Lecture 7: Quality management systems

PRODUCT AND QUALITY

WHY QUALITY IS IMPORTANT?

- Quality has direct impact on economic results in both ways
- Costs
  - Quality assurance
  - Poor quality costs
- Incomes
  - Higher amount of sale by good perception of customers
  - Higher price that consumers are willing to pay

COST OF ACHIEVING GOOD QUALITY

- Prevention costs
  - Quality planning costs
  - Product design costs
  - Process costs
  - Training costs
  - Information costs
- Appraisal Costs
  - Inspection and testing
  - Test equipment costs
  - Operator costs

COSTS OF POOR QUALITY

- External Failure Costs
  - Customer complaint costs
  - Product return costs
  - Warranty claims costs
  - Product liability costs
  - Lost sales costs
- Internal Failure Costs
  - Scrap costs
  - Rework costs
  - Process-failure costs
  - Process downtime costs
  - Price-downgrading costs

THE CENTURY OF QUALITY

1920 - INSPECTION

- Industrial Revolution
  - mass production
  - unit verification
  - defective product
- Taylor's conception of work
- Measurement, comparison and verification activities
- Focus on the quantity produced

1930 – STATISTICAL CONTROL

- Sampling inspection
- Use of statistical tools
- First concerns regarding prevention:
  - identification of causes for defective products
- Focus on the finished product

1930 – STATISTICAL CONTROL

- Seven Basic Quality Tools:
  - Flowcharts and Process Maps
  - Check lists
  - Cause-effect diagrams
  - Pareto diagrams
  - Histograms
  - Scatter diagrams
  - Control charts

SOME HISTORY OF QUALITY MANAGMENT

→ In Japan in the beginning of 1950 – WHY ?

after world war II Japan hade downfall +economical difficulties + low competitiveness => need to use all recourses efficiently

→ JUSE (Japanise Union of Scientists and Engineers + official organisations + a committee + Japanese enterprices >> objective to imporove fastly the Japanese production and life quality

→ E. Deming and J. Juran came from USA to Japan => statistical quality control methods => quality control and quality assurance units in the companies + quality groups and circles in the production process

Kaoru Ishikawa = quality management and techno-social philopsofy and creativeness in the problem solving

→

1960 – QUALITY WARRANTY

- First quality standards
- Customers' specifications
- Preventive actions
- System's approach
- Started the concern about involving everyone in the organization
- Focus on the manufacturing process

1970 – QUALITY MANAGEMENT PROGRAMS

- Evolution from the Quality Warranty phase
- Integration of quality on global management
- Quality Circles
- Audit
- Focus on the work process

1980 – TOTAL QUALITY

- Management Principles:
  - Responsibility delegation
  - Staff autonomy
- Satisfaction of needs and expectations
- Struggle for improvement
- Adaptation needs
- Change management
- Focus on the organizational process

1980 – TOTAL QUALITY

- Quality Management System:
  a set of organisational measures which transmit maximum confidence that a given quality level is being achieved with the adequate resource consumption
- Characteristics:
  - External focus: at the client
  - Global approach and as an integral component of the organization strategy
  - Horizontal vision within the organization, from top management to staff
  - Includes all the concerned parts
  - Continuous learning and adaptation to change

1980 – TOTAL QUALITY

- Tools and methodologies:
  - Re-engineering
  - QFD – Quality Function Deployment
  - Benchmarking
  - Inquiries: clients and staff
  - Brainstorming
  - Balanced Scorecard

1990 - … – EXCELLENCE MODELS

- Orientation guide
- Flexible and adaptable instrument
- Self-assessment and continuous improvement models
- Support on the pathway to excellence
- Focus on customer

What is Quality?

- Meeting specifications
- Meeting customer needs / expectation
- Transparency of service delivery
- Process control
- Achieving desired results
- Continuous Improvement
- Competitive advantage
- Added value for society
- Best value for price
- Cost effectiveness
- Performance measurement
- More for less
- Satisfaction of stakeholders
- Doing the right things
- Doing things right
- Doing the right things right

WHAT IS QUALITY?:

1
- Small improvements in processes
- Identifying and describing processes
- Quality control to meet specifications
- Quality control and financial control are divided.

2
- Customer orientation
- Improvement of results
- Improvement of management & Organisation
- Balanced steering of management

ISO 9000: 2000

3
- Focus of potential customer
- Improvement of staff development
- Improvement of flexibility of the organisation
- Results in terms of added value for society

COMPARISON OF QUALITY MODELS IN SOCIAL SECTOR

Sector	Business Management	Quality Management	Social sector	Rehabilitation
Framework	Guidelines	Standards for QM	Standards for service provision	Principles of Excellence
Emphasise	Innovation & learning	Control & assurance	Control & assurance	Performance improvement & learning
Method	Self evaluation + external audit	External audit	External audit	Self evaluation + External audit
Orientation	Business Excellence	Process and quality control	Performance, process & quality control	Excellence in service provision
Recognition	Europe	Global	Europe	Europe
Strategic option	Flexibility	Efficiency	Efficiency	Effectiveness

TERMINOLOGY OF QUALITY

- Quality policy – The overal quality intentions and direction of an organisation related to quality, as formally expressed by top management (ISO 9000:2000)
- Quality management
- That aspect of the overall management function that determines and implements the quality policy
- Coordinated activities to direct and control an organization with regard to quality
- Quality management system – management system to direct and control an organization with regard to quality. (ISO 9000: 2000)
- Quality control
- The operational techniques and activities that are used to fulfil requirements for quality
- part of quality management focused on fulfilling quality requirements
- Quality assurance
- All those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality
- part of quality management focused on providing confidance that quality requirements are fulfilled (ISO 9000: 2000)

TERMINOLOGY OF QUALITY

- Quality planning part of quality management focused on setting quality objectives and specifying necessary operationmal processes and related resources to fulfil the quality objectives (ISO 9000:2000)
- Quality improvement part of quality management focused on increasing effectiveness and efficiency (ISO 9000:2000)
- Continuous Improvement The process of iteration which results in improving a product.
- Quality requirement requirement for inherent characteristics of a product, process or system (ISO 9000:2000)
- Characteristics distinguishing feature (ISO 9000:2000)
- Adding Value Adding something that was not there before that the customer wants.
- Quality characteristics inherent characteristics of a product, process or system derived from a requirement (ISO 9000:2000)

QUALITY PHILOSOPHERS

- Walter Shewhart
- W. Edwards Deming
- Joseph Juran
- Philip Crosby
- Armand Feigenbaum

THE EARLY AMERICANS

- **W.Edwards Deming** introduced concepts of variation to the Japanese and also a systematic approach to problem solving, which later became known as the Deming or PDCA cycle. Later in the West he concentrated on management issues and produced his famous 14 Points. He remains active today and he has attempted a summary of his 60 years experience in his System of Profound Knowledge.
- **Joseph M. Juran** focused on Quality Control as an integral part of management control in his lectures to the Japanese in the early 1950s. He believes that Quality does not happen by accident, it must be planned, and that Quality Planning is part of the trilogy of planning, control and improvement. He warns that there are no shortcuts to quality.
- **Armand Feigenbaum** is the originator of Total Quality Control. He sees quality control as a business method rather than technically, and believes that quality has become the single most important force leading to organisational success and growth.

THE JAPANESE

- **Dr. Kaoru Ishikawa**´s three main contributions to quality were the simplification and spread of technical statistical tools (the 7 tools of Quality Control) as a unified system throughout all levels of Japanese companies, his input to the company-wide Quality Movement and his input to the Quality Circle Movement.
- **Dr. Genichi Taguchi** developed a methodology for minimum prototyping in product design and troubleshooting in production.
- **Sigeo Shingo** created the poka-yoke system to ensure zero-defects in production by preventive measures.

THE NEW WESTERN WAVE

- **Philip Crosby** is perhaps best known in relation to the concepts of Do It Right First Time and Zero Defects. He is a controversial figure, who has based his quality improvement approach on Four Absolutes of Quality Management and Fourteen Steps to Quality Improvement.
- **Tom Peters** emphasises the importance of customers, innovation, people, leadership and systems. He has 45 prescriptions and 12 traits of a Quality Revolution.
- **Claus Moller** has developed a concept of Personal Quality on which he sees all other concepts of Quality as based. He provides 12 Golden Rules to help improve your actual performance level, and 17 Hallmarks of a quality company.

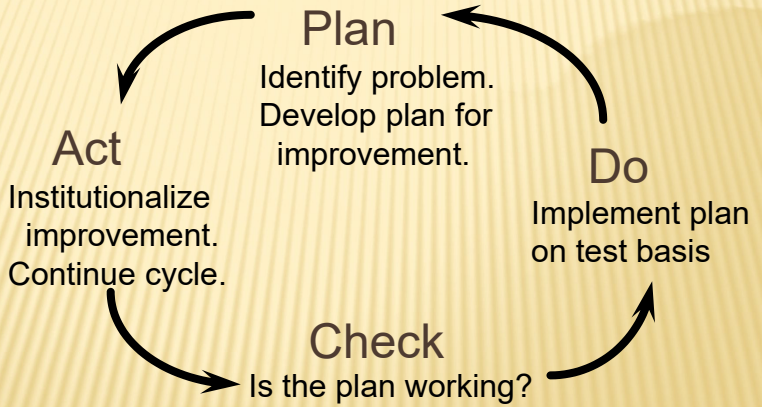
DEMING'S 14 POINTS

1. Create constancy of purpose
2. Adopt philosophy of prevention
3. Cease mass inspection
4. Select a few suppliers based on quality
5. Constantly improve system and workers
6. Institute worker training in SPC

DEMING'S 14 POINTS

7. Instill leadership among supervisors
8. Eliminate fear among employees
9. Eliminate barriers between departments
10. Eliminate slogans
11. Remove numerical quotas
12. Enhance worker pride
13. Institute vigorous education programs on quality improvement
14. Implement these 13 points (Just do it !)

THE P-D-C-A CYCLE



GENERAL IDEA QUALITY MANAGEMENT STANDARD:

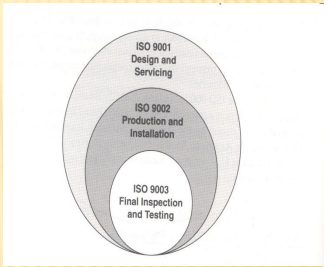
If something is made the same way every time with similar materials, then it will have the same quality when finished, preventing...

ISO 9000 CATEGORIES FIRST VERSION

- ISO 9001 ~ Suppliers and Designers
- ISO 9002 ~ Production
- ISO 9003 ~ Inspection and Test
- ISO 9004 ~ Quality Management

ISO 9000 STANDARDS FIRST VERSION

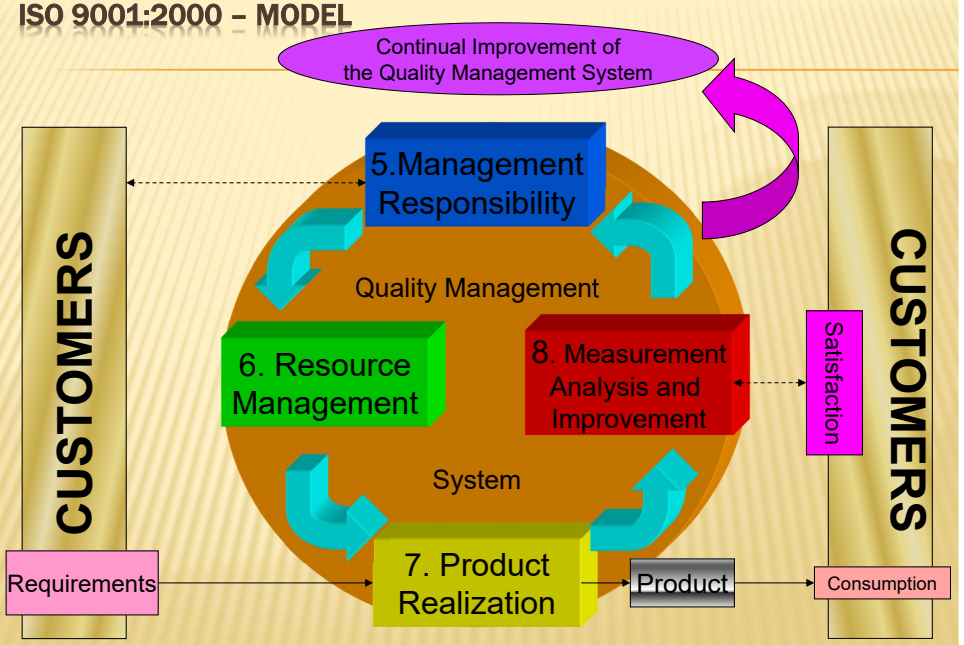
- ISO 9003 Most General of the conformance standards. Applies only to businesses whose product is final inspection and testing.
- ISO 9002 applies mainly to companies that rely on technical drawings and customer specifications for production and installation.
- ISO 9001 covered everything in ISO 9002 and 9003 plus the design process. 4 requirements for certification.



IMPORTANT CHANGES OF ISO VERSION 2000

Criteria	First version	Version from 2000
Main focus	Products	Customer satisfaction
Approach	20 quality elements	Value adding processes
Product requirements	Requirements specified by customer / organization	+ Statutory & regulatory requirements
Involvement of people	What to do, When, Whom & How to do	+ Why it is to be done
Improvements	Maintain the system requirements	Continual improvements should be achieved

ISO 9001:2000 – MODEL



PRINCIPLES OF NEW STANDARD

PRINCIPLE 1 CUSTOMER FOCUS

ORGANIZATIONS DEPEND ON THEIR CUSTOMERS AND THEREFORE SHOULD UNDERSTAND CURRENT AND FUTURE CUSTOMER NEEDS, SHOULD MEET CUSTOMER REQUIREMENTS AND STRIVE TO EXCEED CUSTOMER EXPECTATIONS.

- **Key benefits:**
- Increased revenue and market share obtained through flexible and fast responses to market opportunities.
- Increased effectiveness in the use of the organization's resources to enhance customer satisfaction.
- Improved customer loyalty leading to repeat business.
- **Applying the principle typically leads** to:
- Researching and understanding customer needs and expectations.
- Ensuring that the objectives of the organization are linked to customer needs and expectations.
- Communicating customer needs and expectations throughout the organization.
- Measuring customer satisfaction and acting on the results.
- Systematically managing customer relationships.
- Ensuring a balanced approach between satisfying customers and other interested parties.

PRINCIPLE 2 LEADERSHIP

LEADERS ESTABLISH UNITY OF PURPOSE AND DIRECTION OF THE ORGANIZATION. THEY SHOULD CREATE AND MAINTAIN THE INTERNAL ENVIRONMENT IN WHICH PEOPLE CAN BECOME FULLY INVOLVED IN ACHIEVING THE ORGANIZATION'S OBJECTIVES.

- **Key benefits:**
- People will understand and be motivated towards the organization's goals and objectives.
- Activities are evaluated, aligned and implemented in a unified way.
- Miscommunication between levels of an organization will be minimized.
- **Applying the principle of leadership typically leads** to:
- Considering the needs of all interested parties including customers, owners, employees, suppliers, financiers, local communities and society as a whole.
- Establishing a clear vision of the organization's future.
- Setting challenging goals and targets.
- Creating and sustaining shared values, fairness and ethical role models at all levels of the organization.
- Establishing trust and eliminating fear.
- Providing people with the required resources, training and freedom to act with responsibility and accountability.
- Inspiring, encouraging and recognizing people's contributions.

PRINCIPLE 3 INVOLVEMENT OF PEOPLE

PEOPLE AT ALL LEVELS ARE THE ESSENCE OF AN ORGANIZATION AND THEIR FULL INVOLVEMENT ENABLES THEIR ABILITIES TO BE USED FOR THE ORGANIZATION'S BENEFIT.

- **Key benefits:**
- Motivated, committed and involved people within the organization.
- Innovation and creativity in furthering the organization's objectives.
- People being accountable for their own performance.
- People eager to participate in and contribute to continual improvement.
- **Applying the principle of involvement of people typically leads** to:
- People understanding the importance of their contribution and role in the organization.
- People identifying constraints to their performance.
- People accepting ownership of problems and their responsibility for solving them.
- People evaluating their performance against their personal goals and objectives.
- People actively seeking opportunities to enhance their competence, knowledge and experience.
- People freely sharing knowledge and experience.
- People openly discussing problems and issues.

PRINCIPLE 4 PROCESS APPROACH

A DESIRED RESULT IS ACHIEVED MORE EFFICIENTLY WHEN ACTIVITIES AND RELATED RESOURCES ARE MANAGED AS A PROCESS

- **Key benefits:**
- Lower costs and shorter cycle times through effective use of resources.
- Improved, consistent and predictable results.
- Focused and prioritized improvement opportunities.
- **Applying the principle of process approach typically leads to:**
- Systematically defining the activities necessary to obtain a desired result.
- Establishing clear responsibility and accountability for managing key activities.
- Analyzing and measuring of the capability of key activities.
- Identifying the interfaces of key activities within and between the functions of the organization.
- Focusing on the factors such as resources, methods, and materials that will improve key activities of the organization.
- Evaluating risks, consequences and impacts of activities on customers, suppliers and other interested parties.

PRINCIPLE 5 SYSTEM APPROACH TO MANAGEMENT

IDENTIFYING, UNDERSTANDING AND MANAGING INTERRELATED PROCESSES AS A SYSTEM CONTRIBUTES TO THE ORGANIZATION'S EFFECTIVENESS AND EFFICIENCY IN ACHIEVING ITS OBJECTIVES.

- **Key benefits**:
- Integration and alignment of the processes that will best achieve the desired results.
- Ability to focus effort on the key processes.
- Providing confidence to interested parties as to the consistency, effectiveness and efficiency of the organization.
- **Applying the principle of system approach to management typically leads** to:
- Structuring a system to achieve the organization's objectives in the most effective and efficient way.
- Understanding the interdependencies between the processes of the system.
- Structured approaches that harmonize and integrate processes.
- Providing a better understanding of the roles and responsibilities necessary for achieving common objectives and thereby reducing cross-functional barriers.
- Understanding organizational capabilities and establishing resource constraints prior to action.
- Targeting and defining how specific activities within a system should operate.
- Continually improving the system through measurement and evaluation.

PRINCIPLE 6 CONTINUAL IMPROVEMENT

CONTINUAL IMPROVEMENT OF THE ORGANIZATION'S OVERALL PERFORMANCE SHOULD BE A PERMANENT OBJECTIVE OF THE ORGANIZATION.

- **Key benefits**:
  - Performance advantage through improved organizational capabilities.
  - Alignment of improvement activities at all levels to an organization's strategic intent.
  - Flexibility to react quickly to opportunities.
- **Applying the principle of continual improvement typically leads to**:
  - Employing a consistent organization-wide approach to continual improvement of the organization's performance.
  - Providing people with training in the methods and tools of continual improvement.
  - Making continual improvement of products, processes and systems an objective for every individual in the organization.
  - Establishing goals to guide, and measures to track, continual improvement.
  - Recognizing and acknowledging improvements.

PRINCIPLE 7 FACTUAL APPROACH TO DECISION MAKING

EFFECTIVE DECISIONS ARE BASED ON THE ANALYSIS OF DATA AND INFORMATION

- **Key benefits:**
  - Informed decisions.
  - An increased ability to demonstrate the effectiveness of past decisions through reference to factual records.
  - Increased ability to review, challenge and change opinions and decisions.
- **Applying the principle of factual approach to** decision making typically leads to:
  - Ensuring that data and information are sufficiently accurate and reliable.
  - Making data accessible to those who need it.
  - Analysing data and information using valid methods.
  - Making decisions and taking action based on factual analysis, balanced with experience and intuition

PRINCIPLE 8 MUTUALLY BENEFICIAL SUPPLIER RELATIONSHIPS

AN ORGANIZATION AND ITS SUPPLIERS ARE INTERDEPENDENT AND A MUTUALLY BENEFICIAL RELATIONSHIP ENHANCES THE ABILITY OF BOTH TO CREATE VALUE

- **Key benefits:**
  - Increased ability to create value for both parties.
  - Flexibility and speed of joint responses to changing market or customer needs and expectations.
  - Optimization of costs and resources.
- **Applying the principles** of mutually beneficial supplier relationships typically leads to:
  - Establishing relationships that balance short-term gains with long-term considerations.
  - Pooling of expertise and resources with partners.
  - Identifying and selecting key suppliers.
  - Clear and open communication.
  - Sharing information and future plans.
  - Establishing joint development and improvement activities.
  - Inspiring, encouraging and recognizing improvements and achievements by suppliers.

PROCESS APPROACH

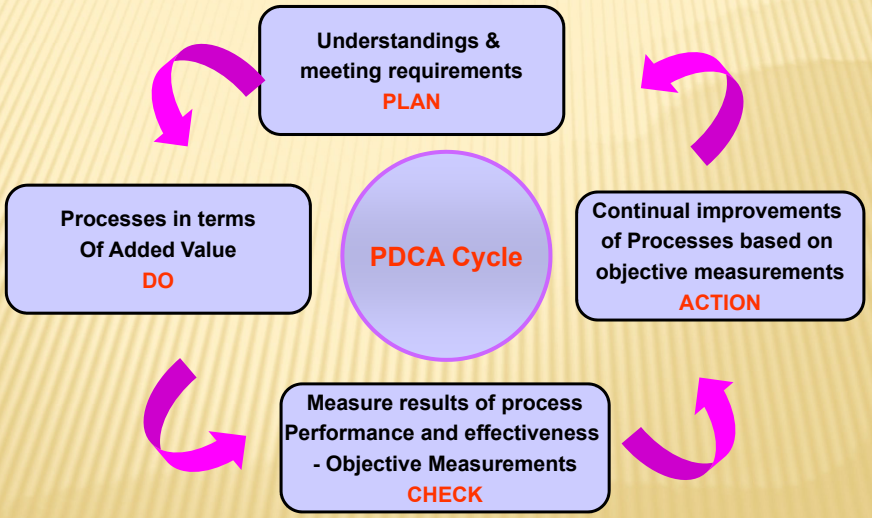
Process definition

Set of interrelated or interacting activities which transforms inputs into outputs

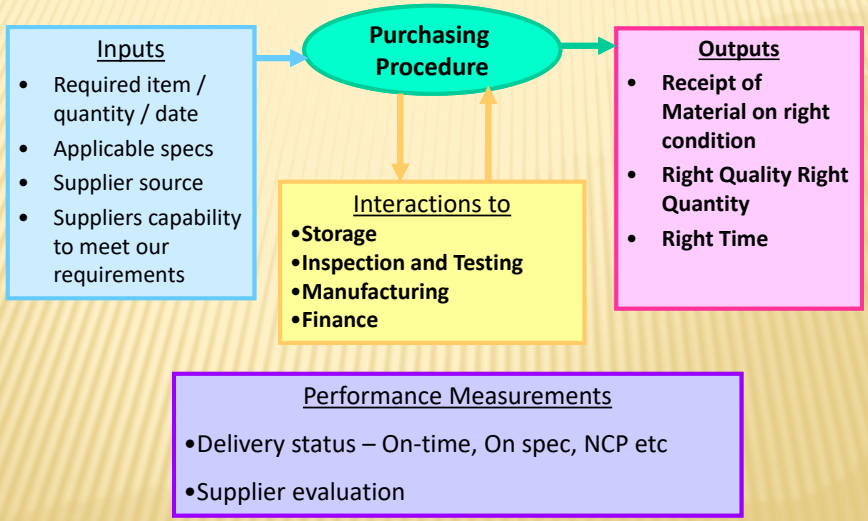
Identify the processes → **Identify the Inputs & outputs** → **Identify the Interactions to other processes** → **Establish measuring criteria** → **Ensure continual improvements**

Do it for all value adding processes

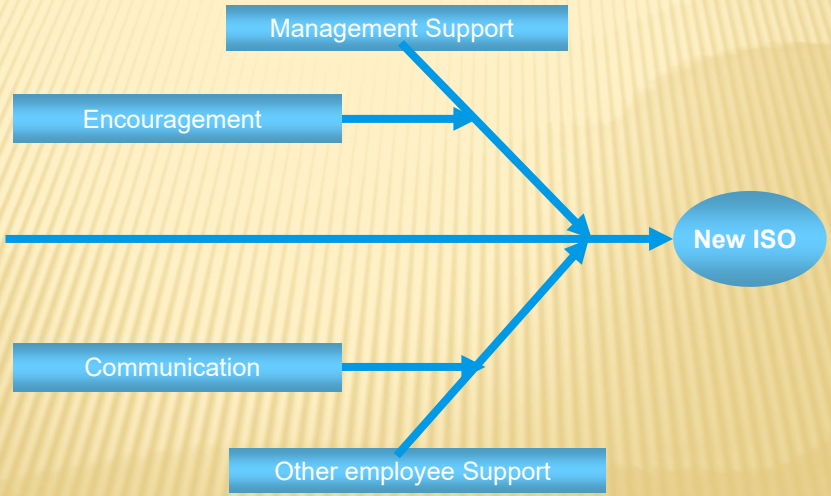
PROCESS APPROACH – CONTINUAL IMPROVEMENTS OF PROCESS



E.G. - PURCHASING PROCESS



CHALLENGES IN IMPLEMENTING NEW STANDARD



TOTAL QUALITY MANAGEMENT CONCEPT

Total quality management represents a set of management principles that view customer-focused quality improvement as the driving force in all functional areas and at all levels in a company. These management principles include customer focus, management leadership, strategic quality planning, company-wide commitment, continuous improvement, and employee involvement.

1. Customer defined quality
2. Top management leadership
3. Quality as a strategic issue
4. All employees responsible for quality
5. Continuous improvement
6. Shared problem solving
7. Statistical quality control
8. Training & education for all employees

TOTAL QUALITY MANAGEMENT-TQM CONCEPT

- ***Customer*** defines quality, and the customer's needs are the top priority
- Top management must provide the ***leadership*** for quality
- Quality is a ***strategic*** issue
- Quality is the responsibility of all ***employees*** at all levels of the organization

TOTAL QUALITY MANAGEMENT-TQM

- All functions of the company must focus on ***continuous quality improvement*** to achieve strategic goals
- Quality problems are solved through ***cooperation*** among employees and management
- Problem solving & continuous quality improvement use ***statistical quality control*** methods
- ***Training and education*** of all employees are the basis for continuous quality improvement

QUALITY AWARDS

Quality awards and certifications have been instrumental in stimulating the growth of quality management worldwide. The Malcolm Baldrige Award is given annually to a maximum of 6 U.S. firms that excel in quality. ISO 9000 certification of a company's quality system is required if that company wishes to do business with the European Common market.

- The Malcolm Baldrige Award (USA award)
- The Deming Prize (Japan Government Award)
- Industry, regional, and company awards
  - Institute of Industrial Engineers
  - NASA
  - European Quality Award

EUROPEAN QUALITY AWARD SCHEME