!

‘Defects’ in Total Quality Management

- Not achieving %100 of the procedures and standards,
- The behaviors like fault, delay, accident etc.
- Deviation from expected value or features that a department in organization have,
- The loss ability to perform defined functions,
- Insufficient system or system component to fulfill desired function with specified limits.

etc.

Managements' Perspective of Defects

Classic Management

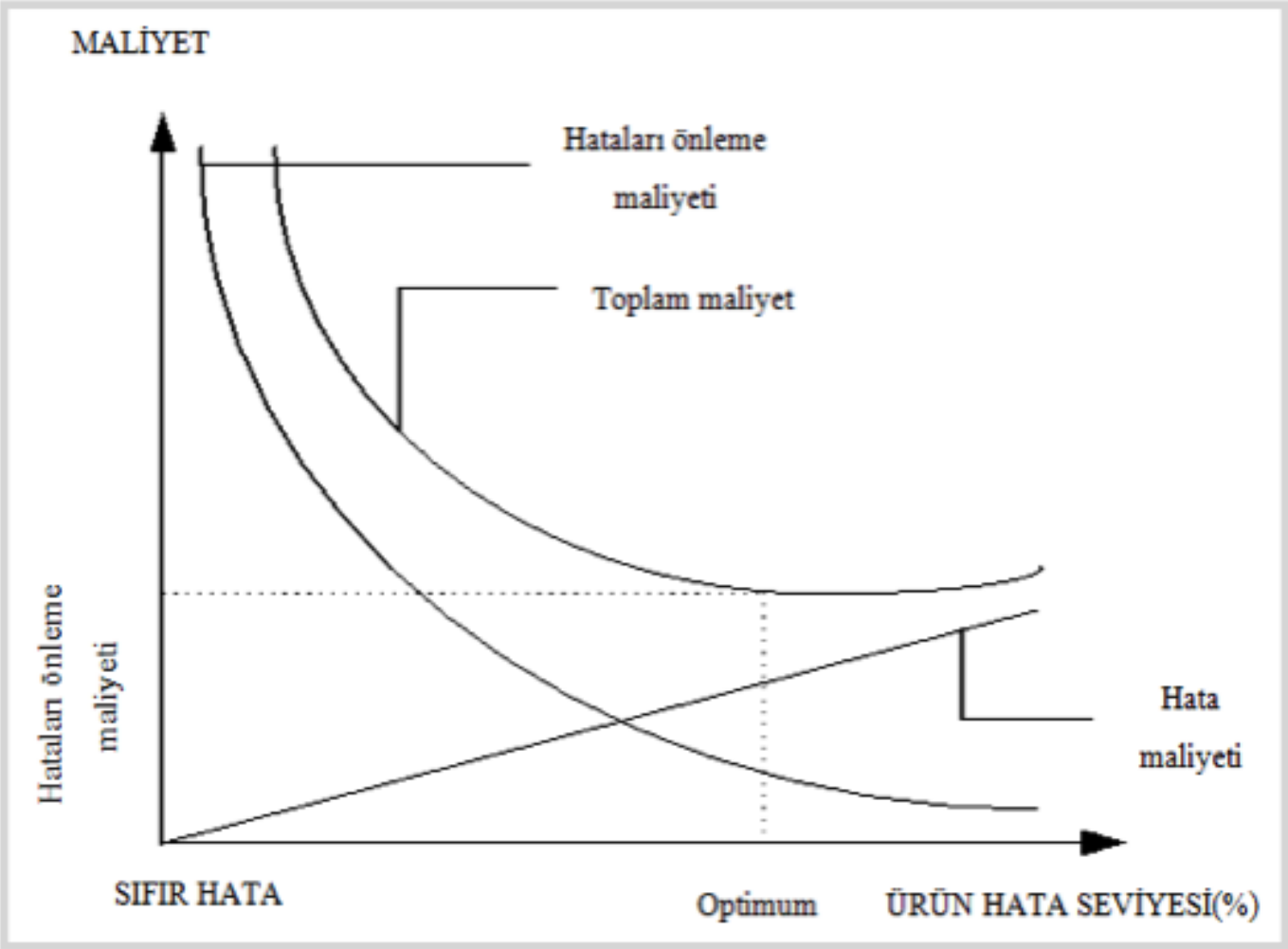
1. Inspection based quality
2. Production in specification limits
3. Reactive approach
4. Production in acceptable error levels
5. Maximum profit oriented production
6. Product quality according to standards
7. Optimum loss or rework
8. Optimum 1st quality/2nd quality rate
9. Prevention of faulty applications and procedure improving management

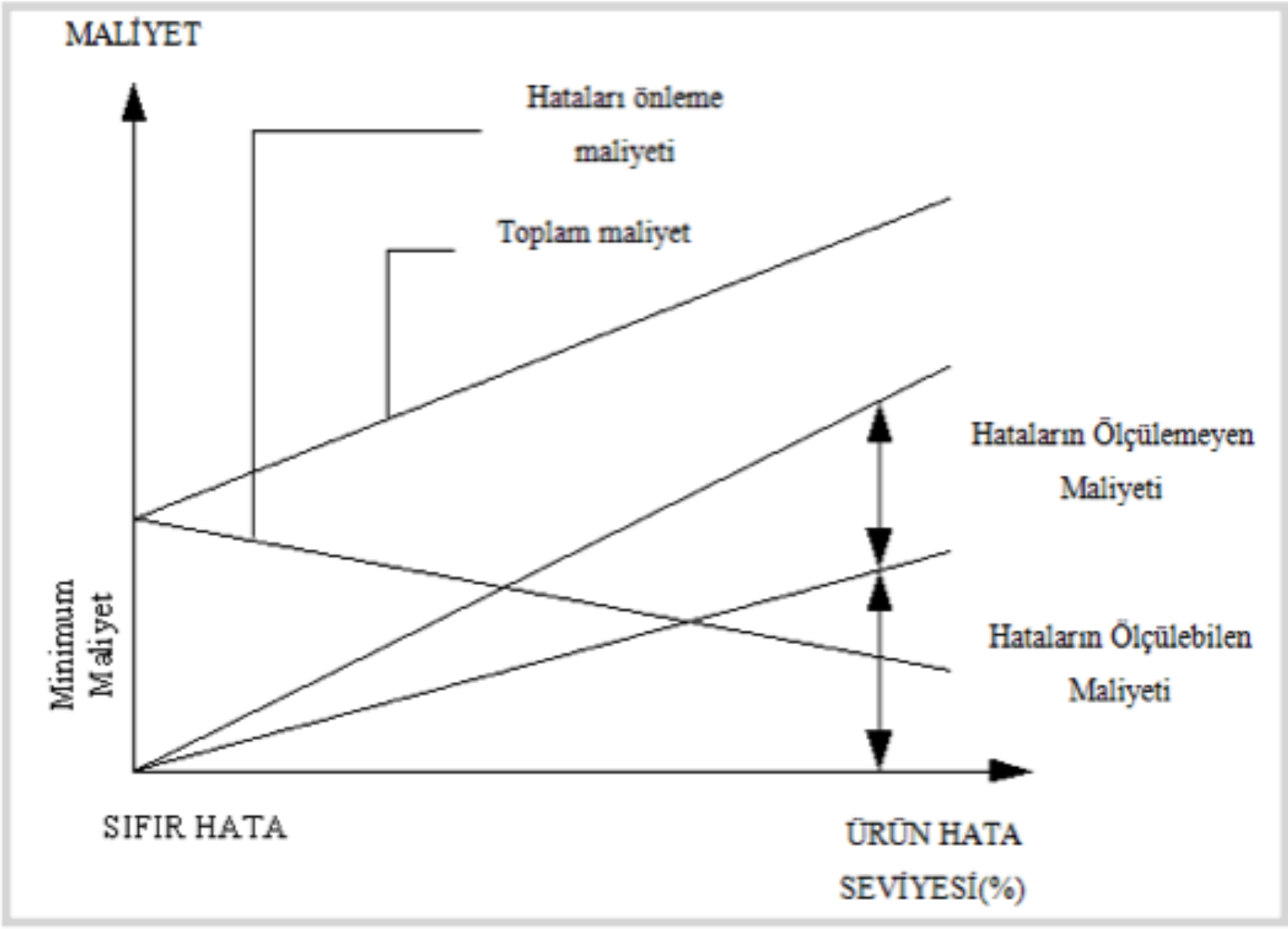
Total Quality Management

1. Prevention based quality
2. Targeted production
3. Finding solutions to possible problems
4. Zero-error targeted production
5. High quality targeted production
6. Product quality due to customer requirements
7. Zero loss or rework
8. 1st quality production only
9. Error preventing management using the ideas of employees

Error Level

Classical Management




MALİYET
Hataları önleme maliyeti
Toplam maliyet
Hataların Ölçülemeyen Maliyeti
Hataların Ölçülebilen Maliyeti
Minimum Maliyet
SIFIR HATA
ÜRÜN HATA SEVİYESİ(%)

Defect Types

Defects can be classified according to their effect on the performance of product or service.

The categories of defects are as follows:

- Critical Defects
- Major Defects
- Minor Defects
- Trivial Defects

Critical Defects

It can also be described as a very serious or dangerous defect.

- Product can not be used,
- Economic loss occurs,
- Psychological loss occurs,
- Quality reliability will be damaged.

Major Defects

It can also be defined as a serious or significant defects:

- Correction is difficult,
- Repair-maintenance cost is high,
- The use life is low,
- Difficulty mounting orientation,
- Confidence in quality control staff and system decrease.

Minor Defects

It can also be described as defects in moderate severity:

- It can reduce the performance of product,
- It can shorten its life,
- It can create malfunction in the assembly
- It can disrupt the appearance in an undesirable way.

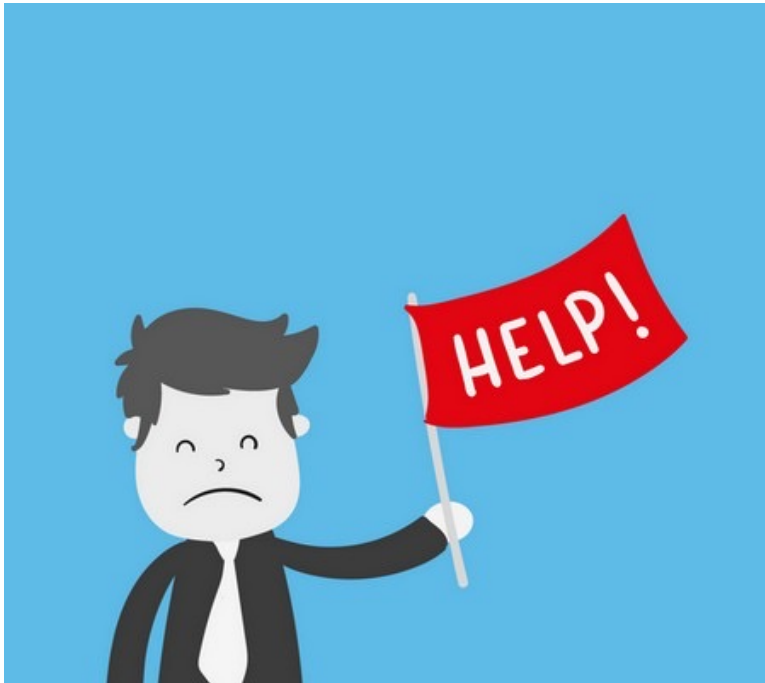
Trivial Defects

It can also be described as a non-serious defect:

- They are inaccurate defects that do not affect working conditions and repair-maintenance costs.
- However, these faults can lead to acceptable external appearance disturbances.

Defect Types

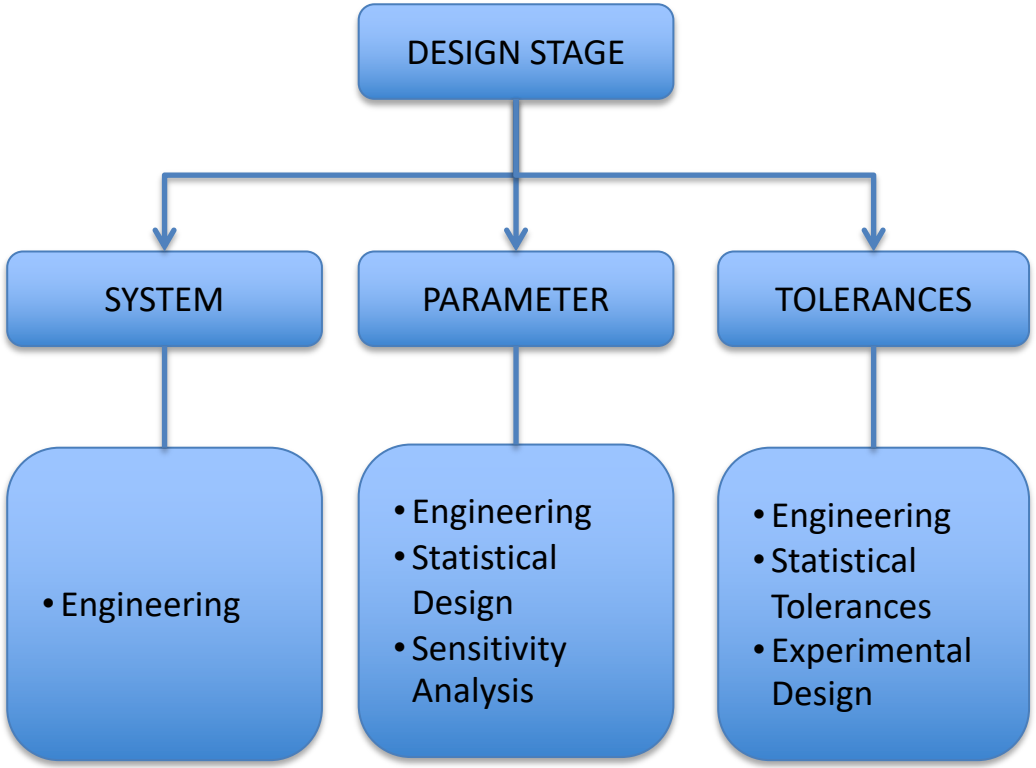
- ✓ Pre-Production Defects
- ✓ Defects During Production
- ✓ Post-Production Defects



Design Errors

Taguchi et al. (1989) divided product design into three phases. These are listed as follows;

- System (Determination of Functions) Design,
- Parameter (Target Identification) Design,
- Tolerance Design.



Design Errors

The quality of a product and the cost of production are determined by the engineering design of the product and the process in which it is produced. A product development process consists of four successive stages. These:

- Product Design,
- Process Design,
- Production,
- Service.

Production Errors

In many enterprises, production errors are mainly due to two reasons.

1. Nonconformities and errors in the production process
2. Errors in planning process

Material Errors

Material errors occur when the geometry of the processing system on the material changes due to changes in its properties or when excessive force is applied during production, storage, holding, transportation, inspection, use and repair operations.

It is possible to combine material faults in two classes.

- Overstressing errors,
- Erosion-aging errors.

Machine and Equipment Errors

- *Errors resulting from technological change:* result in the impairment of the selected technological production process for the machine.
- *Inaccurate use errors:* Disruption of the rules of use leads to early breakdowns and the machine aging process is accelerated in the meantime.
- *Errors from structural changes:* occurs when units that make up the machine as a whole are inconsistent or when relationships and interactions are not well defined.

Method Errors

Method mistakes are either not done or are done incorrectly. The method errors are generally as follows:

- Inadequate working standard
- Management's lack of an effective method to ensure safe and good products
- Job sequence and inaccurate job order
- Ergonomic conditions not desired features

Human Errors

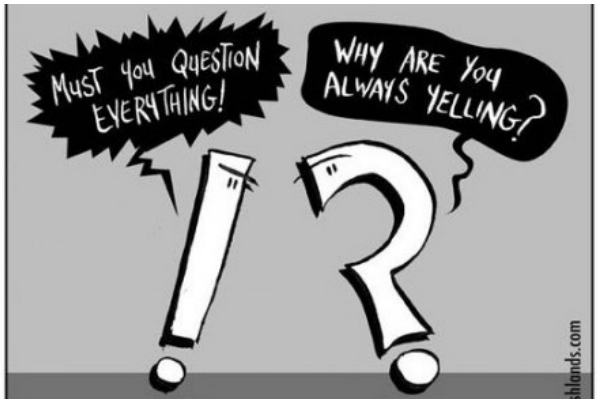
Factors affecting human performance can be classified under the following headings:

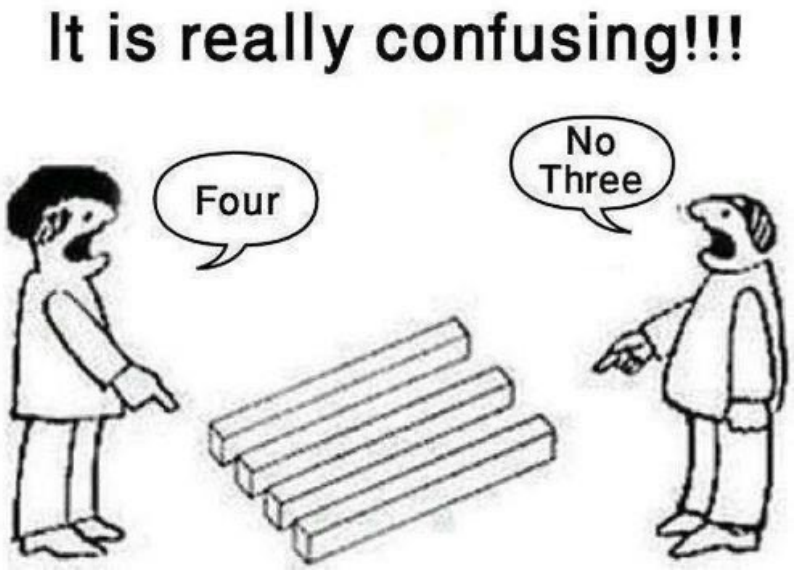
- Factors affecting work related performance,
- Factors affecting environmental performance,
- Physical environment,
- Social environment,
- Organizational environment,
- Factors affecting personal performance,
- Factors affecting psychological-physiological performance.

Human Errors

Juran (1988) grouped human errors, the most important disability of zero error production, into four classes. These;

- Misinterpretation,





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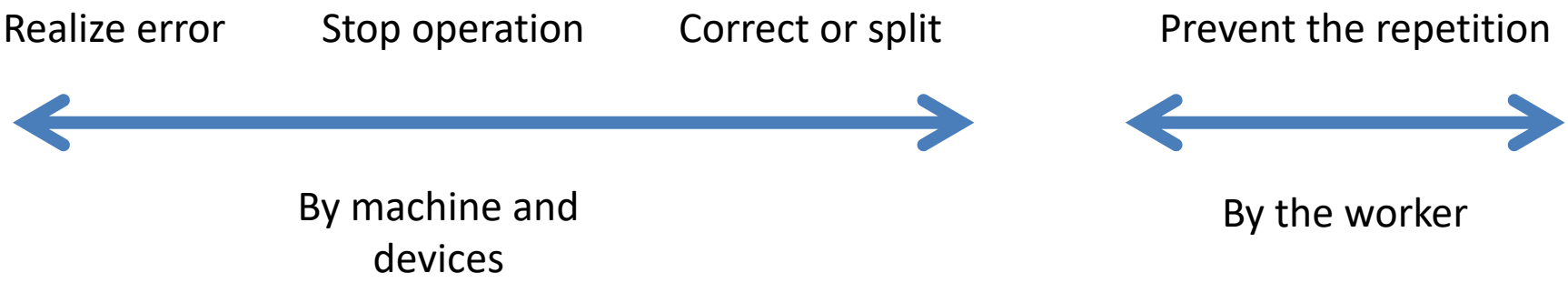
- Misinterpretation,
- Random error,
- Technical deficiency,
- Intentional errors.
  - Defense
  - Different appearance
  - Advocacy
  - Finding unnecessary

Human Error Types and Solutions

Error Types	Solutions
Misinterpretation	Exact definitions and dictionary Check lists Examples
Random error	Ability test Reorganization to reduce tiredness and monotony Safety design in case of malfunction Eliminate unnecessary jobs Error prevention Automation and robots
Technical deficiency	Discover the secrets of successful employees Re-educate people by technology re-reviewing
Intentional errors	To design the data collection plan and to remove the atmosphere of reassessment and giving responsibility Application of reports or explaining the why question Soften orders Giving responsibility To provide balanced editing for purposes Racing and encouraging Recreate the business

Part 2: Error Prevention Mechanisms

Error Prevention Discipline



Error Prevention Hierarchy

- ✓ ***Warnings and Instructions:*** Informs
- ✓ ***Error Detection Algorithms:*** Attention
- ✓ ***Error Prevention Support:*** Sets limits for behavior.
- ✓ ***Error Prevention Mechanism:*** Only allows correct behavior.

Fault Tree Analysis

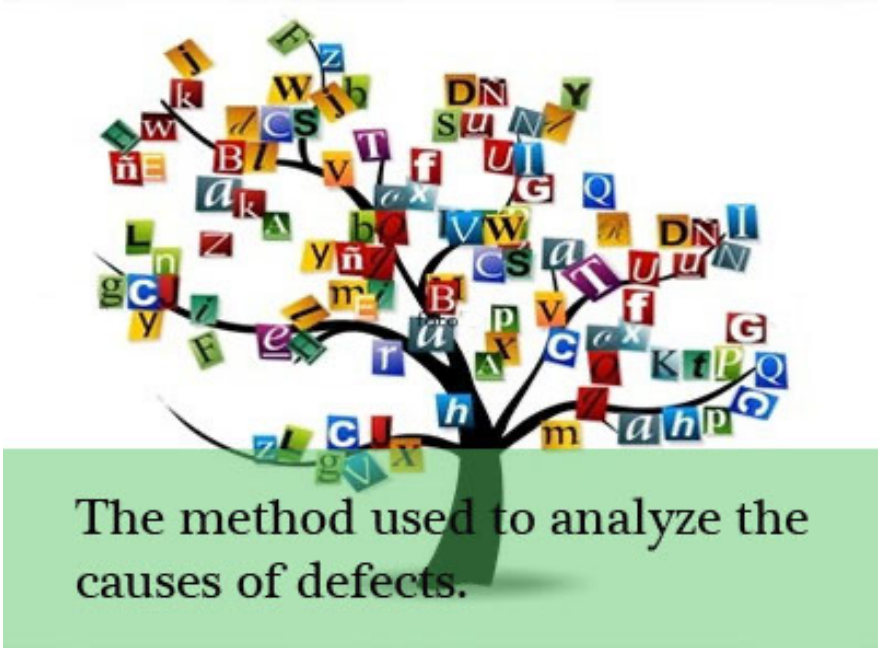
"To design systems that work correctly we often need to understand and correct how they can go wrong."

Dan Goldin, NASA Administrator, 2000

Fault Tree Analysis (FTA)

- In many cases there are multiple causes for an accident or other loss-making event. Fault tree analysis is one analytical technique for tracing the events which could contribute. It can be used in accident investigation and in a detailed hazard assessment.

- The fault tree is a logic diagram based on the principle of multi-causality, which traces all branches of events which could contribute to an accident or failure. It uses sets of symbols, labels and identifiers.



Failure Mode and Effects Analysis (FMEA)

It is a failure analysis technique that allows a customer who has not taken precautions before the error has occurred and is not waiting for an error to be identified and remedied before it arrives.

This feature differs from the quality control methods that are intended to repair failures. Because, it is a protective technique which is not to find and fix failures, but to predict and prevent them.

This method, which is based on risk priorities at the same time, shows how to use the resources that are scarce to the managers (decision makers) to solve the problems first.

Types of FMEA

System FMEA: used to analyze systems and subsystems in design and initial concept determination.

Design FMEA: Consider possible product error patterns that may arise in service or manufacturing stages due to design faults.

Process FMEA: Focuses on the types of errors resulting from process or assembly deficiencies.

Service FMEA: Services are used to analyze services before reaching the customer

What is Jidoka?

Jidoka
«Automation with a human touch»

- The Jidoka Production Mechanism originating from TPS (Toyota Production System) is gaining autonomy.

- The basic principle is to detect and prevent the failure at the source and to ensure that no faulty parts do not go through the next process and that no product is produced incorrectly.
  - The ability of machines to auto-stop when an abnormality occurs
  - The authority to stop the line to the operators
  - Warning systems
  - Separation of operator work and machine work, operator's constant line-up
  - Quick intervention and root cause investigation

Poka Yoke

Poka: Inattention, distraction

Yoke: Elimination

Aim: Zero Error!

- ✓ Use of preventive auxiliary tools / apparatus
- ✓ Prevent errors by designing products that can not be mistaken

For Japanese managers Poka Yoke is a sign of the intelligence of the employees.

Poka Yoke Techniques

Addressing people's 5 senses

1. Specify color, add an encoding mark
2. Using a separator between similar parts or materials, identifying separate places
3. Audible, illuminated stimuli
4. Striking attention signs to the great and spectacular

Depending on the mechanism of the devices

1. Working with templates and equipments
2. Machine automatically stops when an error occurs
3. Failure of the machine if there is a mistake in doing business
4. If the job is forgotten, the next process equipment stops

Why errors occur?

Typical Error / Deficiency Causes

- Forgotten processes
- Process errors
- Setup errors
- Forgotten parts
- Wrong parts
- Incorrect part processing
- Incorrect operation
- Setting errors
- Equipment not properly set up
- Tool / mold etc. not prepared properly.

Types of Human Error

- Forgetfulness
- Do not misunderstand
- Identification, detection errors
- Inexperience
- Forget the rules
- Thoughtfulness
- Slow motion
- Errors due to lack of standards
- Wonder
- Deliberate mistakes (sabotage etc.)

Poka Yoke Mechanisms

Poka Yoke mechanisms used to minimize these errors:

- Finishing switches
- Sensors
- Lightened warnings
- Templates
- Adjusting pins
- Guides
- Counters

Poka Yoke Example

Problem: When the blood tubes are sent to the laboratory, a barcode label is printed and glued on them. But if they do not stick in the right direction, they can not be read in laboratory equipment. Pre-test fixes are required.

Solution: An arrow pointing the right direction is added on the labels and the nurses are told that the arrow should always be in the direction of the cover.

Benefit: Incorrect labeling rate drops from 45% to 7% in two weeks.

5S - Preventing Losses by Keeping the Work Area Clean & Tidy

It is a technique for the clean, regular and purposeful introduction of the work area in the most suitable way.

Japanese	English	Explanation
Seiri	Sort	Throw the unnecessary
Seiton	Store (set in order)	Find an appropriate storage space for everything else
Seiso	Shine	Clear all areas and surfaces
Seiketsu	Standardize	Share 5S procedures and practices
Shitsuke	Sustain	Join monthly audits & share results

5S

- Uncover problems
- Eliminates error possibilities
- Prevents loss of time
- Makes standard work possible

'5S is not just a way to organize your closet. It also questions whether it is really needed!'

1S - Sort

Sort…

- With what we need and what we need to keep
- Things that are unnecessary and need to be thrown away

To distinguish each other correctly.

Then we need to get rid of it unnecessarily and place the necessary one **nearest to the point of use** according to the frequency of use.

2S – Store (Set in order)

- Most of the errors in the processes and in the measurement process and the different forms of work are caused by the disorder in the work areas. For example,
  - Forget to do some processing steps due to not being able to find what you are looking for
  - Using wrong parts due to irregularity

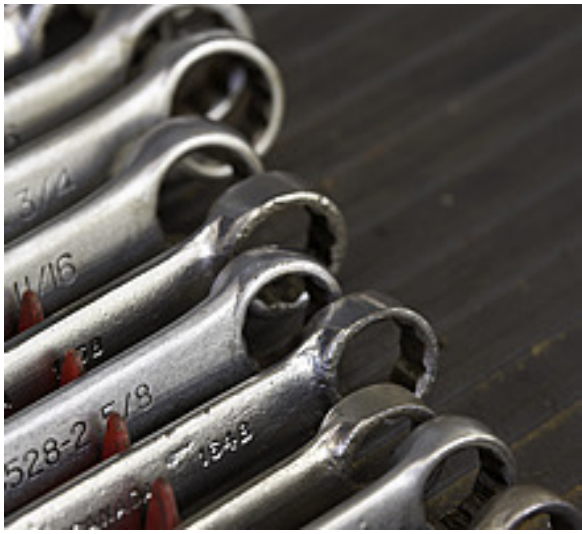
- 5S minimizes these risks by providing order.

Regulation phase in operation;

What we have decided to keep is what we do to easily find and use what we need when we need it.

«Everything must be a place, everything must be in place»

3S - Shine



The shining stage in organizations,

- Sweeping everywhere clean,
- Keeping everything clean,
- It is to keep any unwanted object away from work environment.

4S - Standardize

In the standardizing stage in organizations;

- It ensures the continuity of what we achieved with the first 3S.
- Production & storage areas and materials & equipment should be cleaned in the framework of regular programs.

"We should not allow 'backward' by standardizing the point of arrival.»

5S – Sustain (Discipline)

In disciplinary phase;

- It provides a permanent habit in ensuring the continuity of correct operations
- This is done by the way the employees do what they need to do with a reflex or instinct.
- Regular 5S inspections are also an important element in ensuring the permanence of improvements provided by 5S.

'We must ensure continuity of compliance with the procedures set by the discipline to be achieved.'


WHAT IS TOLERANCE?
Are tolerant people more happy, or are happy people more tolerant?
Study.com