MODERN BUSINESS ENVIRONMENT

LEARNING OUTCOMES

After studying this chapter, you will be able to:

❑ Explain, Modern Business Environment

❑ Evaluate Total Quality Management (TQM), Cost of Quality, Business Excellence Model & Supply Chain Management

❑ Discuss and Apply the Theory of Constraints

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During the past two decades, the business environment in many sectors has been characterized by rapid changes. The environment is ever changing and dynamic in nature. The modern business environment has changed drastically and shaped entirely, in a very different manner. Now, it has become a challenge for business managers to understand their business environment and formulate business plans and policies accordingly. Business technology has advanced business functions and operations to new levels. The role of accounting is one of the most reliable functions in business.

The main revolution has been the transition from a seller’s market to a buyer’s market. Earlier the supplier or service provider dictated the dimensions of a transaction:

- **Price** - usually determined by a “cost plus” approach.
- **Response time** - determined by the supplier.
- **Quality** - determined by the service/product provider.
- **Performance** - dictated to the customer.
From a Sellers’ Market to Buyers’ Market

Today’s business environment is that of a buyer’s market. This trend is the result of international transitions and macroeconomic, technological, political, and social changes. This environment is characterized by:

- Globalization of the world economy.
- Fierce competition among organizations within and across countries.
- Global excess capacities in production, services, and in some areas of development.
- Using new managerial methods.
- Availability and accessibility of data and knowledge.
- Timely availability of materials and services.
- Ease of global travel and transportation.

The challenge for businesses today is to satisfy their customers through the exceptional performance of their processes. Therefore, in this chapter, we first address the Cost of Quality, Total Quality Management, and then focus on Supply Chain Management along with other modern concepts.

COST OF QUALITY (COQ)

The concept of cost of quality has been around for many years. Dr. Joseph M. Juran in 1951 in his Quality Control Handbook included a section on COQ. Mr. Philip B. Crosby in his book Quality Is Free has popularized the COQ concept.

Quality is concerned with conformance to specification; ability to satisfy customer expectations and value for money. Recognising the importance of cost of quality is important in terms of continuous improvement process. The cost of control/conformance and the cost of failure of control/non-conformance is the quantitative measure of COQ. It is the sum of the costs related to prevention and detection of defects and the costs incurred due to occurrences of defects.

Views regarding Cost of Quality

In the past, it was assumed that increased quality is accompanied by increased cost; higher quality means higher cost. Today view of quality cost among practitioners seems fall into three categories:

- Higher quality means higher cost
  Quality attributes such as performance and features cost more in terms of labour, material, design, and other costly resources. The additional benefits which are gained from improved quality do not compensate for the additional expenses.

- The resultant savings are greater than the cost of improving quality
  Deming promoted this view, which is still widely accepted in Japan. The savings result from
less rework, scrap, and other direct expenses related to defects. Japanese firms made continuous improvements using this philosophy.

- **Quality costs are those incurred in excess of those that would have been incurred if product was built or service performed exactly right the first time**

  This view is held by adherents of the TQM philosophy. Here not only direct costs are included, but also those resulting from loss of customers, loss in market share, and many hidden costs and foregone opportunities not identified by modern cost accounting systems.

### Components of COQ

Mr. Philip B. Crosby in his book *Quality is Free* referred to the COQ costs in two broad categories namely ‘Price of Conformance’ and ‘Price of Non-conformance’. These two can be bifurcated further into prevention & appraisal costs and internal & external failure costs. Hence, COQ is often referred as PAF (Prevention, appraisal & failure) model. In other words, ‘Price of Conformance’ is known as ‘Cost of Good quality’ and ‘Price of Non-conformance’ is often termed as ‘Cost of Poor Quality’.

![Diagram of Cost of Quality](image)

**Prevention Costs**

The costs incurred for preventing the poor quality of products and services may be termed as Prevention Cost. These costs are incurred to avoid quality problems. They are planned and *incurred before actual operation* and are associated with the design, implementation, and maintenance of the quality management system. Prevention costs try to *keep failure and appraisal cost to a minimum.*
Examples include the costs for:

- Quality planning (creation of plans for quality, reliability, operations, production, and inspection)
- Quality assurance (creation and maintenance of the quality system)
- Supplier evaluation
- New product review
- Error proofing
- Capability evaluations
- Quality improvement team meetings
- Quality improvement projects
- Quality education and training (development, preparation, and maintenance of programs)
- Cost incurred due to product specification arising may be from incoming materials or intermediate processes.

**Appraisal Costs**

The need of control in product and services to ensure high quality level in all stages, conformance to quality standards and performance requirements is Appraisal Costs. These are costs associated with measuring and monitoring activities related to quality. Appraisal Cost incurred to determine the degree of *conformance to quality requirements* (measuring, evaluating or auditing). They are associated with the *supplier’s and customer’s evaluation* of purchased materials, processes, products and services to ensure that they are as per the specifications. They could include:

Examples include the costs for:

- Verification (checking of incoming material, process setup, and products against agreed specifications)
- Quality audits (confirmation that the quality system is functioning correctly)
- Supplier rating (assessment and approval of suppliers of products and services)
- Checking and testing purchased goods and services
- In-process and final inspection/test
- Field testing
- Product, process, or service audits
- Calibration of measuring and test equipment

**Internal Failure Costs**

Internal Failure Cost associated with *defects found before the customer receives* the product or service. Internal failure costs are incurred to remedy defects discovered before the product or service is delivered to the customer. These costs occur when the product is not as per design...
quality standards and they are detected before they are transferred to the customer. These are costs that are caused by products or services not conforming to requirements or customer/user needs and are found before delivery of products and services to external customers. Deficiencies are caused both by errors in products and inefficiencies in processes. They could include:

Examples include the costs for:

- Waste - waste occurs when unnecessary work is done or holding of stock as a result of errors, poor organization, or communication
- Scrap — defective product or material that cannot be repaired, used, sold
- Rework or rectification — when the work needs to be rectified for defective material or errors
- Failure analysis — activity required to establish the causes of internal product or service failure
- Delays
- Re-designing
- Shortages
- Failure analysis
- Re-testing
- Downgrading
- Downtime
- Lack of flexibility and adaptability

**External Failure Costs**

External failure costs are incurred to mediate *defects discovered by customers*. These costs occur when products or services that fail to reach design quality standards are not detected until after transfer to the customer. After the product or service is delivered and then the defects is found then it is an external failure. Further external failure costs are costs that are caused by deficiencies found after delivery of products and services to external customers, which lead to customer dissatisfaction. They could include:

Examples include the costs for:

- Repairs and servicing (of both products that have been returned by the customer and which are serviced at the customer’s place)
- Warranty claims (failed products that are replaced or services that are re-performed under a guarantee)
- Complaints (all work and costs associated with handling and servicing customer’s complaints)
- Returns (handling and investigation of rejected or recalled products, including transport costs)
- Complaints
- Repairing goods and redoing services
• Warranties
• Losses due to sales reductions
• Environmental costs

The total quality costs are then the sum of all these costs.

Cost of Quality (COQ) = Cost of Control (Prevention Cost + Appraisal Cost) + Cost of Failure of Control (Internal Failure Cost + External Failure Cost)

• In its simplest form, COQ can be calculated *in terms of effort* (hours/days).
• A better approach will be to calculate COQ *in terms of money* (converting the effort into money and adding any other tangible costs like test environment setup).
• The best approach will be to calculate COQ as a *percentage of total cost*. This allows for comparison of COQ across projects or companies.
• To ensure impartiality, an external person say the accountant must determine the Cost of Quality of a project/product rather than a person who is a core member of the project/product team (Say, someone from the Accounts Department).

**Illustration**

Livewell Limited is a manufacturing company that produces a wide range of consumer products for home consumption. Among the popular products are its energy efficient and environment friendly LED lamps. The company has a quality control department that monitors the quality of production.

As per the recent cost of poor quality report, the current rejection rate for LED lamps is 5% of units input. 5,000 units of input go through the process each day. Each unit that is rejected results in a ₹200 loss to the company. The quality control department has proposed few changes to the inspection process that would enable early detection of defects. This would reduce the overall rejection rate from 5% to 3% of units input. The improved inspection process would cost the company ₹15,000 each day.

**Required**

(i) **ANALYSE the proposal and suggest if it would be beneficial for the company to implement it.**

(ii) **After implementation, ANALYSE the maximum rejection rate beyond which the proposal ceases to be beneficial?**
Solution

(i) Analysis of the proposal to make changes to the inspection process:

The company wants to reduce the cost of poor quality on account of rejected items from the process. The current rejection rate is 5% that is proposed to be improved to 3% of units input.

The expected benefit to the company can be worked out as follows:

The units of input each day = 5,000. At the current rate of 5%, 250 units of input are rejected each day. It is proposed to reduce rejection rate to 3%, that is 150 units of input rejected each day. Therefore, improvements to the inspection process would reduce the number of units rejected by 100 units each day. The resultant cost of poor quality would reduce by ₹20,000 each day (100 units of input × ₹200 cost of one rejected unit).

The cost of implementing these additional controls to the inspection process would be ₹15,000 each day.

The net benefit to the company on implementing the proposal would be ₹5,000 each day. Therefore, the company should implement the proposal.

(ii) Analysis of maximum rejection rate beyond which the proposal ceases to be beneficial

The cost of improving controls to the inspection process is ₹15,000 each day. The number of units of input processed each day is 5,000. The cost of rejection is ₹200 per unit.

It makes sense to implement the improvements to controls only if the benefit is greater than the cost involved. To find out the point where the benefits equal the cost, solve the following equation

Let the number of reduction in rejections each day due to improved controls be R.

At ₹200 per unit, benefits from reduction in rejection would be ₹200 × R.

At what point, would this be equal to the cost of control of ₹15,000 per day?

Solving ₹200 × R = ₹15,000; R = 75 units. That is if the improvements to inspection process control reduces the number of rejections by 75 units each day, the benefit to the company would be ₹15,000 each day.

That is if the rejection rate improves by 1.5% (75 units / 5,000 units) then the benefits accruing to the company will equal the cost incurred.

In other words, when the rejection rate is 3.5% (current rate 5% - improvement of 1.5% to the rate) or below, the proposal will be beneficial. In this range, the savings to the cost of poor quality will be more than the cost involved. For example, as explained above, when the improved rejection rate is 3%, the net benefit to the company is ₹5,000 each day.

Beyond 3.5% rejection rate, the proposal will result in savings to the cost of poor quality that is less than the cost involved of ₹15,000 each day.
Optimal COQ

It is generally accepted that an increased expenditure in prevention and appraisal is likely to result in a substantial reduction in failure costs. Because of the trade off, there may be an optimum operating level in which the combined costs are at a minimum.

Hence it is further argued that striving for zero defects through a program of continuous improvements is not good for the economic interest of the company.

Case Scenario

JK Ltd. produces and sells a single product. Presently the company is having its quality control system in a small way at an annual external failure and internal failure costs of ₹4,40,000 and ₹8,50,000 respectively. As the company is not able to ensure supply of good quality products upto the expectations of its customers and wants to manage competition to retain market share considers an alternative quality control system. It is expected that the implementation of the system annually will lead to a prevention cost of ₹5,60,000 and an appraisal cost of ₹70,000. The external and internal failure costs will reduce by ₹1,00,000 and ₹4,10,000 respectively in the new system. All other activities and costs will remain unchanged.

Required

(i) EXAMINE the new quality control proposal and recommend the acceptance or otherwise of the proposal both from financial and non-financial perspectives.

(ii) What is your ADVICE to the company, if the company wants to achieve zero defect through a continuous quality improvement programme?

(iii) SUGGEST a suitable quality control level at a minimum cost.
Solution

(i) Implementation of new system will reduce costs of the non-conformance (internal and external failure) by ₹5,10,000 (-40%). However, this will also increase costs of conformance by ₹6,30,000. There is inverse relationship between the costs of the conformance and the costs of non-conformance. JK Ltd. should try to avoid costs of non-conformance because both internal and external failure affect customer's satisfaction and organisation's profitability. The company should focus on preventing the error such that it ensures that product is of good quality when it reaches the customer at the very first instance. This enhances the customer experience and therefore eliminating the scope for external failures like sales returns and warranty claims. Better quality can yield further sales. Therefore, an increase in spending on quality measures is justified since it not only yields significant improvements to quality but also brings in more sales orders.

Accordingly, from the financial perspective point of view the new proposal for quality control should not be accepted as it will lead to an additional cost of ₹1,20,000 (₹6,30,000 - ₹5,10,000). However, from non-financial perspective point of view as stated above the company should accept the new proposal.

(ii) It is possible to increase quality while at the same time reducing both conformance and non-conformance costs if a programme of aiming for zero defect/and or continuous improvement is followed. Zero defect advocates continuous improvement. To implement this elimination of all forms of waste, including reworks, yield losses, unproductive time, over-design, inventory, idle facilities, safety accidents, etc. is necessary.

(iii) To achieve 0% defects, costs of conformance must be high. As a greater proportion of defects are accepted, however, these costs can be reduced. At a level of 0% defects, cost of non-conformance should be nil but these will increase as the accepted level of defects rises. There should therefore be an acceptable level of defects at which the total costs of quality are at a minimum.

Steps of Application of PAF Model

The prevention, appraisal, and failure (PAF) model is the most widely accepted method for measuring and classifying quality costs. Follow this five-step process.
Conclusion

Many of the costs of quality are hidden and thus making it difficult to identify by formal measurement systems. The iceberg model is very often used to illustrate this matter:

Only a minority of the costs of poor and good quality is obvious – appear above the surface of the water. The reduction of cost under water has a huge scope. If we identify and improve these costs, the costs of doing business will significantly reduce.
TOTAL QUALITY MANAGEMENT (TQM)

Total Quality Management is a management approach that originated in the 1950s and has steadily become more popular since the early 1980s. The concept of Total Quality Management was developed jointly by W. Edwards Deming, Joseph M. Juran, and Armand V. Feigenbaum. TQM is a management philosophy that seeks to integrate all organizational functions (marketing, finance, design, engineering, and production, customer service, etc.) to focus on meeting customer needs and organizational objectives.

TQM aims at improving the quality of organizations outputs, including goods and services, through continual improvement of internal practices. As part of the TQM approach, standards can be set based on both internal priorities or any industry standards currently in place. It is indeed a joint effort of management, staff members, workforce, and suppliers to meet and exceed customer satisfaction level. Industry standards can be defined at multiple levels, and may include production of items to an understood norm or adherence to various laws and regulations governing the operation of the particular business. It was originally applied in manufacturing areas and used in that for a number of years, TQM is now becoming recognized as a generic management tool and now is applied in service and public sector organizations.

TQM's objectives are to eradicate waste and increase efficiency. This is done by ensuring that the production of the organization's product (or service) is apt the first time.

CIMA defines 'Total Quality Management' as “Integrated and comprehensive system of planning and controlling all business functions so that products or services are produced which meet or exceed customer expectations. TQM is a philosophy of business behaviour, embracing principles such as employee involvement, continuous improvement at all levels and customer focus, as well as being a collection of related techniques aimed at improving quality such as full documentation of activities, clear goal-setting and performance measurement from the customer perspective.”

Thus, Total Quality Management (TQM) is a management strategy aimed at embedding awareness of quality in all organizational processes. TQM requires that the company maintain this quality standard in all aspects of its business. This requires ensuring that things are done right the first time and that defects and waste are eliminated from operations. TQM is a comprehensive management system which:

- Focuses on meeting owner’s/ customer’s needs, by providing quality services at a reasonable cost.
- Focuses on continuous improvement.
- Recognizes role of everyone in the organization.
- Views organization as an internal system with a common aim.
- Focuses on the way tasks are accomplished.
- Emphasizes teamwork.
**Six C’s of TQM**

The Six Cs for successful implementation of a Total Quality Management (TQM) process is depicted as follows:

- **Commitment**: If a TQM culture is to be developed, so that quality improvement becomes a normal part of everyone’s job, a clear commitment, from the top must be provided. Without this all else fails. It is not sufficient to delegate ‘quality’ issues to a single person since this will not provide an environment for changing attitudes and breaking down the barriers to quality improvement. Such expectations must be made clear, together with the support and training necessary to their achievement.

- **Culture**: Training lies at the centre of effecting a change in culture and attitudes. Management accountants, too often associate ‘creativity’ with ‘creative accounting’ and associated negative perceptions. This must be changed to encourage individual contributions and to make ‘quality’ a normal part of everyone’s job.

- **Continuous Improvement**: Recognition that TQM is a ‘process’ not a ‘programme’ necessitates that we are committed in the long term to the never-ending search for ways to do the job better. There will always be room for improvement, however small.
Co-operation: The application of Total Employee Involvement (TEI) principles is paramount. The on-the-job experience of all employees must be fully utilised and their involvement and co-operation sought in the development of improvement strategies and associated performance measures.

Customer Focus: The needs of the customer are the major driving thrust; not just the external customer (in receipt of the final product or service) but the internal customer's (colleagues who receive and supply goods, services or information). Perfect service with zero defects in all that is acceptable at either internal or external levels. Too frequently, in practice, TQM implementations focus entirely on the external customer to the exclusion of internal relationships; they will not survive in the short term unless they foster the mutual respect necessary to preserve morale and employee participation.

Control: Documentation, procedures and awareness of current best practice are essential if TQM implementation is to function appropriately. The need for control mechanisms is frequently overlooked, in practice, in the euphoria of customer service and employee empowerment. Unless procedures are in place improvements cannot be monitored and measured nor deficiencies corrected.

Difficulties will undoubtedly be experienced in the implementation of quality improvement and it is worthwhile expounding procedure that might be adopted to minimise them in detail.

Contributions in the field of TQM by Deming

W. Edwards Deming is often referred to as the “father of quality control.” He was a statistics professor at New York University in the 1940s. After World War II he assisted many Japanese companies in improving quality. The Japanese regarded him so highly that in 1951 they established the Deming Prize, an annual award given to organisations that demonstrate outstanding quality. It was almost 30 years later that American businesses began adopting Deming’s philosophy. A number of elements of Deming’s philosophy depart from traditional notions of quality. The first is the role management should play in a company’s quality improvement effort. Historically, poor quality was blamed on workers — on their lack of productivity, laziness, or carelessness. However, Deming pointed out that only 15 percent of quality problems are actually due to worker error. The remaining 85 percent are caused by processes and systems, including poor management. Deming said that it is up to management to correct system problems and create an environment that promotes quality and enables workers to achieve their full potential. He believed that managers should drive out any fear employees have of identifying quality problems, and that numerical quotas should be eliminated. Proper methods should be taught and detecting and eliminating poor quality should be everyone’s responsibility.

Deming outlined his philosophy on quality in his famous “14 Points”. These points are principles that help guide companies in achieving quality improvement. The principles are founded on the idea that upper management must develop a commitment to quality and provide a system to
support this commitment that involves all employees and supplier. Deming stressed that quality improvements cannot happen without organizational change that comes from upper management.

**Deming’s 14 Points Methodology**

1. "Create constancy of purpose towards improvement". Replace short-term reaction with long-term planning.

2. "Adopt the new philosophy". The implication is that management should actually adopt his philosophy, rather than merely expect the workforce to do so.

3. "Cease dependence on inspection". If variation is reduced, there is no need to inspect manufactured items for defects, because there won’t be any.

4. "Move towards a single supplier for any one item." Multiple suppliers mean variation between feedstock.

5. "Improve constantly and forever". Constantly strive to reduce variation.

6. "Institute training on the job". If people are inadequately trained, they will not all work the same way, and this will introduce variation.

7. "Institute leadership". Deming makes a distinction between leadership and mere supervision. The latter is quota and target-based.

8. "Drive out fear". Deming sees management by fear as counter-productive in the long term, because it prevents workers from acting in the organisation’s best interests.

9. "Break down barriers between departments". Another idea central to TQM is the concept of the ‘internal customer’, that each department serves not the management, but the other departments that use its outputs.

10. "Eliminate slogans". Another central TQM idea is that it’s not people who make most mistakes - it’s the process they are working within. Harassing the workforce without improving the processes they use is counter-productive.

11. "Eliminate management by objectives". Deming saw production targets as encouraging the delivery of poor-quality goods.

12. "Remove barriers to pride of workmanship". Many of the other problems outlined reduce worker satisfaction.

13. "Institute education and self-improvement".

14. "The transformation is everyone's job".

**The Plan–Do–Check–Act (PDCA) Cycle**

Deming developed the Plan – Do – Check – Act cycle. PDCA Cycle describes the activities a company needs to perform in order to incorporate continuous improvement in its operation. This
cycle, is also referred to as the *Deming wheel*. The circular nature of this cycle shows that continuous improvement is a never-ending process. Let’s look at the specific steps in the cycle.

**Implementation of TQM**
Implementation of TQM is a strategic decision. The first and foremost step in this process involves *collecting the data related to the organization’s current reality*. TQM implementation should be delayed till the organization is in a state where TQM is likely to succeed. In case there exist an organisational problem such as a very unstable funding base, weak administrative systems, lack of managerial skill, or poor employee morale, TQM would not be appropriate. Management audit helps in identifying the current levels of organizational functioning and areas in need of change.

**Criticisms of Total Quality Management**
Some authors, notably Carlzon (1987), Albrecht (1985) and Albrecht and Zemke (1988) have criticised the direction that TQM implementations have tended to take in practice, in particular

- the focus on documentation of process and ill-measurable outcomes;
- the emphasis on quality assurance rather than improvement; and
- an internal focus which is at odds with the alleged customer orientation.

Carlzon has revived the customer focus with an emphasis on total employee involvement (TEI) culminating in the empowerment of the ‘front-line’ of customer service troops. The main features of his empowerment thrust has been:

- loyalty to the vision of the company through the pursuit of tough, visible goals;
- recognition of satisfied customers and motivated employees as the true assets of a company;
delegation of decision-making to the point of responsibility by eliminating hierarchical tiers of authority to allow direct and speedy response to customer needs; and

decentralisation of management to make best use of the creative energy of the workforce.

Albrecht suggest that TQM may not be appropriate for service based industries, because the standards-based approach of ‘industry best practice’ ignores the culture of organisations. He recommends a move towards TQS (total quality service), which is more customer oriented and creates an environment to promote enthusiasm and commitment. Albrecht suggests that poor service is associated with sloppy procedures, errors, inaccuracies and oversights and poor co-ordination, all of which represents improvement opportunities which can be achieved through tighter controls.

**Conclusion**

There is no single theory on TQM, but Deming, Juran and Ishikawa provide the core assumptions, as a “discipline and philosophy of management which institutionalizes planned and continuous improvement and assumes that quality is the outcome of all activities that take place within an organization; that all functions and all employees have to participate in the improvement process; that organizations need both quality systems and a quality culture.”

To successfully implement TQM immense efforts, time, courage, and patience is required. Successful implementation of TQM results in improved quality across all major processes and departments, higher customer retention, higher revenue on account of improved sales, and global brand recognition.

While TQM shares much in common with the Six Sigma improvement process, it is not the same as Six Sigma. TQM focuses on process improvements, while Six Sigma looks to reduce defects.

**TQM in Practice**

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**Tata Steel** has maintained the confidence to improve performance globally even in the face of a challenging economic climate in which the steel industry happens to be severely affected. One factor that contributes to this confidence is the Company's adherence to Total Quality Management (TQM) to achieve its goals. Since the formal incorporation of TQM for Business Excellence in the late 1980’s Tata Steel has adopted a number of improvement initiatives popular around the world. At Tata Steel’s European operations, Continuous Improvement activities are focused on providing Business Units with the ability to drive business through Lean Management, a common strategy deployment process, training of CI coaches and knowledge sharing through operations.

NatSteel maintains a systematic approach towards improving productivity and enhancing quality while reducing cost at the same time. The Singapore operations concentrated on yield improvement, reduction in power consumption and a significant bottom line benefit. The Xiamen operations have also adopted measures to reduce vulnerability caused by price fluctuations.

With the Company’s better understanding of TQM and the Theory of Constraints (TOC) on the
Deming Application Prize journey, its customer focus and market orientation have undergone a sea-change. Tata Steel has initiated a culture of value creation with customers and suppliers. Specific approaches focus on the ‘needs’ of the customer as opposed to ‘wants’. Programmes include those on Customer Value Management, Retail Value Management, and Solution for Sales and Supplier Value Management. The Company emphasises effective daily work management practices, a clean and safe work environment and consistency and stability of processes as important factors in sustaining development and growth.

In the face of high raw-material price volatility and an overall trend of rapidly increasing prices, in 2009-2010 the procurement Division of Tata Steel India focused its efforts on keeping these trends in check by leveraging long-term contracts and relationships, and on minimising risk by hedging and through various other strategic sourcing tools, including innovations and improvement initiatives using Total Quality Management precepts.

Tata Steel is the first integrated steel company in the world, outside of Japan, to win the Deming Application Prize. The steel giant won the 2008 prize for achieving distinctive performance improvements through the application of total quality management (TQM).

### General Electric Company and Motorola Inc.

Today’s customers demand and expect high quality. Companies that do not make quality a priority risk long-run survival. World-class organizations such as General Electric and Motorola attribute their success to having one of the best quality management programs in the world. These companies were some of the first to implement a quality program called, Six Sigma, where the level of defects is reduced to approximately 3.4 parts per million. To achieve this, everyone in the company is trained in quality. For example, individuals highly trained in quality improvement principles and techniques receive a designation called “Black Belt.” The full-time job of Black Belts is to identify and solve quality problems. In fact, Motorola was one of the first companies to win the prestigious Malcolm Baldrige National Quality Award in 1988, due to its high focus on quality. Both GE and Motorola have had a primary goal to achieve total customer satisfaction. To this end, the efforts of these organizations have included eliminating almost all defects from products, processes, and transactions. Both companies consider quality to be the critical factor that has resulted in significant increases in sales and market share, as well as cost savings.

### THE BUSINESS EXCELLENCE MODEL

Business Excellence (BE) is a philosophy for developing and strengthening the management systems and processes of an organization to improve performance and create value for stakeholders. The essence of this approach is to develop quality management principles that increase the overall efficiency of the operation, minimize waste in the production of goods and services, and help to increase employee loyalty as a means of maintaining high standards throughout the business by achieving excellence in everything that an organization does (including leadership, strategy, customer focus, information management, people, and processes).
Business excellence principles emerged because of development of quality drive into traditional business management. Business excellence considers various management thoughts as core concepts and structures quality management in a manner that can be adapted by any enterprise. Several business excellence models exist world-wide. While variations exist, these models are all *remarkably similar*. The most common include:

- EFQM Excellence Model
- Baldrige Criteria for Performance Excellence
- Singapore BE Framework
- Japan Quality Award Model
- Australian Business Excellence Framework

Few of the models mentioned above having strategic importance in the process of organizational development have been discussed here.

**EFQM Excellence Model**

EFQM Excellence Model meets the Fundamental Concepts of excellence well. It is European model but is closely related to other models such as the US Model Malcolm Baldrige Model. The Baldrige model has the same aims and very similar framework.

The EFQM Excellence Model provides an all-round view of the organisation and it can be used to determine how different methods fit together and complement each other. Based on the needs of the organisation, this model can be used with other tools of improvement to attain sustainable excellence.

The EFQM model is a practical, non-prescriptive tool that enables organizations to understand the cause and effect relationships between what their organisation does and the results it achieves. The EFQM model presents set of three integrated components:

- The Fundamental, concepts of excellence
- The Criteria, conceptual framework
- The RADAR, logic assessment framework

The *fundamental Concepts of Excellence* are the basic principles that describe the essential foundation for any organization to achieve sustainable excellence. These fundamental concepts can be seen in below figure:
The EFQM Excellence Model Criteria

The EFQM conceptual model helps organizations to realize in practice the fundamental concepts and to understand the cause-and-effect relationships between what the organization does and the results it achieves. The EFQM Excellence Model is also a self-assessment model for an organization that wants to assess its level of excellence. It is based on nine criteria. There are five 'Enablers' and four 'Results'. The 'Enabler' criteria cover what an organisation does. The 'Results' criteria cover what an organisation achieves. 'Results' are caused by 'Enablers'.

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The dynamic nature of the model is emphasised by the arrows as shown in the diagram. The model helps the enablers by innovation and learning leading to improved results. The Model's nine boxes, shown above, represent the criteria against which to assess an organisation's progress towards excellence. Each criterion consists of a number of sub-criterion, including the elements that need to be considered for the organization to achieve excellence in its business, and which are indicative of what can be considered good practice; these are further evaluated using the RADAR logic assessment framework.
The last component is the RADAR (results-approaches-deploy-assess-refine) logic, which is a management and evaluation tool for analysing the performance of an organization (refer below figure).

It is used as an underlying basis of the scoring system of the EFQM Excellence Award and can help to lead changes and manage improvement projects.

The EFQM Excellence Model is used by about 30,000 organizations across Europe. Recently, more and more countries especially across Middle East and South America, have started using the model.

(1. Source: EFQM, http://www.efqm.org/)

**Baldrige Criteria for Performance Excellence**

This model provides the foundation for most of the business excellence models adopted around the world. The framework is build round the seven categories i.e.,

- Leadership,
- Strategic planning,
- Customer and market focus,
- Measurement analysis and knowledge management,
- Workforce,
- Process management and
- Business results.
Business Excellence Model and Organizational Culture

Business Excellence approach focuses on strengthening the internal function and communication, looks towards the cultivation of strong ties with consumers and can be incorporated into the culture.

Excellence cannot be attained if the staffs are forced to conform to certain norms. They have to be critically managed and motivated. A wisdom is required to be developed among employees that by pursuing the goal of their organization they are meeting their own objectives. Employees feel accredit when they are considered important elements in pursuit of excellence as they learn new skills.

A feeling of association is developed and employees start believing in the management philosophies when the organization tries to achieve excellence. For achieving business excellence effective leadership is equally important to manage all the resources efficiently.

A strong and empathetic leader, effective communication system, employee empowerment, employee motivation, innovative and creative culture are some of the strategies to make the employees feel connected to the management philosophy of the organization.

A robust culture arises as a result of implementation of business excellence model, which can make the organization a world class performer.


Business Excellence Model in Practice

<table>
<thead>
<tr>
<th>Tata Business Excellence Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>The TBEM which has been adapted on the pattern of Malcolm Balridge Criteria in the business excellence movement. The model has provided Tata companies with a framework for assessing their businesses holistically, and adopting measures to improve their competitive strength, financial performance and operational efficiencies. The TBEM assesses seven core aspects of business operations i.e., leadership, strategic planning, customer and market focus, measurement, analysis and knowledge management, human resource focus, process management and business results. The essence of this framework is a proactive attitude rather than a reactive one. It talks about keeping the business flexible and running it effectively and efficiently.</td>
</tr>
</tbody>
</table>

THEORY OF CONSTRAINTS

During the 1980s Goldratt and Cox advocated a new approach to production management called optimised production technology (OPT). OPT is based on the principle that profits are expanded by increasing the throughput of the plant. The OPT approach determines what prevents throughput being higher by distinguishing between bottleneck and non-bottleneck resources. This approach advocates that bottleneck resources/activities should be fully utilised while non-bottleneck resources/activities should not be utilized to 100% of their capacity since it would result in increase in inventory.
The concept behind the system was first formulated and developed by Goldratt and Core (1986) in USA. Goldratt developed the concept and eventually gave it the name the Theory of Constraints (TOC).

**Operational Measures of Theory of Constraints**

The theory of constraints focuses on revenue and cost management when faced with bottlenecks. It advocates the use of three key measures. These are:

<table>
<thead>
<tr>
<th>Core Measures</th>
<th>Definition</th>
</tr>
</thead>
</table>
| **Throughput (T)** | ▪ Throughput as a TOC measure is the rate of generating money in an organization through Sales.  
▪ Throughput = (Sales Revenue – Unit Level Variable Expenses)/ Time  
▪ Direct Labour Cost is viewed as a fixed unit level expenses and is not usually included. |
| **Investment (I)** | ▪ This is money associated with turning materials into Throughput and do not have to be immediately expensed.  
▪ Includes assets such as facilities, equipment, fixtures and computers. |
| **Operating Expense (OE)** | ▪ Money spent in turning Investment into Throughput and therefore, represent all other money that an organisation spends.  
▪ Includes direct labour and all operating and maintenance expenses |

Based on these three measures, the objectives of management can be expressed as increasing throughput, minimizing investment and decreasing operating expenses.

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Goldratt’s Five-Step Method for Improving Performance

The theory of constraints describes the process of identifying and taking steps to remove the bottlenecks that restrict output. The theory of constraints considers short-run time horizons and assumes other current operating costing to be fixed costs. The key steps in managing bottleneck resources are as follows:

1. **Identifying the System Bottlenecks:** This step involves identification of constraints which restrict output from being expanded.

2. **Describe How to Exploit the Bottlenecks:** Having identified the bottlenecks it becomes the focus of attention since only the bottleneck can restrict or enhance the flow of products. It is therefore essential to ensure that the bottleneck activity is fully utilised. Decision regarding the optimum-mix of products to be produced by the bottleneck activity must be made.

3. **Subordinate Everything Else to the Decision in Step-2:** This step requires that the optimum production of bottleneck activity should determine the production schedule of the non-bottleneck activities.

   Let us consider an organisation dealing with a product which requires multiple parts and processed on different machines. With multiple parts in a product, dependencies arise among operations; some operations cannot be started until parts from previous operations are available. Waiting time appear for two reasons:

   - Parts that require processing at a bottleneck machine must wait in line until the bottleneck machine is free, and
   - Parts made on non-bottleneck machines must wait until parts coming off the bottleneck machines arrive.
Therefore, the workers of non-bottleneck machines should not be motivated to improve their productivity if the additional output cannot be processed by bottleneck machine. Producing more non-bottleneck output results in increase in WIP inventories and no increase in sales volume. Therefore, the preferred course of action is that bottleneck machine should setup pace for non-bottleneck machine.

4. Elevate the System Bottlenecks or Increase Bottleneck Efficiency and Capacity: This step involves taking action to remove (that is elevate) the constraint. This might involve replacing a bottleneck machine with a faster one or providing additional training for a slow worker or changing of the design of the product to reduce the processing time required by a bottleneck activity.

5. Repeat the Process as a New Constraint Emerges: If the bottleneck activity has been elevated and replaced by a new bottleneck activity it is necessary to return to step 1 and repeat the process.

(3. Sources: Cost Management: Accounting and Control By Don Hansen, Maryanne Mowen, Liming Guan; Management and Cost Accounting By Colin Drury)

THROUGHPUT ACCOUNTING

The concept of Throughput Accounting (TA) was created by David Galloway and David Waldron (1988-89) from the theory of constraints. In their opinion, accounting should monitor the rate at which businesses make money. With this important goal in mind, they focused on the return per product per bottleneck hour. They treated only direct material as variable and all labour and overhead costs as fixed. Several ratios were defined by Galloway and Waldron based on the definition of throughput.

Throughput Accounting Ratio:

\[
\frac{\text{Throughput per Bottleneck Minute}}{\text{Factory Cost per Bottleneck Minute}}
\]

Note

Galloway and Waldron define factory cost in the same way that Goldratt defines operating expense. See throughput.

If the TA ratio is greater than 1 the product in question is “profitable” because, if all capacity were devoted to that product, the throughput generated would exceed the total factory cost. If there was a bottleneck products could be ranked by a variant of the TA ratio (although the ranking is the same as that derived by the use of throughput per bottleneck minute).

Other Performance Ratios suggested include:

\[
\frac{\text{Throughput}}{\text{Labour Cost}} \quad \text{and} \quad \frac{\text{Throughput}}{\text{Material Cost}}
\]
Illustration

H. Ltd. manufactures three products. The material cost, selling price and bottleneck resource details per unit are as follows:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Product X</th>
<th>Product Y</th>
<th>Product Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling Price (₹)</td>
<td>66</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>Material and Other Variable Cost (₹)</td>
<td>24</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Bottleneck Resource Time (Minutes)</td>
<td>15</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

Budgeted factory costs for the period are ₹2,21,600. The bottleneck resources time available is 75,120 minutes per period.

Required

(i) Company adopted throughput accounting and products are ranked according to ‘product return per minute’. Select the highest rank product.

(ii) CALCULATE throughput accounting ratio and COMMENT on it.

Solution

(i) Calculation of Rank According to ‘Product Return per minute’

<table>
<thead>
<tr>
<th>Particulars</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling Price</td>
<td>66</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>Variable Cost</td>
<td>24</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Throughput Contribution</td>
<td>42</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>Minutes per unit</td>
<td>15</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Contribution per minute</td>
<td>2.8</td>
<td>3.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Ranking</td>
<td>II</td>
<td>I</td>
<td>III</td>
</tr>
</tbody>
</table>

(ii) Ranking Based on ‘TA Ratio’

<table>
<thead>
<tr>
<th>Particulars</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution per minute</td>
<td>2.80</td>
<td>3.00</td>
<td>2.50</td>
</tr>
<tr>
<td>Factory Cost per minute (₹2,21,600 / 75,120)</td>
<td>2.95</td>
<td>2.95</td>
<td>2.95</td>
</tr>
<tr>
<td>TA Ratio (Cont. per minute / Cost per minute)</td>
<td>0.95</td>
<td>1.02</td>
<td>0.85</td>
</tr>
<tr>
<td>Ranking Based on TA Ratio</td>
<td>II</td>
<td>I</td>
<td>III</td>
</tr>
</tbody>
</table>

Comment

Product Y yields more contribution compared to average factory contribution per minute, whereas X and Z yield less.
Advantages and Disadvantages

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in inventory.</td>
<td>Focus on short-term goals as opposed to long-term with ABC.</td>
</tr>
<tr>
<td>More productive machines.</td>
<td>Main emphasis on increasing sales and volume, not quality as opposed to Total Quality Management.</td>
</tr>
<tr>
<td>Ability to meet shorter lead times.</td>
<td>Might result in loss of the overall picture while looking at specific constraints.</td>
</tr>
<tr>
<td>More flexible.</td>
<td>Focuses on the push approach as opposed to pull approach of JIT.</td>
</tr>
<tr>
<td>Better customer service.</td>
<td>Valid only if applied to the total supply chain process including management, production, resources and support.</td>
</tr>
<tr>
<td>Better product mix.</td>
<td>Dependent on circumstances, operating expenses under TOC/TA are regarded as fixed, which is simplistic in the view of detractors. Therefore, TOC and TA are basically the same thing as variable costing.</td>
</tr>
<tr>
<td>Better customer relationship.</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

TOC/TA-based approach as a direct costing approach may be more suitable for short term product mix decisions. This approach is clear than approaches that allocate indirect costs more or less arbitrarily (Boyd and Cox, 2002). On balance, it may be considered that TOC should not be ignored due to the comprehensibility of the approach. TOC is a tool and not a philosophy.

Theory of Constraints in Practice

Sunshine PTE Ltd., Singapore

Sunshine PTE Ltd. produces parts for automotive. Its primary measure of productivity is labour absorption under the assumption that if more work is being done to create inventory, profits will increase. However, using this measure resulted in actions to increase inventory and build stock products rather than fill actual customer orders.

Process improvements (like Lean Sigma initiatives) were implemented to reduce costs. Efforts were made to decrease the labour involved in producing parts. This was done for all operations. Many non-constraints became faster, producing even more work than the constraints could handle. Even though labour went down, inventory increased and it became more difficult to fulfill orders on time and to properly prioritize manufacturing jobs.

When management learned about throughput, it shifted its focus from absorbing costs into
inventory to increasing how quickly work could be completed. Emphasis was given to improving constraints. By investing $89,000 in the facility and adding 3 additional workers to the day shift, output increased by 83%. Under traditional Cost Accounting, these expenses would not have been justified because local output efficiency would have declined on a per labour hour basis. However, the cost was minimal compared to the increase in throughput.

SUPPLY CHAIN MANAGEMENT

A complete chain of serving the customers or consumer whether linked or interdependent is the composition of supply chain. It comprises of vendors that supply raw material, producers who convert the material into products, warehouses that store, distribution centers that deliver to the retailers and retailers who sell the product to the ultimate user.

Supply chains encourage value-chains because, without them, no producer has the ability to give customers what they want, when and where they want, at the price they want. Deficiencies in supply chain reduces the ability of the producers to compete with each other.

The term supply chain can be referred to as the entire network of organisations working together to design, produce, deliver and service products. In other words all activities associated with the flow and transformation of goods from raw material to end user- is called supply chain.

The transformation of product from node to node includes activities such as

- Production Planning
- Purchasing
- Material Management
- Distribution
- Customer Service
- Forecasting

The Global Supply Chain Forum (GSCF) defines Supply chain management as the “integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders”.

The following eight supply chain management processes are included in the GSCF framework:

- **Customer Relationship Management**, to manage and analyse customer’s interaction and data throughout the life cycle with the main motive of improving business relations.
- **Supplier Relationship Management**, provides the structure for how relationships with suppliers are developed and maintained.
- **Customer Service Management**, provides the key points of contact for administering product and service agreements.
### Demand Management
- Provides the structure for optimising the customer's requirements with supply chain capabilities.

### Order Fulfilment
- Includes all activities necessary to define customer requirements, design the logistics network, and fill customer orders.

### Manufacturing Flow Management
- Includes all activities necessary to move products through the plants and to obtain, implement and manage manufacturing flexibility in the supply chain.

### Product Development and Commercialization
- Provides the structure for developing and bringing to market new products jointly with customers and suppliers.

### Returns Management
- Includes all activities related to returns, reverse logistics, gatekeeping, and avoidance.

(Source: Supply Chain Management: Processes, Partnerships, Performance By Douglas M. Lambert)

#### Types of Supply Chain- Push and Pull

During the traditional chain suppliers were at one end. Suppliers give their products to manufacturer or distributors who further send it to retailers. Although customers are the source of the profits, they are at the end of the chain in the ‘push’ model.

Under Push model stocks are produced on the basis of anticipated demand. Demand forecasting can be done via a variety of sophisticated techniques may be from operations research area or data mining.

**Push Model**

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Manufacturer</th>
<th>Distributer</th>
<th>Retailer</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>•Supply to Forecast</td>
<td>•Production Based on Forecast</td>
<td>•Inventory Based on Forecast</td>
<td>•Stock Based on Forecast</td>
<td>•Purchase What is Available</td>
</tr>
</tbody>
</table>

Under Pull model stocks are produced in response to the actual demand. This new business model is less products centric and more directly focused on the individual consumer – a more marketing-oriented approach.

**Pull Model**

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Manufacturer</th>
<th>Distributer</th>
<th>Retailer</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>•Supply to Order</td>
<td>•Produce to Order</td>
<td>•Automatically Replenish Warehouse</td>
<td>•Automatically Replenish Stock</td>
<td>•Customer Orders</td>
</tr>
</tbody>
</table>
Electronic connections are used in the pull model to bring out the needs of customers.

- Electronic supply chain connectivity gives end customers the opportunity to give direction to suppliers, for example about the precise specifications of the products they want.
- Ultimately, customers have a direct voice in the functioning of the supply chain.

Supply chain created through E-Commerce brings benefit to both customer and manufacturer. Thus, facilitating the companies to fulfil the customer needs, carry fewer inventories, and send products to market more quickly.

**Upstream and Downstream Flow**

A supply chain begins right from the supplier and finally ends on end customer or consumer. In the total chain there are flows of material, information and capital or finance. *When the flow relates to supplier it is termed as upstream flow. If the flow is with consumers or customers it is named as downstream flow.*

**Management of Upstream Supplier Chain**

Management of transactions with suppliers are termed as upstream supply chain management.

```
Relationship with Suppliers
Use of Information Technology
E-Sourcing
E-Purchasing
E-Payment
```

**Relationship with Suppliers**

Supplier Relationship Management (SRM) is undergoing a major transition. In today's global economy there are so many factors to consider when choosing and managing a supplier. Supplier capabilities of innovation, quality, reliability and costs/price reductions and agility to reduce risk factors all have witnessed significant changes when aligned with key suppliers. Greater value can be achieved for both businesses, something that would be difficult to achieve if operating independently.

**Supplier Strategy:**

To possess a commendable influence on the whole upstream flow, organization has to build up a set of strategies which in turn results in control over suppliers. This strategy is likely to take account of matters such as the following:
Sources
Location and availability of source. The bargaining power of buying organization depends on that whether the suppliers' businesses larger or smaller than the buying organization. In the era of globalization companies choose suppliers from different parts of world.

Number of Suppliers
In the event the buying company wants to avail huge discount bulk purchase from single supplier is advisable. However, if requirement is to avoid the risk of failed deliveries organization may prefer several or multiple suppliers.

Cost, Quality, and Speed of Delivery
These factors are closely interrelated and the strategy will probably need to make compromises to achieve the right balance.

Make or Buy and Outsourcing
Depending upon the application of various strategic cost management techniques, decision on to produce or to outsource.

Use of Information Technology
The main activities of upstream supply chain are procurement and logistics. In modern business environment upstream supply chain management use E-Procurement process. E-Procurement is the electronic methods beginning from identification of the organization’s requirements and end on payment. E-Procurement includes E-Sourcing, E-Purchasing and E-Payment.

E-Sourcing
In E-Sourcing organization provide electronic invitation to tenders and request them to submit their quotations. Especially organization which may opt to choose tenders from different countries. E-Sourcing is the best possible way to find out the best supplier among others. This process reduces the cost, time and effort associated with the selection of supplier than it is required in traditional method.

E-Purchasing
In recent years, organizations are shifting from centralized purchasing to decentralization. Usage of technology has resulted in lesser time, lower cost & better result in product selection and ordering. Features of an E-Purchasing system include:

- Electronic catalogues for core/standard items.
- Recurring requisitions/shopping lists for regularly purchased items. The standard shopping lists form the basis of regular orders and the lists can have items added or deleted for each specific order.
- Electronic purchase orders dispatched automatically through an extranet to suppliers.
- Detailed management information reporting capabilities.
E-Payment

After purchasing from the best possible supplier payment also takes place through *electronic mode* i.e. *invoicing and fund transfer*. E-Payment results in faster payment with zero error which is expected in manual form.

E-Procurement is beneficial for organization as it results in lower cost, lesser time, quick ordering, selection of best supplier, control over inventory, better purchase and sales, greater financial transparency etc. even a small problem in technology can crash the whole system in few moments.

**Downstream Supply Chain Management**

Management of transactions with consumers or customers are termed as downstream supply chain management.
**Relationship Marketing**

Marketing plays a vital role to successfully handle the downstream supply chain management. The relationship marketing helps the organization to keep existing customer and to attract new customers through helpful staff, quality service/product, appropriate prices and proper customer care etc.

**Six Markets Model** identifies the six key “market domain” where organizations may consider directing their marketing activities.

**Internal Markets**

Internal Markets are the crucial requirement for the success of relationship marketing. Internal markets include internal departments and staff. Staff have the ability to determine customer oriented corporate culture.

**Referral Markets**

Referral Markets include two main categories: existing customers who recommend their suppliers to others and referral sources such as a consultancy firm that may refer work to a law firm.

**Influence Markets**

Influence Markets represent entities and individuals, which have the ability to influence the marketing environment of a firm may include financial analysts, shareholders, the business press, the government, and consumer groups. A good relationship needs to be developed by the firms with critical sources of influencers relevant to their markets.

**Recruitment’s Markets**

Recruitment Markets are focal point for relationship marketing. Firms have to manage its relationships with recruitment markets such as commercial recruitment agencies, universities and institutes in order to have access to potential employees who possess the required skills for the job position.

**Supplier’s Markets**

Supplier Markets refer to traditional suppliers as well as organizations with which the firm has some form of strategic alliance to gain benefits such as better quality, faster reach-to-market, original and creative products, and lower levels of inventory.

**Customer’s Markets**

Customer Markets represent all existing and prospective customers as well as intermediaries. They can be either consumers or intermediaries. In today’s environment, the way firms provide services affects the market and helps in gaining customers.
The six markets model suggests that a firm must regulate its actions towards developing appropriate relationships with each of the market areas as the management of relationships in each of the six markets is critical for the attainment of customer retention objective.


Gordon (1998) states that there are six dimensions that illustrate how relationship marketing differs from the historical definition. These are that:

- Relationship marketing seeks to create new value for customers and then share it with these customers.
- Relationship marketing recognises the key role that customers have both as purchasers and in defining the value they wish to receive.
- Relationship marketing businesses are visualised to design and align process.
- Relationship marketing represents continuous cooperative effort between buyers and sellers.
- Relationship marketing recognises the value of customer’s purchasing lifetimes (i.e. Customer Lifetime Value).
- Relationship marketing even searches for the chain of relations that can be drawn within the organisation. Customer’s wants and values are created between the organisation and its main stakeholders, including suppliers, distribution channels, intermediaries, and shareholders.

The growing interest in relationship marketing suggests a shift in the nature of marketplace transactions from discrete to relational exchanges, from exchanges between parties with no past history and no future to interactions between parties with a history and plans for future interaction.
Customers Relationship Management

To manage and analyse customer’s interaction and data throughout the life cycle with the main motive of improving business relations the strategies and technologies used is Customer Relationship Management (CRM). Relation includes relations with customers, assisting in customer retention and driving sales growth. Customers under different channels are compiled through CRM. The staff dealing with customers get a detailed information about customer’s personal information, purchase history, buying preferences and concerns. Organizations must ensure customers are satisfied with their products and services for higher customer retention. Remember one satisfied customer brings ten new customers with him where as one dissatisfied customer takes away ten customers along with him. In simpler words, CRM is knowing the needs of the customers and providing them with best possible solution.

Analysis of Customers and their Behaviour

Analysis of customers is necessary based on geographical location or purchasing characteristics. For industrial customer expectation of benefits - quality, discount, serviceability, size of the should be taken into consideration. During such analysing process, management should keep in mind the physiological need, safety need, social need, status/ ego need and self-fulfilment need of existing and future customers.

Customers Account Profitability (CAP)

Most firms today understand the source of their revenues but unfortunately, do not understand the source of profits. Often, attempts to measure profitability center on either product costs alone or on profitability at the business unit or enterprise level. These attempts can be severely misleading. What firms fail to do is measure profit at the most meaningful and controllable level, the customer level. Understanding the underlying components of cost and addressing specific causes of poor profitability associated with specific customers will significantly improve bottom-line performance.

Undertaking a customer account profitability improvement initiative is a five-step process:

1. Analyse the customer base and split it into the segments
2. Calculate the annual revenues earned from the customer
3. Calculate the annual costs of serving the segment
4. Identify and retain quality customers
5. Re-engineer/ eliminate the unprofitable segments
Customer Profitability Analysis is best conducted with a technique known as Activity Based Costing or ABC analysis. The net profit coming from each customer which can be calculated by revenue less costs done by this tool. These costs are not only manufacturing and distribution costs but also sales costs, marketing costs, services cost and any other related costs which have to be undertaken to service the customer.

After finalisation of cost customers are divided into different profit tiers. This principle is best observed in the **banking industry** with credit card as a product. Customers are basically classified into four types:

- Platinum Customers – Most Profitable
- Gold Customers – Profitable
- Iron Customers – Low Profit but Desirable
- Lead Customers – Unprofitable and Undesirable

A credit card company would always give the best service as well financial and other benefits to the top two customers. It will at the same time try to attract iron customers and try to convert these iron customers to platinum or gold customers. Finally, these companies will have systems in place so as to avoid lead customers completely.

It is found that with customer profitability analysis, the firm can correctly classify customers and also find out which of the customers it needs to hold on to and acquire more of the same type, and which customers it needs to let go of. Several times, firms find out that there are customers which they should have left altogether as the profitability from these customers is minimum and expenses are more.

Cost calculation is one of the major problem in CPA. Calculating cost per customer becomes difficult especially in a service environment where manpower as well as time also has a cost factor associated with it. Time spent with each customer is different and therefore the cost is different. Furthermore, there are several non-customer related costs too. If these costs are ignored, then right figures would be difficult to check. The customers will be shown more profitable than they are.
Customers Lifetime Value (CLV)

Customer Lifetime Value is the present value of net profit that we derive from a customer over the entire lifetime of relationship with that particular customer. It is the net present value of the projected future cash flows from a lifetime of customer relationship. It is an essential tool used in marketing to focus on more profitable customers and stop servicing non-profitable customers.

First of all, we need to ascertain the profits generated from each customer. ABC model helps in associating direct costs and revenues to a particular customer over a period of time to ascertain the profit margins from that particular customer. To ascertain the lifetime value, judgements with regards to the duration of relationships have to be made. These require detailed analysis of the strength of relationships, the likelihood, frequency and amount of repeated or additional purchases, competitive products, customer loyalty etc. Thus, profit margins are then discounted at the firm’s cost of capital or any other rate that may be determined by the organisation to arrive at the CLV.

Illustration

Cineworld is a movie theater is located in a town with many colleges and universities around it. The town has a substantial student population, most of whom are avid movie goers. Business for Cineworld has been slow in the recent years due to the advent of streaming websites, that show the latest and popular movies online. However, the management of Cineworld continue to feel students would still enjoy the watching movies on big-screen, along with the facilities and ambience that only a movie theater can offer. Accordingly, they have framed a plan to attract students by offering discounts on movie tickets.

The average time a student spends at the college or university is 4 years, which is the average duration of any course. For a nominal one-time subscription fee, Cineworld plans to offer students discounts on movie tickets for a period of 4 years. By attracting more footfalls, Cineworld targets to cross sell it food & beverages and souvenirs. This would help it sustain a reasonable revenue each year.

Cineworld would attract attention to the plan by initially offering free tickets, food and beverage and gift vouchers. This one time initial expense, net of the one-time subscription fee collected, would cost ₹5,000 per student. On subscription to the plan, the viewership and purchases of each student is expected to be as follows:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Years 1 and 2</th>
<th>Years 3 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spend on movie tickets per year</td>
<td>2,000</td>
<td>1,500</td>
</tr>
<tr>
<td>Spend on food and beverage per year</td>
<td>4,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Spend on souvenirs and accessories per year</td>
<td>2,250</td>
<td>750</td>
</tr>
</tbody>
</table>

Assumptions

1. Only 50% of the subscribers are expected to visit the theatres in years 3 and 4.
2. Across all years, only 75% of the subscribers who visit the theatre are expected to buy food and beverage.

3. Only 25% of the subscribers who visit are expected to buy souvenirs in years 1 and 2, and 10% of them in years 3 and 4.

Given that PVIFA of ₹1 for 4 years at 10% = 3.169 and PVIFA of ₹1 for 2 years at 10% = 1.735.

**Required**

CALCULATE the customer lifetime value per subscriber for the above plan.

**Solution**

Customer lifetime value per subscriber can be found by calculating the present value of the revenue that is generated over the period of 4 years. This netted out with the cost incurred to attract subscribers, would give the customer lifetime value per subscriber.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Particulars</th>
<th>Revenue (per year)</th>
<th>PVIFA</th>
<th>PV of Revenue</th>
<th>Probability of Usage</th>
<th>Net Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Net cost of attracting students (onetime expense)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5,000</td>
</tr>
<tr>
<td>2</td>
<td>Net revenue from movie tickets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Years 1-2</td>
<td>2,000</td>
<td>1.735</td>
<td>3,470</td>
<td>100%</td>
<td>3,470</td>
</tr>
<tr>
<td></td>
<td>Years 3-4 (refer note 1)</td>
<td>1,500</td>
<td>1.434</td>
<td>2,151</td>
<td>50%</td>
<td>1,076</td>
</tr>
<tr>
<td>3</td>
<td>Sale of food and beverages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Years 1-2</td>
<td>4,000</td>
<td>1.735</td>
<td>6,940</td>
<td>75%</td>
<td>5,205</td>
</tr>
<tr>
<td></td>
<td>Years 3-4 (refer note 2)</td>
<td>3,000</td>
<td>1.434</td>
<td>4,302</td>
<td>37.5%</td>
<td>1,613</td>
</tr>
<tr>
<td>4</td>
<td>Sale of souvenirs and accessories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Years 1-2</td>
<td>2,250</td>
<td>1.735</td>
<td>3,904</td>
<td>25%</td>
<td>976</td>
</tr>
<tr>
<td></td>
<td>Years (refer note 3)</td>
<td>750</td>
<td>1.434</td>
<td>1,076</td>
<td>5%</td>
<td>54</td>
</tr>
<tr>
<td>5</td>
<td>Total revenue (Steps 2+3+4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12,394</td>
</tr>
<tr>
<td>6</td>
<td>Net revenue from subscription plan (steps 5-1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7,394</td>
</tr>
</tbody>
</table>

**Note 1:**

PVIFA (10%, 4 years) = 3.169 and PVIFA (10%, 2 years) is 1.735. Therefore, PVIF for years 3 and 4 = PVIFA (10%, 4 years) - PVIFA (10%, 2 years) = 3.169 - 1.735 = 1.434.
Note 2:
Only 50% of the subscribers are expected to attend in years 3 and 4. Out of those only 75% are expected to buy food and beverage. Therefore, only 38% of the subscribers (75% of 50% subscribers who visit) are expected to buy souvenirs in years 3 and 4.

Note 3:
Only 50% of the subscribers are expected to attend in years 3 and 4. Out of those only 10% are expected to buy souvenirs. Therefore, only 5% of the subscribers (10% of 50% subscribers who visit) are expected to buy souvenirs in years 3 and 4.

Present value of total revenue generated over the four-year period by a customer is ₹12,393 while the corresponding expense is ₹5,000. Therefore, the customer lifetime value per subscriber is ₹7,393. Cineworld has to multiply this with the expected number of subscribers each year, to find out if this would be a profitable proposition.

Customer’s Selection, Acquisition, Retention and Extension

Customer Selection – Type of customer which the company needs to target has to be selected.
- Who are we targeting?
- What is their value?
- Where do we reach them?

Customer Acquisition – A relationship needs to be developed with new customers.
- Methods of acquiring customers include traditional off-line techniques (e.g. advertising, direct mail, etc.) and online techniques (e.g. search engine marketing, online PR, online partnerships, interactive adverts, opt-in e-mail, viral marketing, etc.).

Customer Retention - Keeping existing customers.
- Emphasis on understanding customer needs to ensure better customer satisfaction.
- Ensure ongoing service quality by focussing on tangibles, reliability, responsiveness, assurance and empathy.
- E-techniques for retaining customers are personalisation, mass customisation, extranets, opt-in e-mail and online communities.

Customer Extension - The products bought by the customers need to be increased.
- "Re-sell" similar products to previous sales
- "Cross-sell" closely related products
- "Up-sell" more expensive products

The use of Information Technology in Downstream Supply Chain Management

In managing downstream supply chain organizations link their sales system to the purchasing system of its customer through Electronic Data Change. Using E-Business, they sale products.
Intelligence gathering is used to monitor the online customer transactions. E-mail is the way through which organization keeps touch with customers. Use of IT results in quick action, reduction in associated cost and saving in time.

**Brand Strategy**

Specially branding of product makes a huge difference in its appeal to customers. Branding can be usage of logo or specific colour or any other means which makes the product or service distinctively visible among others.

**More Information on Key Business Processes**

### Procurement Process

To enable the flow of manufacturing management process and development of new products, organisation have to make strategic plans along with its suppliers. In Global firms, sourcing may be managed on a global basis. The desired outcome is a relationship where both parties benefit and a reduction in the time required for the product's design and development.

Development of rapid communication systems, such as Electronic Data Interchange (EDI) and Internet Linkage, to convey possible requirements faster may be developed by purchasing departments.

To obtain products and materials from outside suppliers, various activities involving resource planning, supply sourcing, negotiation, order placement, inbound transportation, storage, handling, and quality assurance, etc. have to be done many of which include the responsibility to coordinate with suppliers on matters of scheduling, supply continuity (inventory), hedging, and research into new sources or programs. In the recent times, Procurement has become a core source of derive value.

### Manufacturing Flow Management Process

Based on the past tends the manufacturing process produces and supplies products to the distribution channels. Flexibility in Manufacturing processes in order to respond to market changes is a must. Orders are processes operating on a just-in-time (JIT) basis in minimum lot sizes. Thus, shorter cycle times, would mean improved responsiveness and efficiency in meeting customer demand. This process manages activities related to planning, scheduling, and supporting manufacturing operations, such as work-in-process storage, handling, transportation, and time phasing of components, inventory at manufacturing sites, etc.

**Product Development and Commercialization**

Here, customers and suppliers must be integrated into the product development process in order to reduce the time to market.

For the firms to have a competitive edge, as product life cycles get shorter, the appropriate products and services should be developed and successfully launched at even shorter time schedules.
According to Lambert and Cooper (2000), managers of the product development and commercialization process must:

1. Closely coordinate with customer relationship management so that they are able to identify customer-articulated needs;
2. select materials and suppliers in aggregate with procurement; and
3. Enhance production technology in the manufacturing flow to manufacture and integrate into the best supply chain flow for the given combination of product and markets.

Mixing the suppliers for the new product development process was shown to have a major impact on product target cost, quality, delivery, and market share. Tapping into suppliers as a source of innovation requires an extensive process characterized by development of technology sharing, but also involves managing intellectual property issues.

Physical Distribution
This concerns the movement of a finished product or service to customers. In physical distribution, the customer is the final destination of a marketing channel, and the availability of the product or service is a vital part of each channel participant’s marketing effort. It is also through the physical distribution process that the time and space of customer service become an integral part of marketing. Thus, it links a marketing channel with its customers (i.e., it links manufacturers, wholesalers, and retailers).

Service Level Agreements (SLA)
An agreement between the customer and service provider is termed as a service-level agreement. This can be a legally binding formal or an informal "contract". The agreement may be between separate organisation or within different teams of the organisation. SLAs commonly include many components, from a definition of services to the termination of agreement. To ensure that SLAs are consistently met, agreements are often designed with specific lines of differentiation and the parties involved are required to meet regularly to create an open forum for communication. Providers rewards and penalties are specified. There is always place left for revisiting in most SLA.

Benefits of Supply Chain
Benefits of supply chain are enormous on any business. Highly controlled supply chain fetches tangible benefits such as inventory reduction, personnel reduction, productivity improvement; order management improvement, financial cycle improvement etc. Further it results in information visibility, new/ improved processes, customer responsiveness, standardization- flexibility & globalization of business performance.

Supply Chain Management in Practice

<table>
<thead>
<tr>
<th>Apple's Supply Chain Model5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Chain Planning at Apple Inc is the classic example of New Product Development Process. It's the integration of R&amp;D, Marketing and various function under supply chain</td>
</tr>
</tbody>
</table>
management. Apple Inc accelerates the new product introduction by acquiring the licensing and 3rd party businesses. Apple Inc has to make the pre-payments to some suppliers to secure the strategic raw materials.

Apple Inc purchases raw materials from various sources then get them shipped to an assembling plant in China. From there, assembler will ship products directly to consumers (via UPS/ Fedex) for those who buy from the Apple's Online Store. For other distribution channels, such as retail stores, direct sales and other distributors, Apple Inc will keep products at Elk Grove, California (where central warehouse and call center are located) and supply products from there. At the end of product's life, customer can send products back to the nearest Apple Stores or dedicated recycling facilities.
Apple Supply Chain has very high risks as enumerated below:

- Some re-sellers may also distribute products from the competing manufacturers.
- Inventories can become obsolete or exceed the anticipated demand.
- Some components are currently obtained from the single or limited sources.
- Some custom components are not common to the rest of the industries.
- Ability to obtain components in sufficient quantities is important.

Apple being a marketing company now-a-days having inventory turnover ratio [cost of goods sold of digital content/ downloadable products are excluded] of 59 which is quite impressive. Apple have about 156 key vendors across the globe. In effective supply chain management Apple synchronizes data between the central warehouse in California and its own 246 stores + customers. The success of its supply chain operations depends on how well they manage the supplier relationship. This includes early supplier involvement in new product development, close communication, and supplier performance improvement/evaluation.

### Supply Chain Collaboration Between Wal-Mart and Procter & Gamble

Before Wal-Mart and Procter & Gamble started collaborating back in the '80s, retailers shared very little information with manufacturers. But then the two giants built a software system that hooked P&G up to Wal-Mart's distribution centers. When P&G's products run low at the distribution centers, the system sends an automatic alert to P&G to ship more. In some cases, the system communicates down to the individual Wal-Mart store, allowing P&G monitor the shelves through real-time satellite link-ups that send messages to the factory whenever a P&G item swoops past a scanner at the register. Within the last couple of years, the relationship has expanded to include radio-frequency identification (RFID) technologies to gain even more insight into ridding inefficiencies in the supply chain.

With this kind of minute-to-minute information, P&G knows when to make, ship and display more products at the Wal-Mart stores. There’s no need to keep products piled up in warehouses awaiting Wal-Mart's call. Invoicing and payments happen automatically too. The system saves P&G so much in time, reduced inventory and lower order-processing costs that it can afford to give Wal-Mart "low, everyday prices" without putting itself out of business.

GAIN SHARING ARRANGEMENTS

Gain sharing is an approach to the review and adjustment of an existing contract, or series of contracts, where the adjustment provides benefits to both parties. A fundamental form of gain-sharing is where a supplier agrees to perform its side of the contract with no guarantee of receiving a payment. Instead, any payment received is based upon the benefits that emerge to the customer as a result of the successful completion of the supplier’s side of the bargain. This is clearly a risky stance for the supplier, because it could spend a fortune and walk away with nothing. Alternatively, if the benefits to the customer are substantial, the supplier could find itself rewarded with a large return. In this situation, the supplier could almost be described as taking an equity stake in the customer rather than entering into a contract with it. There must be no rewards for the suppliers to achieve a higher return through adversarial behaviour or by hiding behind the contract. Gain-sharing deals are, on the face of it, a win-win situation for suppliers and their customers.

Example

Cost Savings initiatives and Gain Sharing arrangements at Chiang International -

- Supplier will deliver 3% minimum cost savings on controllable portion of costs.
- Cost savings generated in first year as a result of Supplier idea will be retained by Supplier.
- Cost savings generated in year second will be shared between Chiang International and Supplier at a ratio of 40%:60%.
- Cost savings generated in year three will be passed along to Chiang International.
- Any cost savings generated by an idea proposed exclusively by Chiang International that does not require capital investment by Supplier will be immediately passed along to Chiang International.


OUTSOURCING

Outsourcing (also sometimes referred to as "contracting out") is a business practice used by companies to reduce costs or improve efficiency by shifting tasks, operations, jobs or processes to another party for a span of time.

The contract given to third party can be done at the premises or outside. Outsourcing is a cost-saving measure, and practising this can have a significant impact on manufacturing.

Outsourcing is not limited to manufacturing. Giving services to customer such as those in a call center, and computer programming jobs are also outsourced by companies seeking ways to reduce costs.

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A part of product may even be purchased from outside this would be within the purview of outsourcing, such as components for computer equipment. The component can be purchased for a lower cost than it would be for the company to manufacture that component themselves, and the component may be of higher quality. Outsourcing is often an integral part of downsizing or reengineering.

**Advantages of Outsourcing**
- Outsourcing helps in cost savings. The lower cost of operation and labour, and Reduction in overhead costs makes it attractive to outsource.
- It frees an organization from investments in technology, infrastructure and people that make up the bulk of a back-end process capital expenditure.
- It gives businesses flexibility in staffing, manpower management, helps in cost savings.

**Disadvantages of Outsourcing**
- One of the biggest disadvantages is the risk of losing sensitive data and the loss of confidentiality.
- Control of operations and deliverables of activities outsourced.
- Inexperienced worker or improper process can lead to quality problems.

**Outsourcing in Practice**

**Parexel**

*The Challenge*

Parexel needed a recruitment solution that would not only source and screen potential candidates, but also develop and build talent pipelines, understand the labor market, deliver top candidates during periods of heavy hiring, scale up and down quickly, and build a strong connection between the hiring manager and recruiting consultants.

*The solution*

Parexel selected ‘IBM Talent Acquisition & Optimization’ and ‘IBM Kenexa Brass Ring on Cloud’ to attract top talent and meet its organizational hiring needs.

*The benefits*
- Hired at 90 percent over forecast in the program’s first year.
- Delivered a multi-regional solution, including North America and 17 countries in Europe.
- Lowered time-to-fill by 40 percent.
SUMMARY

- **Cost of Quality** – It is the sum of the costs related to prevention and detection of defects and the costs incurred due to occurrences of defects. Cost of quality consists of the Prevention Cost, Appraisal Cost, Internal Failure Cost and External Failure Cost.

- **Total Quality Management** – TQM aims at improving the quality of organizations outputs, including goods and services, through continual improvement of internal practices. The plan – do – check – act (PDCA) cycle describes the activities a company needs to perform in order to incorporate continuous improvement in its operation.

- **6Cs’** - Commitment, Culture, Continuous Improvement, Co-operation, Customer Requirements and Control.

- **Business Excellence Model** – The EFQM Excellence Model provides an all-round view of the organisation and it can be used to determine how these different methods fit together and complement each other. Based on the needs of the organisation, this model can be used with other tools of improvement to attain sustainable excellence.

- **Theory of Constraints** – The theory of constraints focuses on revenue and cost management when faced with bottlenecks. It advocates the use of three key measures – Throughput, Investments and Operating expenses. The objectives of management can be expressed as increasing throughput, minimizing investment and decreasing operating expenses.

  (a) Throughput = (Sales Revenue – Unit Level Variable Expenses)/ Time

  (b) Investment is money associated with turning materials into Throughput and do not have to be immediately expensed.

  (c) Operating expense is the money spent in turning Investment into Throughput and therefore, represents all other money that an organisation spends.

  (d) Five step method of improving performance – Identify System Bottlenecks, Exploit the Constraint, Subordinate and Synchronise to the Constraint, Increase Bottleneck efficiency and Capacity, Repeat the process as and when a new constraint arises.

- **Throughput Accounting Ratio** = \( \frac{\text{Throughput per bottleneck minute}}{\text{Factory cost per bottleneck minute}} \)

- **Supply Chain Management** – The term supply chain can be referred to as the entire network of organisations working together to design, produce, deliver and service products.

  (a) Types of Supply Chain based on forecasted demand and actual demand are push and pull supply chain

  (b) Key to Supply Chain Processes –

      o **Customer Relationship Management** – Understanding customer needs and providing them with the best possible solution to assist in customer retention and driving sales growth.

Demand Management Style – Flexibility in manufacturing process to react to changing market is a must. Orders processed under JIT with minimum lot sizes have shorter cycle time and thus increases efficiency in meeting customer demands.

Order Fulfilment – Timely fulfilment of customer demands.

Manufacturing Flow Management – This process manages activities related to planning, scheduling, and supporting manufacturing operations, such as work-in-process storage, handling, transportation, and time phasing of components, inventory at manufacturing sites, etc.

Supplier Relationship Management – When selecting the key suppliers, weightage should be given to Supplier capabilities of innovation, quality, reliability and costs/price reductions and agility to reduce risk factors.

Product Development and Commercialization – Customers and suppliers must be integrated into the product development process in order to reduce the time to market. For the firms to have a competitive edge, as product life cycles get shorter, the appropriate products and services should be developed and successfully launched at even shorter time schedules.

Returns Management – Returns management is necessary in case of both upstream and downstream supply chain flow for optimum utilisation of resources and reduction in cost of repairs and renewal.

Customer Account Profitability – Profitability associated with each customer. What companies fail to do is measure profit at the most meaningful and controllable level, the customer level. Understanding the underlying components of cost and addressing specific causes of poor profitability will significantly improve bottom-line performance.

Customer Life Time Value - It is the net present value of the projected future cash flows from a lifetime of customer relationship.

(c) Benefits of Supply Chain Management - Tangible benefits such as inventory reduction, personnel reduction, productivity improvement, order management improvement, financial cycle improvement etc. Further it results in information visibility, new/improved processes, customer responsiveness, standardization-flexibility & globalization of business performance.

- Gain Sharing Arrangements – Gain sharing is an approach to the review and adjustment of an existing contract, or series of contracts, where the adjustment provides benefits to both parties.

- Outsourcing – Outsourcing (also sometimes referred to as "contracting out") is a business practice used by companies to reduce costs or improve efficiency by shifting tasks, operations, jobs or processes to another party for a span of time.
1. CIMZ is a new banking company which is about to open its first branch in INDIA. CIMZ believes that in order to win customers from the market, it needs to offer potential customers a new banking experience. Other banking companies are focusing on interest rates and bank charges, whereas CIMZ believes that quality and timely availability of service is an important factor to attract customers.

*Required*

EXPLAIN how Total Quality Management would enable CIMZ to gain competitive advantage in the banking sector.

2. Cool Air Private Ltd. manufactures electronic components for cars. Car manufacturers are the primary customers of these products. Raw material components are bought, assembled and the electronic car components are sold to the customers.

The market demand for these components is 500,000 units per annum. Cool Air has a market share of 100,000 units per annum (20% market share) for its products. Below are some of the details relating to the product:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price</td>
<td>₹2,500 per unit</td>
</tr>
<tr>
<td>Raw material cost</td>
<td>₹900 per unit</td>
</tr>
<tr>
<td>Assembly &amp; machine cost</td>
<td>₹500 per unit</td>
</tr>
<tr>
<td>Delivery cost</td>
<td>₹100 per unit</td>
</tr>
<tr>
<td>Contribution</td>
<td>₹1,000 per unit</td>
</tr>
</tbody>
</table>

The customers due to defects in the product return 5,000 units each year. They are replaced free of charge by Cool Air. The replaced components cannot be repaired and do not have any scrap value. If these defective components had not been supplied, that is had the sale returns due to defective units been nil, customers’ perception about the quality of the product would improve. This could yield 10% increase in market share for Cool Air, that is demand for its products could increase to 150,000 units per annum.

*Required*

(i) ANALYZE, the cost of poor quality per annum due to supply of defective items to the customers.

(ii) The company management is considering a proposal to implement an inspection process immediately before delivery of products to the customers. This would ensure nil
sales returns. The cost of having such a facility would be ₹2 crores per annum, this would include materials and equipment for quality check, overheads and utilities, salaries to quality control inspectors etc. ANALYZE the net benefit, if any, to the company if it implements this proposal.

(iii) Quality control investigations reveal that defective production is entirely on account of inferior quality raw material components procured from a large base of 30 suppliers. Currently there is no inspection at the procurement stage to check the quality of these materials. The management has a proposal to have inspectors check the quality control at the procurement stage itself. Any defective raw material component will be replaced free of cost by the supplier. This will ensure that no product produced by Cool Air is defective. The cost of inspection for quality control (materials, equipment, salaries of inspectors etc.) would be ₹4 crores per annum. ANALYZE the net benefit to the company if it implements this proposal? Please note that scenarios in questions (ii) and (iii) are independent and not related to each other.

(iv) Between inspection at the end of the process and inspection at the raw material procurement stage, ADVISE a better proposal to implement (a) in terms of profitability and (b) in terms of long term business strategy?

3. EKS Ltd. manufactures a single product, which requires three components. The company purchases one of the components from three suppliers. DE Ltd., PE Ltd. and ZE Ltd. The following information are available:

<table>
<thead>
<tr>
<th></th>
<th>DE Ltd.</th>
<th>PE Ltd.</th>
<th>ZE Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price quoted by supplier (per hundred units)</td>
<td>₹240</td>
<td>₹234</td>
<td>₹260</td>
</tr>
<tr>
<td>% of Defective of total receipts</td>
<td>3%</td>
<td>5%</td>
<td>2%</td>
</tr>
</tbody>
</table>

If the defectives are not detected they are utilized in production causing a damage of ₹200 per 100 units of the component. Total requirements are 12,000 units of the components.

The company intends to introduce a system of inspection for the components on receipt. The inspection cost is estimated at ₹26 per 100 units of the components. Such as inspection will be able to detect only 90% of the defective components received. No payment will be made for components found to be defective in inspection.

**Required**

(i) Advice whether inspection at the point of receipt is justified.

(ii) Which of the three suppliers should be asked to supply?

4. A company produces and sells a single product. The cost data per unit for the year 2019 is predicted as below:

<table>
<thead>
<tr>
<th></th>
<th>₹ per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Material</td>
<td>35</td>
</tr>
<tr>
<td>Direct Labour</td>
<td>25</td>
</tr>
</tbody>
</table>
The company has forecast that demand for the product during the year 2019 will be 28,000 units. However, to satisfy this level of demand, production quantity will be increased?

There are no opening stock and closing stock of the product.

The stock level of material remains unchanged throughout the period.

The following additional information regarding costs and revenue are given:

- 12.5% of the items delivered to customers will be rejected due to specification failure and will require free replacement. The cost of delivering the replacement item is ₹5 per unit.
- 20% of the items produced will be discovered faulty at the inspection stage before they are delivered to customers.
- 10% of the direct material will be scrapped due to damage while in storage.

Due to above, total quality costs for the year is expected to be ₹10,75,556.

The company is now considering the following proposal:

1. To introduce training programmes for the workers which, the management of the company believes, will reduce the level of faulty production to 10%. This training programme will cost ₹4,50,000 per annum.
2. To avail the services of quality control consultant at an annual charges of ₹50,000 which would reduce the percentage of faulty items delivered to customers to 9.5%.

**Required**

(i) PREPARE a statement of expected quality costs the company would incur if it accepts the proposal. Costs are to be calculated using the four recognised quality costs heads.

(ii) Would you RECOMMEND the proposal? Give financial and non-financial reasons.

**Theory of Constraints**

5. Z Plus Security (ZPS) manufactures surveillance camera equipment that are sold to various office establishments. The firm also installs the equipment at the client’s place to ensure that it works properly. Each camera is sold for ₹2,500. Direct material cost of ₹1,000 for each camera is the only variable cost. All other costs are fixed. Below is the information for manufacturing and installation of this equipment:

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Manufacture</th>
<th>Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Capacity (camera units)</td>
<td>750</td>
<td>500</td>
</tr>
<tr>
<td>Actual Yearly Production and Installation (camera units)</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>
**Required**

The questions below are separate scenarios and are not related to each other.

(i) IDENTIFY the bottleneck in the operation cycle that ZPS should focus on improving. Give reasoning for your answer.

(ii) An improvement in the installation technique could increase the number of installations to 550 camera units. This would involve total additional expenditure of ₹40,000. ADVISE ZPS whether they should implement this technique?

(iii) Engineers have identified ways to improve manufacturing technique that would increase production by 150 camera units. This would involve a cost ₹100 per camera unit due to necessary changes to made in direct materials. ADVISE ZPS whether they should implement this new technique.

**ANSWERS/ SOLUTIONS**

1. Total Quality Management is a management philosophy. It concerns itself with managing the processes and people to make sure that the customer is satisfied at each and every stage. This means making the needs of the customer the priority, expanding the relationship beyond traditional services and incorporating the customer’s needs in the company’s business plan and corporate strategy. In TQM, the concept of “quality” is perceived exclusively from the frame of reference of the customer. These customers can be internal, such as, those working in another department and there can be external customers who are the end recipients of the product or services. The organisation should attempt for continuous improvement in the quality that it delivers with the ultimate aim of achieving zero defects in this quality.

TQM should be view as an investment rather than as a cost that should be minimised. There are many ways in which investment can be made in TQM:

- fine-tuning the product mix,
- fine-tuning of the processes of ensuring quality,
- introducing employee development programmes with the nature of an academic course,
- empowering the employees professionally and personally,
- improving the top management commitment to quality,
- monitoring of the performances and proper rewarding based on achievements,
- ensuring the customer satisfaction etc.

CIMZ could provide its employees with training in the technical aspects of banking practice as well as in customer care. Customers would thus get a better service not only technically but also from a customer care perspective. This should lead to smaller customer complaints and greater customer satisfaction. It could also motivate customers to recommend others to use this bank.
TQM also requires CIMZ to respond to its customer’s requirements immediately for example by providing more staff to reduce the lengths of queues in festive/ seasonal/ busy time. If Bank could also be opened for longer hours to allow customers to complete their bank related requirements and have meetings with bank employees at a time that is more convenient for the customer, this would lead to more satisfaction to customers.

In long run, if bank continue to follow TQM, the bank would have higher profits and competitive advantage in banking sector despite incurring additional expenditure to improve quality.

2. (i) Customer demand for Cool Air’s products is 100,000 units per annum. However, 5,000 defective units supplied are to be replaced free of charge by the company. Therefore, the total number of items supplied to customers per annum = 100,000 + 5,000 units = 105,000 units. The cost of replacement would include raw material cost, assembly & machining cost and delivery cost of 5,000 units = 5,000 units × (900+500+100) per unit = 5,000 units × ₹1,500 per unit = ₹75,00,000 per annum. Further, had the sale returns not happened, market share would have increased by 50,000 units. Contribution is ₹1,000 per unit, for 50,000 units contribution would be ₹5,00,00,000. Therefore, the cost of poor quality per annum = cost of replacement + contribution from lost sales = ₹75,00,000 + ₹5,00,00,000 = ₹5,75,00,000 per annum.

(ii) Inspection at the end of the process would detect defects before delivery to the customers. This would ensure that the sale returns would be nil. Given in the problem, 5,000 units supplied are defective and would need to be replaced, in other words, they need to be manufactured again. In other words, inspection after production, before delivery to customers would not prevent production of defective units. However, compared to the current scenario, since these defective units have not yet been delivered to the customer, the cost for additional delivery of replaced products would be saved. This savings in the extra delivery cost = 5,000 units × ₹100 per unit = ₹5,00,000 per annum. Further, had the sale returns not happened, market share would have increased by 50,000 units. Contribution is ₹1,000 per unit, for 50,000 units it would be ₹5,00,00,000 per annum. Therefore, the total benefit from the inspection process before delivery to customers = savings on delivery costs + contribution from incremental sales = ₹5,00,000 + ₹5,00,00,000 = ₹5,05,00,000 per annum. The cost to the company to maintain good quality of its products through inspection = ₹2,00,00,000 per annum. Therefore, the net benefit to the company would be ₹3,05,00,000.

(iii) Inspection of raw material at the procurement stage could entirely eliminate defective production. The benefit would be two-fold, the current replacement cost for 5,000 units will no longer be incurred. Secondly, due to better customer perception, market share would increase, resulting in an increased contribution / revenue to the company. In other words, the cost of poor quality will be nil.
As explained in solution (i), the cost of poor quality per annum = cost of replacement + contribution from lost sales = ₹75,00,000 + ₹5,00,00,000 = ₹5,75,00,000 per annum. This would be the benefit by implementing the proposal.

Cool Air has to incur an inspection cost to ensure this highest standard of quality (0% defects) which would cost ₹4,00,00,000 per annum. Therefore, the net benefit to the company would be ₹1,75,00,000 per annum.

(iv) (a) The proposal to implement inspection immediately before delivering goods to the customers results in a net benefit of ₹3,05,00,000 per annum. Alternately, the proposal to implement inspection at the raw material procurement stage results in a net benefit of ₹1,75,00,000 per annum. Therefore, from a profitability point of view, inspection immediately before delivery of goods to the customer would be the preferred option.

(b) The drawback of inspection at the end of the production process is that (1) it cannot prevent production of defective goods and (2) information regarding the root cause of defective production, in this case, supply of defective raw materials will not get tracked. Therefore, inspection at the end of production does not contribute to resolving the root cause of defective production. On the other hand, inspection at the procurement stage can eliminate production of defective goods. This will ensure a much higher quality of production, better utilization of resources and production capacity. Therefore, from a long-term strategy point of view, inspection at the raw material procurement stage will be very beneficial. Currently the cost of ensuring this highest quality of production (0% defects) is ₹4 crores per annum. The cost of ensuring 100% quality is quite high, such that the net benefit to the company is lesser than the other proposal. However, due to its long-term benefit, Cool Air may consider some minimum essential quality control checks at the procurement stage. Although selective quality check might not ensure complete elimination of defective production, it can contribute towards reducing it. At the same time cost of selective quality check would not be so high as to override its benefits. To determine the extent of quality control inspection, Cool Air should determine its tolerance limit for defective production and do an analysis of the quality / cost trade-off.

3. (i) A: Statement Showing Computation of Effective Cost before Inspection

<table>
<thead>
<tr>
<th>Particulars</th>
<th>DE Ltd.</th>
<th>PE Ltd.</th>
<th>ZE Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units Supplies (No.s)</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Defectives Expected (No.s)</td>
<td>360</td>
<td>600</td>
<td>240</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase of Components</td>
<td>28,800</td>
<td>28,080</td>
<td>31,200</td>
</tr>
<tr>
<td>Add: Production Damage on Defective Components (@ ₹200 per 100 components)</td>
<td>720</td>
<td>1,200</td>
<td>480</td>
</tr>
</tbody>
</table>
### B: Statement Showing Computation of Effective Cost after Inspection

<table>
<thead>
<tr>
<th>Particulars</th>
<th>DE Ltd.</th>
<th>PE Ltd.</th>
<th>ZE Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units Supplies (No.s)</td>
<td>12,000</td>
<td>12,000</td>
<td>12,000</td>
</tr>
<tr>
<td>Defects Not Expected (No.s)</td>
<td>36</td>
<td>60</td>
<td>24</td>
</tr>
<tr>
<td>Defectives Expected (No.s)</td>
<td>324</td>
<td>540</td>
<td>216</td>
</tr>
<tr>
<td>Components Paid For</td>
<td>11,676</td>
<td>11,460</td>
<td>11,784</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase of Components</td>
<td>28,022.40</td>
<td>26,816.40</td>
<td>30,638.40</td>
</tr>
<tr>
<td>\textit{Add} Inspection Cost</td>
<td>3,120.00</td>
<td>3,120.00</td>
<td>3,120.00</td>
</tr>
<tr>
<td>\textit{Add} Production Damage on Defective</td>
<td>72.00</td>
<td>120.00</td>
<td>48.00</td>
</tr>
<tr>
<td>Components @ ₹200 per 100 components</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>31,214.40</td>
<td>30,056.40</td>
<td>33,806.40</td>
</tr>
<tr>
<td>Good Components (Nos.)</td>
<td>11,640</td>
<td>11,400</td>
<td>11,760</td>
</tr>
<tr>
<td>Cost per 100 Good Components</td>
<td>268.16</td>
<td>263.65</td>
<td>287.47</td>
</tr>
</tbody>
</table>

### Advice Whether Inspection at the Point of Receipt is Justified

On comparing the cost under situation, A and B shown above, we find that it will not be economical to install a system of inspection.

Further we also need to consider that presently many organizations are undergoing Just in Time (JIT) implementation. JIT aims to find a way of working and managing to eliminate wastes in a process. Achievement of this is ensured through eliminating the need to perform incoming inspection. Inspection does not reduce the number of defects, it does not help in improving quality. In general inspection, does not add value to the product. It simply serves as a means of identifying defects the supplier has failed to recognize subsequent to the manufacturing of the product.

As a matter of fact, organizations implementing JIT are seeking eventually to eliminate the need for performing incoming inspection activities through a combination of reducing the supplier base, selection through qualification and vendor development. Vendor development and its proper management seeks to assist the supplier who maintains an interest in striving to provide 100% defect-free materials and parts.

So, to decision whether inspection at the point of receipt is justified or not will also depend on Qualitative factors as well.
(ii) On comparing the buying cost of components under different situations, as analysed and advised above, if company decides not to install a system of inspection, supplier DE would be cheaper otherwise supplier PE would be cheaper and company may choose supplier accordingly.

This question can also be solved by assuming receipt of good components as requirement i.e. 12,000 units.

4. (i) Statement of ‘Expected Quality Costs’

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Current Situation (₹)</th>
<th>Proposed Situation (₹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention Costs</td>
<td>---</td>
<td>4,50,000</td>
</tr>
<tr>
<td>Appraisal Costs</td>
<td>---</td>
<td>50,000</td>
</tr>
<tr>
<td>External Failure Costs</td>
<td>3,20,000</td>
<td>2,35,120</td>
</tr>
<tr>
<td>Internal Failure Costs</td>
<td>7,55,556</td>
<td>3,91,538</td>
</tr>
<tr>
<td>Total Quality Costs</td>
<td>10,75,556</td>
<td>11,26,658</td>
</tr>
</tbody>
</table>

Workings

External Failure Cost

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Current Situation</th>
<th>Proposed Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer's Demand</td>
<td>...(A)</td>
<td>28,000 units</td>
</tr>
<tr>
<td>Number of units Dispatched to Customers</td>
<td>...(B)</td>
<td>32,000 units</td>
</tr>
<tr>
<td>(28,000 units) 87.5% ; (28,000 units) 90.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of units Replaced</td>
<td>...(B) – (A)</td>
<td>4,000 units</td>
</tr>
<tr>
<td>External Failure Cost</td>
<td>₹3,20,000</td>
<td>₹2,35,120</td>
</tr>
</tbody>
</table>
## Internal Failure Cost

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Current Situation</th>
<th>Proposed Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of units Dispatched to Customers (A)</td>
<td>32,000 units</td>
<td>30,939 units</td>
</tr>
<tr>
<td>Number of units Produced &amp; Rejected (B)</td>
<td>40,000 units/32,000 units × 80%</td>
<td>34,377 units/30,939 units × 90%</td>
</tr>
<tr>
<td>Number of units Discovered Faulty (B) – (A)</td>
<td>8,000 units</td>
<td>3,438 units</td>
</tr>
<tr>
<td>Cost of Faulty Production (D)</td>
<td>₹6,00,000</td>
<td>₹2,57,850</td>
</tr>
<tr>
<td>Material Scrapped (E)</td>
<td>₹1,55,556</td>
<td>₹1,33,688</td>
</tr>
<tr>
<td>Internal Failure Cost (D) +(E)</td>
<td>₹7,55,556</td>
<td>₹3,91,538</td>
</tr>
</tbody>
</table>

### (ii) Recommendation

On purely *financial grounds* the company should not accept the proposal because there is an increase of ₹51,102 in quality costs. However there may be *other factors* to consider as the company may enhance its reputation as a company that cares about quality products and this may increase the company's market share.

On balance the company should accept the proposal to improve its *long-term* performance.

5. (i) **Identification of Bottleneck:** Installation of cameras is the bottleneck in the operation cycle. The annual capacity for manufacturing and installation are given to be 750 camera units and 500 camera units respectively. Actual capacity utilization is 500 camera units, which is the maximum capacity for the installation process. Although, ZPS can additionally manufacture 250 camera units, it is constrained by the maximum units that can be installed. Therefore, the number of units manufactured is limited to 500 camera units, subordinating to the bottleneck installation operation. Therefore, ZPS should focus on improving the installation process.

(ii) **Improving Capacity of Installation Technique:** Every camera sold increases the throughput contribution by ₹1,500 per camera unit (sale price ₹2,500 per camera unit less direct material cost ₹1,000 per camera unit). By improving the current installation technique an additional 50 camera units can be sold and installed. This would involve total additional expenditure of ₹40,000. Hence, the incremental benefit would be:
Particulars | Amount (₹)
--- | ---
Increase in throughput contribution (additional 50 camera units ₹1,500 per camera unit) | 75,000
Less: Increase in total expenditure | 40,000
Incremental benefit | 35,000

Since the annual incremental benefit is ₹35,000 per annum, ZPS should implement this improvement to installation technique, the current bottleneck operation.

(iii) **Improving Manufacturing Capacity:** Every camera sold increases the throughput contribution by ₹1,500 per camera unit (sale price ₹2,500 per camera unit less direct material cost ₹1,000 per camera unit). By improving the current manufacturing technique an additional 150 camera units can produced. This would involve a cost ₹100 per camera unit due to necessary changes to made in direct materials. Therefore, number of units manufactured can increase to 650 camera units. However, production of 150 camera units will not translate into additional sales, because each sale also requires installation by ZPS. In a year only 500 camera installations can be made, leading to an inventory pile up of 150 camera units. This is detrimental to ZPS, since it does not earn any contribution by holding inventory. Therefore, ZPS should not go ahead with the proposal to improve the manufacturing technique.