



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)
(Established under section 3 of UGC Act 1956)
Coimbatore-641021

DEPARTMENT OF MANAGEMENT

Subject: **Strategic Cost Management**

Semester: **III**

Subject Code: **17MBAP301B**

Class- II MBA

Scope:

In order to understand the concepts of costing related to business decisions, strategic cost management has been as an elective subject of finance specialization.

Objectives:

To understand the concept of costing and cost reduction methods. To manage total cost and production costing. To know the process of various costing methods and management. To learn about strategic control systems.

Unit I

Costing - Purpose - Utility, Objectives - Elements of Cost - Cost Sheet – Methods of Costing –Problems - Cost Reduction and Productivity: Cost Reduction Value Analysis – Productivity - Value added concepts - Learning curves - Quality Circles.

Unit II

Total Cost Management - Managing Process Cost - Managing Production Costs - Managing Delivery Costs - Managing Structural Cost. Target Costing - Cost as a source of competitive advantage - Life Cycle Costing.

Unit III

Activity Based Costing - Drawbacks of Conventional Costing - Methodology of ABC - Merits, demerits suitability of ABC - Implementation of ABC. Management Control Systems - Evaluating Management Control Systems - Responsibility Centers - Evaluation of the Performance of Different Responsibility Centers.

Unit IV

Linear Programming and Regression Analysis - Implications of Linear Programming for Cost Accountants - Guidelines for Regression Analysis - Applications of Regression Analysis in Cost Functions.

Unit V

Strategic Control Systems - Decentralization and Transfer Pricing - Choices about Responsibility Centers - Market Based and Cost Based Transfer Prices - Multinational Transfer Pricing.

Note: Problems 20 Marks and Theory 80 Marks

Suggested Readings:

Text Book:

1. Horngren. (2008). *Cost Accounting* (4th edition). New Delhi. AITBS Publications.
2. Vijay Govindrajan. (2000). *Strategic Cost Management* (3rd edition). New Delhi: Wishwa Prakasham.
3. Jokhotiya, G.P. (2010). *Strategic Financial Management*. New Delhi: Vikas Publication Ltd.

References:

- 1 Antony. (2010). *Management Accounting* (3rd edition). New Delhi: Tata Mc Graw Hill.
- 2 J Batty.J. (2007). *Management Accounting* (1st edition). New Delhi: Vikas Publishing House.
- 3 Atkinson & Robert Kaplan. (1998). *Advanced Management Accounting*. New Delhi: Prentice Hall of India.
- 4 Ajit Prasad. (2009). *Strategic Financial Management*. New Delhi: Vikas Publication Ltd.



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Department of Management

Name: **P. SATHIYA BAMA**

Department: **Management**

Subject Code: **17MBAPF301B**

Semester: **III**

Year: **2017-19 Batch**

Subject: Strategic Cost Management

UNIT I

SL. No.	Lecture Duration (Hr)	Topics to be covered	Support Materials
1	1	Cost Accounting – Meaning, Definition, Scope	R1 : 1.31 – 1.33
2	1	Objectives and Importance of Cost Accounting	R1 : 1.33 – 1.35
3	1	Methods of Costing	R1 : 1.36 – 1.40
4	1	Elements of Cost – Material, Labour and Overheads	R1 : 1.41 – 1.43
5	1	Preparation of Statement of Cost – Case Discussion	R1 : 1.44 – 1.45
6		Preparation of Cost Sheet	R1 : 1.46 – 1.49
7	1	Cost Control and Cost Reduction	R2 : 741 - 742
8	1	Value Analysis – Value chain analysis	T : 6 – 9, W1
9	1	Value Analysis – Supply chain analysis	T : 9 – 11,
10	1	Learning Curve - Principles, Application	R2 : 581- 582
11	1	Learning Curve - Limitations	R2 : 583
12	1	Recapitulation and discussion of important questions	
Total no. of hours planned for Unit - I			12

UNIT II

SL. No.	Lecture Duration (Hr)	Topics to be covered	Support Materials
1	1	Total Cost Management – Direct and Indirect Cost, Factors affecting direct and indirect cost	T : 24 - 26
2	1	Cost behavior pattern – Variable and Fixed cost	T : 27 - 29
3	1	Cost drivers, Relationship of type of cost, Total cost and Unit cost	T : 30 - 33
4	1	Managing Process Cost – Flow of Process cost, Equivalent Units, Weighted Average Method, Issues in process cost	R3 : 130 - 156
5	1	Managing Production cost – Flow of production cost	R3 : 80 - 89
6	1	Managing Delivery cost,	W2
7	1	Managing structural cost	W2
8	1	Target Costing – Major influence on target costing,	R3 : 644 - 650
9	1	Target Costing – Economic profit - Case Discussion	R3 : 651 - 656
10	1	Limitations of the profit – Maximizing Model,	R3 : 656 - 658
11	1	Role of accounting product costs in pricing, Strategic pricing of new product	R3 : 658 - 661
12	1	Recapitulation and discussion of important questions	
Total no. of hours planned for Unit - II			12

UNIT III

SL. No.	Lecture Duration (Hr)	Topics to be covered	Support Materials
1	1	Activity Based Costing – Under costing and Over costing, Activity Based Costing system	T : 152 – 159, W3

2	1	Implementing Activity Based Costing, Comparing alternate costing system	T : 160 - 165
3	1	Using Activity based Costing Systems for improving cost management and profitability	T : 166 - 170
4	1	Activity Based Costing in Service and Manufacturing Companies, - Case Discussion	T : 171 - 173
5	1	Product profitability whale curve	R4 : 149 - 152
6	1	Responsibility Accounting – Responsibility centers	R2 : 491 - 493
7	1	Resource centre, Cost centre,	R2 : 493 - 495
8	1	Profit centre, Investment centre	R2 : 495 - 500
9	1	Return on Investment	R2 : 501 - 504
10	1	Problem of Allocation	R2 : 505 - 509
11	1	Net Income and Residual Income	R2 : 509 - 511
12	1	Recapitulation and discussion of important questions	
Total no. of hours planned for Unit - III			12

UNIT IV

SL. No.	Lecture Duration (Hr)	Topics to be covered	Support Materials
1	1	Linear Programming – Basic requirements	R2 : 536 - 539
2	1	Simplex Method	R2 : 539 - 541
3	1	Different terms used in Linear Programming	R2 : 542 - 544
4	1	Uses and Limitations of Linear Programming	R2 : 544 - 546
5	1	Formulation of Linear Programming - Case Discussion	R2 : 546 - 550
6	1	Regression analysis – Guidelines for Regression analysis	R2 : 515 - 519
7	1	Least square method, Standard Error, Confidence Limit	R2 : 520 - 523
8	1	Application of Regression analysis in cost function	R2 : 523 – 527,

			W4
9	1	Regression analysis – Problems will be worked out	T : 301 - 310
10	1	Regression analysis – Problems will be worked out	T : 311 - 320
11	1	LPP – Problems will be worked out	T : 550 - 569
12	1	Recapitulation and discussion of important questions	
Total no. of hours planned for Unit - IV			12

UNIT V

SL. No.	Lecture Duration (Hr)	Topics to be covered	Support Materials
1	1	Strategic Control System	W5
2	1	Transfer Price – Meaning, Types of Transfer pricing	R2 : 357 – 365
3	1	Cost based pricing, Full cost transfer pricing	R2 : 366 – 370
4	1	Market based and multinational Transfer pricing, Transfer Pricing rules	R3 : 560 – 562
5	1	Transfer price – Tax issues	R3 : 562 – 565
6	1	Transfer price in Service Industry - - Case Discussion	R3 : 565 – 567
7	1	Difference between Maximum and Minimum Transfer Pricing	T : 927 - 932
8	1	Dual Pricing, Decentralization and Transfer pricing	T : 932 - 936
9	1	Recapitulation and discussion of important questions	
Total no. of hours planned for Unit - V			9
10	1	Discussion of previous ESE question papers	
11	1	Discussion of previous ESE question papers	

12	1	Discussion of previous ESE question papers	3
Total no. of hours planned for Unit – V and Discussion of previous ESE question papers			12

TEXT BOOKS

T – Charles T Horngren, Srikant M. Datar, George Foster, Madhav V. Rajan, Christopher Ittner, Cost Accounting – A Managerial Emphasis, Pearson Prentice Hall, New Delhi, 13th Edition, 2009.

REFERENCES

- R1 - S.P. Jain and K.L.Narang. Cost Accounting : Principles and Practice. Kalyani Publishers. Ludhiana, 2006.
- R2 – P.K. Sikdar, Advanced Cost and Management Accounting, Viva Book Private Limited, New Delhi, 2005
- R3 – Ronald W Hilton, G. Ramesh, M. Jayadev, Managerial Accounting, Tata Mc Graw Hill Publishing Company Limited, New Delhi, 2008
- R4 - Robert Haplan and Anthony A. Atkinson. Advanced Management Accounting. Prentice Hall, New Delhi, 3rd Edition, 2001

WEBSITES

- W1 - <http://www.yourarticlelibrary.com>
- W2 - <https://forum.manager.io>
- W3 - www.accountingcoach.com
- W4 - <http://www.dummies.com>
- W5 - <http://yourbusiness.azcentral.com>

UNIT-I-Introduction to Costing

SYLLABUS

Introduction to Costing - Purpose - Utility, Objectives - Elements of Cost - Cost Sheet – Methods of Costing –Problems - Cost Reduction and Productivity: Cost Reduction Value Analysis – Productivity - Value added concepts - Learning curves - Quality Circles.

INTRODUCTION TO STRATEGIC COST MANAGEMENT

In global competitive environment, the most efficient firms view all of their spending as an investment. They make efficient spending decisions based on a strategic vision and their internal capabilities to deliver value from that investment. Traditionally firms have been under pressure to cut costs in the short term without really thinking about sustainable growth and integration with the overall business strategy.

In today's business environment of increased global competition, new markets, increasing regulation and changing demographics, successful companies must develop a multifaceted cost competence. It has been observed that traditional firm's tactical solutions, despite consuming considerable resources, have failed to deliver the planned reduction of costs and have not resulted into competitive advantage.

In many cases the cost savings achieved in the short term have leaked away and the cost base has returned to previous high levels and considerable damage to corporate structure, image, culture and morale has been done. Therefore it should be understood that 'Cost' is a strategic issue. There is a need to continuously strive to optimize the same in the context of the entire business model of the firm. Execution of any chosen strategy has to be carefully managed to ensure the appropriate balance between revenue growth and cost.

It has also been observed that firms that are taking the investment approach to managing cost are thriving in this new environment, striking a balance between a competitive cost structure, cost effective strategy execution and investment in the future. They are delivering a very good response

to the cost challenge. Thus it becomes necessary to link the Cost Management to strategies of the organisation.

It is quite natural that most important objectives for any organisation are its long term growth and survival. Profit maximisation is the key to attainment of these objectives, which in turn depends on how efficiently the revenues are bolstered and how effectively the costs are minimised. Due to volatile and constantly declining revenue stream, organisations are forced to realign their cost structure and to invest in effective cost management strategy so as to improve their bottom lines.

Strategic cost management approaches require that supply chain team work together to identify process improvement that reduces costs across the supply chain. E.g. team based value engineering efforts, on-site supplier development, cross enterprise cost reduction projects, joint brainstorming efforts on new products, supplier suggestion programmes, and supply chain redesign efforts. Organisations should use various techniques of Strategic Cost Management for reducing and controlling cost in today's competitive world. One of the basic things an organisation relies on for its long-term sustainability is cost management

and giving it a strategic emphasis has led to the evolution of a new stream of management known as strategic cost management which is crucial in modern business environment.

The strategic cost management itself involves a number of techniques that are useful in improving the efficiency and long-term competitiveness of the firm. Strategic Cost Management not only leads to incremental performance improvement but also to transformational change across the value chain.

It is viewed as part of business process to influence decisions on pricing and profitability across several dimensions: product, customer, region, and distribution channel. Strategic Cost Management helps to find lower cost solutions but it should also be kept in mind that this also requires proper supply chain management.

Strategic Cost Management: Technique

1. Activity Based Costing (ABC):

ABC is a natural outgrowth of today's competitive and complex environment. ABC provides a closer approximation of the cost of a product than that provided by the traditional volume based costing method. The main principle of ABC states that activities cause costs and to control costs, the activities must be controlled.

Under ABC system, the activities are identified, the expenses related to each activity are clubbed together to get activity-wise expenses, a cost driver for each activity is selected and finally the cost of the product is worked out.

Traditional cost accounting measures what it costs to do a task whereas ABC records the cost of not doing also. The system monitors activities more closely, relates costs to activities and bring in cost effectiveness. This system of costing makes a great impact in the service sector also.

ABC is a primary source of information for Activity Based Management (ABM). ABM is basically a top down approach wherein the top management exploits information derived from ABC and passes the decision to the operational level towards continuous improvement and excellence.

2. Target Costing (TC):

As customers become more demanding and seek great value, importance of effective cost management becomes even more. Much of the Indian manufacturing in the past was occurring in a cost plus environment, aided by extensive government regulations. The operating practice was to fix a price as: $\text{Price} = \text{Cost} + \text{Profit}$. But in the global market the customer will dictate the price and features that he will be looking for.

Target costing is a new attempt in which cost is the difference between the price expectation of the customers and margin expectations of the corporation entities. $\text{Cost} = \text{Price} - \text{Target Profit}$. Management Accountant will have to work closely with design and engineering personnel to achieve this target.

3. Total Quality Management (TQM):

Total Quality Management is a term first coined by the U.S. Naval Air Systems Command to describe its Japanese-style management approach to quality improvement.

TQM is a set of management practices throughout the organisation, geared to ensure that the organisation consistently meets or exceeds customer requirements. TQM places strong focus on process measurement and controls as means of continuous improvement.

Total Quality is a people-focused management system that aims at continual increase in customer satisfaction at continually lower real cost. In a TQM effort, all members of an organisation participate in improving processes, products, services and the culture in which they work.

4. Benchmarking:

Benchmarking is the process of determining who is the very best, who sets the standard, and what that standard is. In other words, Benchmarking refers to the search for the best practices that yields the benchmark performance, with emphasis on how you can apply the process to achieve superior results.

Often Benchmarking is used to evaluate performance. Benchmarking represents “**best practice**” available inside or outside the organisation.

5. Business Process Reengineering (BPR):

Business Process Reengineering, when fully implemented, will reduce a lot of clerical work and maintenance of records. Thus Purchasing, Material Receipts, Accounts Payable procedures and documentation will be virtually eliminated. Instead annual contracts with a few reliable suppliers to whom payments for quantities consumed in production will be made.

These improvements are made possible by the rapid strides made in Information Technology. Government support and the attitude of Business Executives at the top level will determine the pace of acceptance of these recent developments.

It can be noted that the above system and practices would lead in overall improvement in the performance of the organisation, reduction in cost of production and improvement in productivity. As such the above singularly and collectively play a very vital role in the financial control of an organisation.

6. JIT Inventory Control System:

Originally developed in Japan and successfully implemented. Under this system, a company should maintain a very minimal level of inventory and rely mostly on suppliers to provide parts and components “**Just in Time**” to meet assembly requirements.

JIT philosophy is dedicated to the elimination of waste because stocks of raw materials and finished goods are reduced leading to minimum holding cost of inventory.

However, this system may not be applicable in the present Indian situation because of unreliable transport arrangement, not so excellent relations with suppliers and distance of supply sources from the factory. Over emphasis on safety stock will come in the way of its implementation.

7.Balanced Score Card:

The balanced score card is a [strategic cost management](#) technique for communicating and evaluating the achievement of the strategy of the organisation. It has been developed by Kaplan and Norton. This technique has been adopted by rapidly growing organisations as a mechanism to help effectively manage their performance and strategy.

Traditional financial measures such as ROI, RI, value added, EPS, variance analysis etc. deal with past performance and are inadequate for evaluating current information needs of large growing companies.

Traditional performance measures have the following drawbacks:

1. Performance measures lay too much emphasis on financial aspects.
2. Measures are not customer oriented and do not take care of the requirements of customers.
3. Departmental performance measures are not linked to the organisation's strategic objectives and as a result fail to achieve the overall objectives of the organisation.
4. Sometimes performance measures are irrelevant to the situation.
5. Traditional performance measures are mainly developed to meet the requirements of the organisations who are operating in a seller's market. But now a day's business enterprises are operating in a buyer's market where there is acute competition.

For survival in the market, the organisation must come up to the expectations of customers and must deliver defect free product on time at a low price. Organisations must develop performance measures that take care of customers expectations.

Prior to 1980s management accounting, control systems used to focus mainly only on financial performance measures.

Only those items were included which could be expressed in monetary terms and motivated managers to focus excessively on cost reduction and ignore other important variables (such as quality, delivery, after sales service, etc.) which were necessary to compete in the global market that emerged during the 1980s.

Consideration of non-financial measures plays a very important role these days in achieving success of financial terms. Thus, a mix of non-financial measure and financial measures emerged to cope with the

requirements of customers. Performance measurement systems much achieve a balance which supports progress against pre-determined objectives.

According to Kaplan and Norton previous system that incorporated non-financial measurements used ad hoc collection of such measures more like checklists of measures for managers to keep track of and improve than a comprehensive system of linked-measurement. The need to integrate financial and non-financial measures of performance led to the emergence of the balanced scorecard (BSC).

Four persecution of BSC as developed by Kaplan and Norton are given below:

1. Customer perspective, i.e., how to customers view us. This perspective lays emphasis on the ability of the organisation to provide quality goods and services promising delivery in time and ensuring that goods and services are provided at low cost and low cost of ownership keeping in view the overall satisfaction of customers.

2. Internal business process perspective (i.e. to satisfy our shareholders and customers at what business must we excel?). The organisation should make efforts to excel at the business which will satisfy customers and provide a good return to shareholders.

3. Learning and growth perspective (i.e. can we continue to improve and create values?) In order to meet the new changes in the market and coming up to the expectations of customers, employees should be willing or asked to take on dramatically new responsibilities and may be ready to acquire new skills, technologies and organisational designs that were not available in the past.

4. Financial perspective (i.e. how do we look to shareholders?). This perspective lays emphasis on profitability and market value of the organisation so that shareholders are duly compensated. The purpose of balanced scorecard is to strike a balance in these four perspectives and to achieve the overall best for the organization.

Balanced Scorecard is a Performance metric used in strategic management to identify and improve various internal functions and their resulting external outcomes. The balanced Scorecard attempts to measure and provide feedback to an organisation in order to assist in implementing strategies and objectives.

It is a set of performance targets and results relating to four dimensions of performance—financial, customer, internal process and innovation. As a structure, balanced scorecard methodology breaks broad goals down successively into vision, strategies, tactical activities, and metrics.

As an example of how the methodology might work, an organisation might include in its mission statement a goal of maintaining employee satisfaction. This would be the organisation's vision. Strategies

for achieving that vision might include approaches such as increasing employee-management communication.

Tactical activities undertaken to implement the strategy could include, for example, regularly scheduled meetings with employees. Finally, metrics could include quantifications of employee

suggestions or employee surveys. So this technique helps to take proper action to create the desired future results.

8. Kaizan Costing:

Kaizan refers to continual and gradual improvement through small betterment activities, rather than large or radical improvement made through innovation or large investment in technology. It is the process of cost reduction during the manufacturing phase of an existing product. Kaizen costing is most consistent with the saying “slow and steady wins the race.”

It is a Japanese term for making improvements to a process through small, incremental amounts rather than through large innovations. It is a planning method used during the manufacturing cycle with an emphasis on reducing variable costs in one period below the costs in a base period.

9. Six Sigma:

Six Sigma originated at Motorola in the early 1980s in response to a CEO-driven challenge to achieve tenfold reduction in product-failure levels in five years. It is a multifaceted approach to process improvement, reduced costs, and increased profits. With a fundamental principle to improve customer satisfaction by reducing defects, its ultimate performance target is virtually defect-free processes and products.

The Six Sigma methodology, consisting of the steps: Identifying the Process—Define- Measure- Analyse-Improve-Control,” is the roadmap to achieving this goal. Within this improvement framework, it is the responsibility of the improvement team to identify the process, the definition of defect, and the corresponding measurements, improvement and control.

The primary objective of Six Sigma is to improve customer satisfaction, and thereby profitability by reducing and eliminating defects. Defects may be related to any aspect of customer satisfaction high product quality, schedule adherence, cost minimisation etc.

10. Life Cycle Costing (LCC):

A life cycle cost analysis calculates the cost of a system or product over its entire life span. This also involves the process of Product Life Cycle Management so that the life cycle profits are maximised.

The analysis of this system includes cost for planning, research & development, production, operation, maintenance, cost of replacement and disposal or salvage. This concept provides important information for pricing and also helps in managing cost incurred throughout lifecycle of a system or product.

Process of LCC:

LCC involves identifying the individual costs relating to the procurement of the product or service. These can be either “one-off” or “recurring” costs.

Examples of one-off costs include:

- (i) Procurement;
- (ii) Implementation and acceptance;
- (iii) Initial training;
- (iv) Documentation;
- (v) Facilities;
- (vi) Transition from incumbent supplier(s);
- (vii) Changes to business processes; and
- (viii) Withdrawal from service and disposal

Examples of recurring costs include:

- (i) Retraining;
- (ii) Operating costs;
- (iii) Service charges;
- (iv) Contract and supplier management costs;

- (v) Changing volumes;
- (vi) Cost of changes;
- (vii) Downtime due non-availability;
- (viii) Maintenance and repair; and
- (ix) Transportation and handling.

It is important to understand the difference between these cost groupings because one-off costs are sunk costs once the acquisition is made whereas recurring costs are time dependent and continue to be incurred throughout the life of the product or service.

Furthermore, recurring costs can increase with time for example through increased maintenance costs as equipment becomes old. These types of costs incurred will vary according to the goods or services being acquired.

11.Theory of Constraints (TOC):

During the 1980s Goldratt and Cox (1984) advocated a new approach to production management called optimized 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.

A bottleneck might be a machine whose capacity limits the throughput of the whole production process. The aim is to identify bottlenecks and remove them or, if this is not possible, ensure that they are fully utilized at all times. Non-bottleneck resources should be scheduled and operated based on constraints within the system, and should not be used to produce more than the bottlenecks can absorb.

The OPT philosophy therefore, advocates that non-bottleneck resources should not be utilized to 100% of their capacity, since this would merely result in an increase in inventory. Thus, idle time in non-bottleneck is not considered detrimental to the efficiency of the organisation.

If it were utilized, it would result in increased inventory without a corresponding increase in throughput for the plant. The process of maximising profit when faced with bottleneck and non-bottleneck operations is known as theory of constraint (TOC).

The process involves five steps:

- (i) Identify the system's bottleneck;
- (ii) Decide how to exploit the bottlenecks;
- (iii) Subordinate everything else to the decision in step (ii);
- (iv) Elevate the system's bottlenecks;
- (v) If, in the previous steps a bottleneck has been broken go back to step (i).

12. Activity Based Management (ABM):

The adopters of activity based costing (ABC) used it to produce more accurate product or service costs but it soon became apparent to the users that it could be extended beyond purely product costing to a range of cost management applications.

The term activity based management (ABM) or activity based costing management (ABCM) are used to describe the cost management applications. To complement an ABM system only first three stages of the five stages for designing an activity-based product costing system are required.

They are:

- (i) Identifying the major activities that take place in the organisation;
- (ii) Assigning costs to cost pools/cost centres for each activity;
- (iii) Determining the cost driver for each major activity.

ABM rules business as a set of linked activities that ultimately add value to the customer. It focuses on managing the business on the basis of activities that make up the organisation. ABM is based on the premise that activates consume costs.

Therefore, by managing activities costs will be managed in the long-term. The goal of ABM is to enable customer needs to be satisfied while making fewer demands on organisational resources.

ABC also provides information on the cost of activities why activities are taken and how will they are performed. ABM is much broader concept than ABC. It refers to the management philosophy that focuses on the planning execution and measurement of the activities as the key to competitive advantage.

From the above we can conclude that [Strategic Cost Management](#) helps to find lower cost solutions but this also requires proper supply chain management. Globalized market place and consumer's increased demands on availability put higher pressure on companies supply chain.

If supply chain is efficient, then end consumers will be better served. If supply chain is on top, it not only helps to gain new consumers but also helps to retain old ones.

The major responsibility of purchasing is to ensure that the price paid for an item is fair and reasonable because price has a direct-impact on the end consumer's perception of value provided by the organisation.

So evaluation of supplier's cost to provide the product and services is an ongoing challenge within all industries. Price analysis focuses simply on a seller's price perspective, giving less consideration to actual cost of production.

On the other hand cost analysis, lays emphasis on each individual cost element (i.e. material, labour, overhead, other administrative costs and profits) and final cost of product. This analysis determines a fair and reasonable price and develop plan to achieve future cost reduction. So price and cost management should be considered from total supply chain perspective. [Strategic cost management](#) requires that purchasing and logistics system should adopt a series of new initiatives that can deliver results of the bottom line.

COSTING

Meaning of Cost Accounting

Cost accounting developed as an advanced phase of accounting science and is trying to make up the deficiencies of financial accounts. It is essentially a creation of the twentieth century. Cost accounting accounts for the costs of a product, a service or an operation. It is concerned with actual costs incurred and the estimation of future costs. Cost accounting is a conscious and rational procedure used by accountants for accumulating costs and relating such costs to specific products or departments for effective management action. Cost accounting through its marginal costing technique helps the management in profit planning and through its another technique i.e. Standard costing facilitates cost control. In short, cost accounting is a management information system which analyses past, present and future data to provide the basis for managerial decision making.

Distinction Between Financial Accounting And Cost Accounting

Though there is much common ground between financial accounting and cost accounting and though in fact cost accounting is an outgrowth of financial accounting yet the emphasis differs. Firstly financial accounting

is more attached with reporting the results of business to persons other than internal management - government, creditors, investors, researchers, etc. Cost accounting is an internal reporting system for an organisation's own management for decision making. Secondly financial accounting data is historical in nature and its periodicity of reporting is much wider. Cost

accounting is more concerned with short-term planning and its reporting period much lesser than financial accounting. It not only deals with historic data but also is futuristic in approach. Thirdly, in financial accounting the major emphasis in cost classification is based on the type of transaction e.g. Salaries, repairs, insurance, stores, etc. But in cost accounting the major emphasis is on functions, activities, products, processes and on internal planning and control and information needs of the organisation.

Utility Of Cost Accounting

A properly installed cost accounting system will help the management in the following ways:

- the analysis of profitability of individual products, services or jobs.
- the analysis of profitability of different departments or operations.
- it locates differences between actual results and expected results.
- it will assist in setting the prices so as to cover costs and generate an acceptable level of profit.
- cost accounting data generally serves as a base to which the tools and techniques of management accounting can be applied to make it more purposeful and management oriented.
- the effect on profits of increase or decrease in output or shutdown of a product line or department can be analysed by adoption of efficient cost accounting

system.

Distinction Between Costing And Cost Accounting

Costing is the technique and process of ascertaining costs. It tries to find out the cost of doing something, i.e., the cost of manufacturing an article, rendering a service, or performing a function. Cost accounting is a broader term, in that it tries to determine the costs through a formal system of accounting (unlike costing which can be performed even through informal means). Stated precisely, cost accounting is a formal mechanism by means of which costs of products and services are ascertained and controlled. The institute of cost and management accountants, u.k. define

cost accounting as: the application of accounting and costing principles, methods and techniques in the ascertainment of costs and the analysis of savings and/or excesses as compared with previous experience or with standards. It, thus, includes three things:

§ Cost Ascertainment: finding out the specific and precise total and unit costs of products and services.

§ Cost Presentation: reporting cost data to various levels of management with a view to facilitate decision making.

§ Cost Control: this consists of estimating costs for production and activities for the future, and keeping them within proper limits.

Budgets and standards are employed for this purpose.

Cost accounting also aims at cost reduction, i.e., achieving a permanent and real reduction in cost by improving the standards. Cost accountancy is a comprehensive term that implies the 'application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control'. It seeks to control costs and ascertain the profitability of business operations.

Classification Of Cost

In the process of cost accounting, costs are arranged and rearranged in various classifications. The term 'classification' refers to the process of Grouping costs according to their common characteristics. The different bases of cost classification are:

1. By nature or elements (materials, labour and overheads)
2. By time (historical, pre-determined)
3. By traceability to the product (direct, indirect)
4. By association with the product (product, period)
5. By changes in activity or volume (fixed, variable, semi-variable)
6. By function (manufacturing, administrative, selling, research)

- and development, pre-production)
7. By relationship with the accounting period (capital, revenue)
 8. By controllability (controllable, non-controllable)
 9. By analytical/decision-making purpose (opportunity, sunk, differential, joint, common, imputed, out-of-pocket, marginal, uniform, replacement)
 10. By other reasons (conversion, traceable, normal, avoidable, unavoidable, total)

1. Elements Of Cost

The elements of costs are the essential part of the cost. There are broadly three elements of cost, as explained below:

(A) Material

The substance from which the produce is made is called material. It can be direct as well as indirect.

I) Direct Material: it refers to those materials which become an integral part of the final product and can be easily traceable to specific physical units. Direct materials, thus, include:

1. All materials specifically purchased for a particular job or process.
2. Components purchased or produced.
3. Primary packing materials (e.g., carton, wrapping, card-board boxes etc.).

4. Material passing from one process to another.

li) Indirect Material: all materials which are used for purpose ancillary to the business and which cannot conveniently be assigned to specific physical units are known as 'indirect materials'. Oil, grease, consumable stores, printing and stationery material etc. Are a few examples of indirect materials.

(b) Labour

In order to convert materials into finished products, human effort is required. Such human effort is known as labour. Labour can be direct as well as indirect.

I) Direct Labour:

It is defined as the wages paid to workers who are engaged in the production process and whose time can be conveniently and economically traceable to specific physical units. When a concern does not produce but instead renders a service, the term direct labour or wages refers to the cost of wages paid to those who directly carry out the service, e.g., wages paid to driver, conductor etc. Of a bus in transport service.

li) Indirect Labour:

Labour employed for the purpose of carrying out tasks incidental to goods produced or services provided is called indirect labour or indirect wages. In short, wages which cannot be directly identified with a job, process or operation, are generally treated as indirect wages. Examples of indirect labour are: wages of store-keepers, foremen, supervisors, inspectors, internal transport men etc.

(C) Expenses

Expenses may be direct or indirect.

I) Direct Expenses:

These are expenses which can be directly, conveniently and wholly identifiable with a job, process or operation. Direct expenses are also known as chargeable expenses or productive expenses. Examples of such expenses are: cost of special layout, design or drawings, hire of special machinery required for a particular contract, maintenance cost of special tools needed for a contract job, etc.

li) Indirect Expenses:

Expenses which cannot be charged to production directly and which are neither indirect materials nor indirect wages are known as indirect expenses. Examples are rent, rates and taxes, insurance, depreciation, repairs and maintenance, power, lighting and heating etc.

The above elements of cost may be shown by means of a chart:

		Element of cost			
		materials	labour		expenses
Direct	indirect	direct	indirect	direct	indirect

1. Overheads

The term overheads includes, indirect material, indirect labour and indirect expenses, explained in the preceding paragraphs. Overheads may be incurred in the factory, office or selling and distribution departments/divisions in an undertaking. Thus overheads may be of three types: factory

overheads, office and administrative overheads and selling and distribution overheads. This classification of overheads may be shown thus:

Classification Of Overheads

Overheads

Factory office selling and distribution

Indirect indirect indirect indirect indirect indirect

indirect indirect indir Material labour exp mat lab.

Exp. Mat. Lab exp

2. Cost Classification By Time

On the basis of the time of computing costs, they can be classified Into historical and pre-determined costs.

I) Historical Costs:

These costs are computed after they are incurred. Such costs are available only after the production of a particular thing is over.

ii) Pre-Determined Costs:

These costs are computed in advance of production on the basis of a specification of all factors influencing cost. Such costs may be:

1. Estimated costs: estimated costs are based on a lot of guess work. They try to ascertain what the costs will be based on certain factors. They are less accurate as only past experience is taken into account primarily, while computing them.

2. Standard costs: standard costs is a pre-determined cost based on a technical estimate for material, labour and other expenses for a selected period of time and for a prescribed set of working conditions.

3. Cost Classification By Traceability

As explained previously, costs which can be easily traceable to a product are called direct costs. Indirect costs cannot be traced to a product or activity. They are common to several products (e.g., salary of a factory manager, supervisor etc.) And they have to be apportioned to different products on some suitable basis. Indirect costs are also called 'overheads'.

4. Cost Classification By Association With Product

Costs can also be classified (on the basis of their association with products) as product costs and period costs.

1.Product Costs: product costs are traceable to the product and include direct material, direct labour and manufacturing overheads. In other words, product cost is equivalent to factory cost.

2.Period Costs: period costs are charged to the period in which they are incurred and are treated as expenses. They are incurred on the basis of time, e.g., rent, salaries, insurance etc. They cannot be directly assigned to a product, as they are incurred for several

products at a time
(generally).

5. Cost Classification By Activity/Volume

Costs are also classified into fixed, variable and semi-variable on the basis of variability of cost in the volume of production.

1.Fixed Cost:

Fixed cost is a cost which tends to be unaffected by variations in volume of output. Fixed cost mainly depends on the passage of time and does not vary directly with the volume of output. It is also called period cost, e.g., rent, insurance, depreciation of buildings etc. It must be noted here that fixed costs remain fixed upto a certain level only. These costs may also vary after a certain production level.

2.Semi-Variable Cost:

These costs are partly fixed and partly variable. Because of the variable element, they fluctuate with volume and because of the fixed element, they do not change in direct proportion to output. Semi-variable or semi-fixed costs change in the same direction as that of the output but

not in the same proportion. For example, the expenditure on maintenance is to a great extent fixed if the output does not change significantly. Where, however, the production rises beyond a certain limit, further expenditure on maintenance will be necessary although the increase in the expenditure will not be in proportion to the rise in output. Other examples in this regard are: depreciation, telephone rent, repairs etc.

3. Variable Cost:

Cost which tends to vary directly with volume of outputs is called 'variable cost'. It is a direct cost. It includes direct material, direct labour, direct expenses etc. It should be noted here that the variable cost per unit is constant but the total cost changes corresponding to the levels of output. It is always expressed in terms of units, not in terms of time.

6. Cost Classification By Function

On the basis of the functions carried out in a manufacturing concern, Costs can be classified into four categories:

1. Manufacturing/Production Cost: it is the cost of operating the manufacturing division of an enterprise. It is defined as the cost of the sequence of operations which begin with supplying materials, services and ends with the primary packing of the product.

2.Administrative/Office Cost: it is the cost of formulating the policy, directing the organisation and controlling the operations of an undertaking, which is not directly related to production, selling, distribution, research or development. Administration cost, thus, includes all office expenses: remuneration paid to managers, directors, legal expenses, depreciation of office premises etc.

3.Selling Cost: selling cost is the cost of seeking to create and stimulate demand e.g., advertisements, showroom expenses, sales

promotion expenses, discounts to distributors, free repair and servicing expenses, etc.

4.Distribution Cost: it is the cost of the sequence of operations which begins with making the packed product, available for despatch and ends with making the reconditioned returned empty package, if any, available for re-use. Thus, distribution cost includes all those expenses concerned with despatching and delivering finished products to customers, e.g., warehouse rent, depreciation of delivery vehicles, special packing, loading expenses, carriage outward, salaries of despatch clerks, repairing of empties for re-use, etc.

5. Research And Development Cost: it is the cost of discovering new ideas, processes, products by experiment and implementing such results on a commercial basis.

6.Pre-Production Cost: expenses incurred before a factory is started and expenses involved in introducing a new product are preproduction costs. They are treated as deferred revenue expenditure and charged to the cost of future production on some suitable basis.

7. Cost Classification By Relationship With Accounting Period

On the basis of controllability, costs can be classified as controllable or uncontrollable.

1.Controllable Cost: a cost which can be influenced by the action of a specified member of an undertaking is a controllable cost, e.g., direct materials, direct labour etc.

2.Uncontrollable Cost: a cost which cannot be influenced by the action of a specified member of an undertaking is an uncontrollable cost, e.g., rent, rates, taxes, salary, insurance etc.

The term controllable cost is often used in relation to variable cost and the term uncontrollable cost in relation to fixed cost. It should be noted here that a controllable cost can be controlled by a person at a given organisation level only. Sometimes two or more individuals may be involved in controlling such a cost.

8. Cost Classification By Decision-Making Purpose

Costs may be classified on the basis of decision-making purposes for which they are put to use, in the following ways:

1. Opportunity Cost: it is the value of the benefit sacrificed in favour of choosing a particular alternative or action. It is the cost of the best alternative foregone. If an owned building, for example, is proposed to be used for a new project, the likely revenue which the building could fetch, when rented out, is the opportunity cost which should be considered while evaluating the profitability of the project.

2. Sunk Cost: a cost which was incurred or sunk in the past and is not relevant for decision-making is a sunk cost. It is only historical in nature and is irrelevant for decision-making. It may also be defined as the difference between the purchase price of an asset and its salvage value.

3. Differential Cost: the difference in total costs between two alternatives is called as differential cost. In case the choice of an alternative results in increase in total cost, such increase in costs is called 'incremental cost'. If the choice results in decrease in

total costs, the resulting decrease is known as decremental cost.

4. Joint Cost: whenever two or more products are produced out of one and the same raw material or process, the cost of material purchased and the processing are called joint costs. Technically speaking, joint cost is that cost which is common to the processing of joint products or byproducts upto the point of split-off or separation.

5. Common Cost: common cost is a cost which is incurred for more than one product, job territory or any other specific costing object. It cannot be treated to individual products and, hence, apportioned on some suitable basis.

6. Imputed Cost: this type of cost is neither spent nor recorded in the books of account. These costs are not actually incurred (hence known as hypothetical or notional costs) but are considered while making a decision. For example, in accounting, interest and rent are recognized only as expenditure when they are actually paid. But in costing, they are charged on a notional basis while ascertaining the cost of a product.

7. Out-Of-Pocket Cost: it is the cost which involves current or future expenditure outlay, based on managerial decisions. For example a company

has its own trucks for transporting goods from one place to another. It seeks to replace these by employing public carriers of goods. While making this decision, management can ignore depreciation, but not the out-of-pocket costs in the present situation, i.e., fuel, salary to drivers and maintenance paid in cash.

8. Marginal Cost: it is the aggregate of variable costs, i.e., prime cost plus variable overheads.

9. Replacement Cost: it is the cost of replacing a material or asset in the current market.

Cost Sheet

Cost sheet is a statement presenting the items entering into cost of products or services. It shows the total cost components by stages and cost per unit of output during a period. It is usually prepared to meet three objectives: to provide the classification of costs in a summarised form, to prepare estimates of costs for future use and to facilitate a comparative study of costs with previous cost sheets to know the cost trends.

The layout of a typical cost sheet is provided below:

Specimen cost sheet

Direct materials

opening stock of materials
add purchases of materials
less closing stock of materials

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Unit 1

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(a) materials consumed

Direct wages

Direct expenses

Prime cost

Add Factory Overheads

Factory Rent, Rates, Taxes
Fuel-Power And Water
Lighting And Heating
Indirect Wages
Salaries Of Works Manager Etc.
Indirect Materials
Drawing Office And
Works Office Expenses
Depreciation On
Factory Land And
Building
Less Scrap Value
Defective Work

Add Work In Progress (Opening)

Less Work In Progress (Closing)

Works cost

Add Office/Administration Overheads

Office Rent, Insurance, Lighting, Cleaning
Office Salaries, Telephone, Law And
Audit Expenses

General Manager's Salary

Printing And Stationery

Maintenance, Repairs, Upkeep Of Office
bldg

bank charges and miscellaneous expenses

Cost Of Production

Add opening stock

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of finished goods

Less closing stock

of finished goods

Cost of goods sold

Add selling and

distribution overheads

showroom expenses,

salesmen's salaries

& commission, bad

debts, discounts,

warehouse rent, carriage

outwards,

advertising, delivery

expenses, samples and

free gifts etc.

Cost of sales

add net profit or deduct net loss:

Sales

Treatment of certain items in the cost sheet:

(a) Computation Of Profit: profit may be calculated either as a

Percentage of cost or selling price.

Example:

profit as a percentage of cost:

Factory cost 5,700

Administration overhead 600

Total cost 6,300

Profit 10% on cost 630

Selling price 6,930

percent

So profit = cost -----
100

Example: Profit as a percentage of selling price. Here the percentage is on Selling price. Selling price includes Cost + Profit.

Sales price = 100

Less profit = 10

Cost price = 90

This profit of rs.10 is on rs.90 which is the cost price.

So it is 1/9th of cost price. In the above example,

Total cost = 6,300

Profit on 10% on SP = 700

Selling price 7,000

(b) Treatment Of Stock: the term 'stock' includes three items: raw materials, work in progress and finished goods. The value of raw materials is arrived at in the following manner:

Opening stock of raw material

Add purchases

Add expenses involved in the

purchases of raw material Less

closing stock of raw materials

Work-in-progress represents the quantity of semi-finished goods at the time of the preparation of the cost sheet. It represents cost of materials, labour and manufacturing expenses to-date. Work-in-progress may be

shown in the cost sheet either immediately after the prime cost or after the calculation of the factory overheads, as shown in the specimen cost sheet. Finally, in respect of stock of finished goods, adjustments have to be made where opening and closing stock of finished goods are given. This is done, as shown in the specimen cost sheet, by adding opening stock of finished goods to the cost of production arrived at on the basis of current figures and reducing the closing stock of finished goods from this total. Let's explore these aspects more clearly through the following illustrations:

Tenders And Quotations:

While preparing tenders or quotations, manufacturers or contractors have to look into the figures pertaining to the previous year as shown in the cost sheet for that period. These figures have to be suitably

modified in the light of changes expected in the prices of materials, labour, etc., and submit the tender or quotation accordingly.

Illustrations

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE**Class: II MBA****Course Name: Strategic Cost Management****Course Code: 17MBAPF301B****Unit 1****Semester: III Year: 2017-19 Batch**

Illustration 1:

Prepare the cost sheet to show the total cost of production and cost per unit of goods manufactured by a company for the month of July 2012. Also find out the cost of sales.

Stock of raw materials 1-7-2012	3,000
Raw materials purchased	28,000
Stock of raw materials 31-7-2012	4,500
Manufacturing wages	7,000
Depreciation of plant	1,500
Loss on sale of a part of plant	300
Factory rent and rates	3,000
Office rent	500
General expenses	400
Discount on sales	300
Advertisement expenses to be fully charged	600
Income-tax paid	2,000

The number of units produced during July, 2012 was 3,000.

The stock of finished goods was 200 and 400 units on 1-7-2012 and 31-7-2012 respectively. The total cost of units on hand on 1-7-2012 was Rs.2,800. All these have been sold during the month.

Output
3,000 units.

Cost sheet for the year ended 31-7-2012

Particulars	Total Cost	Per
Unitcost		
	Rs.	Rs.
Raw materials consumed		
Opening stock	3,000	
Add purchases	28,000	

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		31,000		
	Less closing stock	4,500	26,500	8.83
Direct wages		7,000	2.33	
Prime cost		33,500	11.16	
Factory overheads:				
Depreciation	1,500			
Factory rent	3,000	4,500	1.50	
Factory cost		38,000	12.66	
Office and administrative				
Overheads:				
Office rent	500			
General expenses	400	900	0.30	
Cost of production		38,900	12.96	
Statement of cost of sales				
Cost of production		38,900		
Add: opening stock of				
Finished goods		2,800		
		41,700		
Less: closing stock of finished				
Goods (400 x rs.12.96)		5,184		
Cost of production of goods sold		36,516		
Add: selling and distribution overhead:				
Discount on sales	300			
Advertisement expenses	600	900		

Cost of sales

37,416

Illustration 2:

From the following particulars, prepare a cost sheet for the year ending 31-12-2011.

Opening stock of raw materials (1-1-2011)	50,000
Purchases of raw materials	1,60,000
Closing stock of raw materials (31-12-2011)	80,000

QUALITY CIRCLE

First let us see what a quality circle is. A group of employees volunteering to meet together and work together for the improvement of the work place or process or any other thing related to the organisation is called as a quality circle. The focus may be on safety of the work place, cleanliness of the work place, improvement of a production process, cutting down the spillage, disposal of waste and so on.

In other words, a group of employees who share a similar idea or responsibility, volunteering to help others or the organisation is a quality circle.

Quality circle concept is introduced by the Japanese, calling it at first as “quality control circles”. Later, this concept is adopted by the world, well received, add their own ideologies, and now, it is a successful method to improve a work place.

The basic idea of Ishikawa, the Japanese author of this concept, is “recognising the values of the worker as a human being, with feelings, knowledge, experience, wisdom and interest towards his activities”.

I think we can understand this concept well with an example. In our school days, teacher used to form groups of students, a mixture of

performers, stars and slow learners. Each group will have a leader, who usually will be an enthusiastic and studious person. The leader will help the other students in the group to understand complex maths problems or to understand the theory of physics or just listen to a history question and answer.

Cost Reduction

Meaning of Cost Reduction:

Cost reduction is a planned positive approach to reduce expenditure. It is a corrective function by continuous process of analysis of costs, functions, etc. for further economy in application of factors of production.

Tools and Techniques of Cost Reduction:

The various techniques and tools used for achieving cost reduction are practically the same which have been suggested for cost control.

Some of these are:

- (i) Budgetary control,
- (ii) Standard costing,
- (iii) Standardisation of products and tools and equipment's,
- (iv) Simplification and variety reduction,
- (v) Improvement in design,
- (vi) Material control,
- (vii) Labour control,
- (viii) Overhead control,
- (ix) Production planning and control,
- (x) Automation,
- (xi) Operation research,

- (xii) Market research,
- (xiii) Planning and control of finance,
- (xiv) Value analysis,
- (xv) Quality measurement and research,
- (xvi) Cost benefit analysis.
- (xvii) Contribution Analysis
- (xviii) PERT
- (xix) Job Evaluation and Merit Rating.

Advantages of Cost Reduction:

Cost reduction causes a definite increase in margins. The saving in cost may also be passed to consumers in the form of lower prices or more quantity in the same price. This will create more demand for the products, economies of large scale production, more employment through industrialisation and all-round improvement in the standard of living. Government may also stand to gain by way of higher tax revenues.

Increased competitive strength to the industry stimulates more exports. Thus, profit is increased by reducing the costs, it can be utilised for expansion of the organisation which will create more employment and overall industrial prosperity.

Cost reduction is essential of a product has to withstand its global market. Brand loyalty is fading away fast. Nowadays consumers have become price and quality conscious. Hence cost reduction is the key for global competitiveness.

There are many advantages of cost reduction.

Some of these are:

1. Cost reduction increases profit:

It provides a basis for more dividends to the shareholders, more bonus to the staff and more retention of profit for expansion of the business which will create more employment and overall industrial prospects.

2. Cost reduction will provide more money for labour welfare schemes and thus improve men-management relationship.

3. Cost reduction will help in making goods available to the consumers at cheaper rates. This will create more demand for the products, economies of large scale production, more employment through industrialisation and all-round improvement in the standard of living.

4. Cost reduction will be helpful in meeting competition effectively.

5. Higher profit will provide more revenue to the government by way of taxation.

6. As a result of reduction in cost, export price may be lowered which may increase total exports.

7. Cost reduction is obtained by increasing productivity. Therefore, a developing country, like India, which suffers from shortage of resources can develop faster if it makes the best use of resources by increasing productivity.

8. Cost reduction lays emphasis on a continuous search for improvement which will improve the image of the firm for long-term benefits.

According to G. Kantharaj, "In the particular context of a developing economy, it becomes predominantly important to emphasize on Cost Reduction in agriculture, industry, public administration, etc. Cost Reduction cannot be ushered in by a magic wand. Cost reduction is everybody's concern.The motto of every industry and every organisation should be to produce more goods and to render efficient services. Spiralling up of prices and inflationary trends seem to have reached a Point of No Return in the country. The situation cannot be salvaged, unless every responsible individual wages a war vehemently to curtail the wastages and delays in his own jurisdiction."

Dangers of Cost Reduction:

The possible dangers of any cost reduction plan may be as follows:

1. Quality may be sacrificed at the cost of reduction in cost: To reduce cost, quality may be reduced gradually and it may not be detected till it has assumed alarming proportion. Quality may be reduced

to such an extent that it may not be accepted in the market and the business may be lost to the competitors.

2. In the beginning cost reduction programme may not be liked by the employees and danger may be posed to the programme because success of any cost reduction plan depends upon the willing cooperation and active participation of the employees.

3. It is possible that reduction in cost may not be real and permanent. It may not be based on sound reasons and may be short lived and cost may come back to the original cost level when temporary conditions (i.e. fall in prices of materials) due to which cost has reduced disappear.

4. There may be a conflict between individual objective and organisational objective. It is possible that a head of a particular department may follow activities which may reduce the cost of his department but may lead to increase in cost for the organisation as a whole.

Value Analysis

Value Analysis is one of the major techniques of cost reduction and control. It is a disciplined approach which ensures the necessary functions for the minimum cost without diminishing quality, reliability, performance and appearance.

It is a creative approach to eliminate the unnecessary costs which add neither to quality nor to the appearance of the product. It is a systematic application of techniques to identify the functions of a product or a component and to provide the desired function at the lowest total cost.

These are the days of providing the customer with really best quality products at least cost which is possible through value analysis which proves wrong rightly “Best and Cheap” or “Best is never cheap” or “Cheap is Costly”.

‘Value’ is one of those terms having good many connotations and even contradictory definitions. Value’ is a word that is very often used by individuals without being clearly understood. Forget about common people. Even different departments of the same organisation have different opinions of the ‘value’ of the product that the company manufactures.

The designer equates value with reliability; purchase people with price paid for them; production personnel with that of cost from the angle of manufacture; sales people with what customer is willing to pay. In the field of value investigation, value refers to economic value, which itself can be sub-divided into four types as cost value, exchange value, use value and esteem value.

“Cost Value” is the measure of sum of all costs incurred in producing the product. The ‘cost value’, therefore is the sum of raw-material cost, labour cost, tool cost and overheads expended to produce the product.

“Exchange Value” is the measure of all the properties, qualities and features of the product which make the product possible of being traded for another product or for money. In a conventional sense, ‘exchange value’ refers to the price that a purchaser will offer for the product, the price being dependent upon the satisfaction value which derives from the product.

Value derived from the product consists of two components namely (a) value due to reliability of performance of the product and the value which the possession bestows upon the buyer. These are often referred to as “value in value” and “esteem in value”.

“Use Value” is the measure of properties, qualities and features which make the product accomplish a use, work or service. Use value, therefore, is the price paid by the buyer or the cost incurred by the manufacturer in order to ensure that the product performs its intended function efficiently.

Use value in the fundamental form of economic value. An item without use value can have neither exchange value nor esteem value. “Esteem Value” is the measure of properties, features, attractiveness graphic packaging and the like which increases sales appeal or which attracts customers and create in them a strong desire to own the product.

“Esteem value”, therefore, is the price paid by the buyer or the cost incurred by the manufacturer beyond the use value. It is the perception value.

Value Analysis Proper:

Value analysis is an organised approach to identify unnecessary costs associated with any product, material, part, component, system or service by analysis of function and efficiently eliminating them without impairing the quality functional reliability or its capacity to give service.

According to Society of American Value Engineers (SAVE) “Value analysis is the systematic application of recognised techniques which identify the function of a product or services establish a monetary value for the function and provide the necessary function reliability at that lowest overall cost.”

Mr. Lorry D. Miles production engineer working at General Electricals of USA defined it as “Value analysis is the study of the relationship of design, function and cost of any material or service with an object of reducing its cost through modification of design or material specifications, manufacture by more efficient process, changes in sources of supply, elimination or incorporation into another item.”

Thus, value analysis is a systematic application of established techniques to identify the functions of a product or component and to provide the desired functions at the lowest total cost. It is a creative approach to eliminate unnecessary costs which add neither to quality no to the appearance of the product.

It is a rational and structured process consisting of:

- (a) Functional analysis to define the reason for the existence of a product or its components,
- (b) Creatively analysis for generating new and better alternatives and
- (c) Measurement for evaluating the value of present and future concepts.

The phrase value analysis can be defined as a technique which examines the facts of a function and cost of a product in order to determine whether the cost can be reduced or altogether eliminated, while retaining all the features of performance and quality of a product or both.

Therefore, logically, VA is an organised approach of exposing and eliminating unnecessary costs. The method has logical foundation in its fundamental approach to cost reduction and profit improvement and in this objective approach, the VA techniques has to analyse the functional cost of an item and recommend a change.

Put alternatively, VA is a team approach to think functionally about a component as to “what it does” rather than “what it is”. This approach is the real test of understanding problems under study.

Value Analysis and Value Engineering:

‘ VA’ and ‘VE’ are closely related terms so much so that many people use them interchangeably. Though the philosophy understanding the two is the same the identification of unnecessary costs yet they are different. The difference lies in the time and stage at which the technique is applied.

“Value Analysis” is the application of a set of techniques to an existing product with a view to improve its value. Thus, it is remedial process. “Value Engineering” is the application of exactly the same set of techniques to a new product at the design stage project concept or preliminary design when no hardware exists to ensure that bad features not added. Thus, it is a ‘preventive’ measure. In that sense, ‘VE’ is fundamental and VA is collateral because ‘prevention is better than cure.’

Value Analysis versus Other Conventional Approaches:

Speaking in terms of “cost reduction” value analysis is an effective tool of cost reduction which differs from established conventional approaches such as industrial engineering, production engineering, methods engineering and the like.

First:

Traditional approaches concern “post-production” stage but V.A. can be the ‘pre-production’ as well as “post production stage” technique.

Second:

Traditional approaches are “methods concerned”. They accept the drawing of the part “as is” and, therefore, set to improve the part through analysis of manufacturing methods, machines, materials, tools, jigs and fixtures and the like.

On the other hand, ‘VA’ does not accept the designed product and its components “as is” but advocates cost reduction through identification of the function and subsequent redesign of the product so as to make it perform its functions at the lowest possible cost.

‘VA’, therefore, challenges the very design specifications, design requirements and the design itself.

Third:

Traditional methods are mere “cost centered” while VA, in addition to cost improvement, usually seeks to improve quality, reliability, maintainability, safety, performance and alluring features.

Fourth:

VA is more potent than traditional cost reduction techniques. Instances can be brought to surface to demonstrate that VA can remove ten to twenty percent of cost after the traditional methods of cost reduction have applied.

Award of warning is essential at this stage, In spite of VA’s better potential and greater effectiveness, it is not a substitute nor is it intended to replace effective cost reduction techniques which have been in use for many years and have proved effective and valuable in their areas of application. What can be said is that VA can augment or strengthen the process of cost reduction and quality improvement.

Phases of Value Analysis:

As an exercise, the phases of value analysis are:

1. Phase of Origination:

In the first phase, a value analysis study team is constituted. The project is selected and clearly defined. The team examines in detail the product and its components to understand thoroughly their nature.

2. Phase of Information:

After familiarisation, a functional analysis is carried out to determine the functions and uses of the product and its components. The cost and importance of each function are identified. A value index is calculated on the basis of cost benefit ratio for each function. A list is being prepared in which the items of functions are arranged in decreasing order of value.

3. Phase of Innovation:

This is the creative phase concerned with the generation of new alternatives to replace or removing the existing ones.

4. Phase of Evaluation:

Each and every alternative is analysed and the most promising alternatives are selected. These alternatives are further examined for economic and technical feasibility.

The alternatives finally selected must be capable of performing the desired functions satisfactorily. These must meet the standards of accuracy, reliability, safety, maintenance and repairs, environmental effects and so on.

5. Phase of Choice:

In this phase, report is prepared. This report contains a summary of the study, conclusions and specific proposals. The decision makers choose the alternative. The programs and action plans are then developed to implement the chosen alternative.

6. Phase of Implementation:

The chosen alternative is put to the actual use with the help of the programs and action plans so developed in advance.

7. Phase of Review:

The progress of analysis changes in continuously monitored and followed up in order to provide assistance, to clarify any misconceptions and to ensure that the desired results are achieved.

Merits of Value Analysis:**1. Improvement in Product Design:**

It leads to improvements in the product design so that more useful products are given shape. Now in case of ball points, we do not have clogging, there is easy and even flow of ink and rubber pad is surrounding that reduces figures fatigue.

2. High Quality is maintained:

High quality implies higher value. Thus, dry cells were leaking; now they are leak proof; they are pen size with same power. Latest is that they are rechargeable.

3. Elimination of Wastage:

Value analysis improves the overall efficiency by eliminating the wastages of various types. It was a problem to correct the mistakes. It was done by pasting a paper. Now, pens are there and liquid paper is developed which dries fast and can write back.

4. Savings in Costs:

The main aim of value analysis is to cut the unwanted costs by retaining all the features of performance or even bettering the performance. Good deal of research and development has taken place. Now milk, oils, purees pulp can be packed in tetra packing presuming the qualities and the tetra pack is degradable unlike plastic packs.

5. Generation of New Ideas and Products:

In case of tooth brushes, those in 1930's were flat and hard, over 60 to 70 years brushes have come making brushing teeth easy, cosy and dosy as it glides and massages gums.

6. Encourages Team-Spirit and Morale:

Value analysis is a tool which is not handled by one, but groups or teams and an organisation itself is a team of personnel having specification. A product is the product of all team efforts. Therefore, it fosters team spirit and manures employee morale as they are pulling together for greater success.

7. Neglected Areas are brought under Focus:

The organisational areas which need attention and improvement are brought under the spot-light and even the weakest gets a chance of getting stronger and more useful finally join's the main strain.

8. Qualification of Intangibles:

The whole process of value analysis is an exercise of converting the intangibles to tangible for decision making purpose. It is really difficult to make decisions on the issues where the things are (variables) not quantifiable.

However, value analysis does it. The decision makers are provided with qualified data and on the basis of decisions are made. Such decisions are bound to be sound.

9. Wide Spectrum of Application:

The principles and techniques of value analysis can be applied to all areas-man be purchasing, hardware, products, systems, procedures and so on.

10. Building and Improving Company Image:

The company's status or image or personality is built up or improved to a great extent. Improvement in quality and reduction in cost means competitive product and good name in product market; it is a good pay master as sales and profits higher and labour market it enjoys reputation; it capital market, nobody hesitates to invest as it is a quality company

Limitations:

Like any other cost reduction technique, value analysis has its own limitations. The most common limitations are that the man made excuses are the blocks in implementing these plans of value analysis

Learning Curve

A learning curve is a concept that graphically depicts the relationship between cost and output over a defined period of time, normally to represent the repetitive task of an employee or worker. The learning curve was first described by psychologist Hermann Ebbinghaus in 1885 and is used as a way to measure production efficiency and to forecast costs. In the visual representation of a learning curve, a steeper slope indicates initial learning translates into higher cost savings, and subsequent learnings result in increasingly slower, more difficult cost savings.

The learning curve is also referred to as the experience curve, the cost curve, the efficiency curve or the productivity curve. This is because the learning curve provides measurement and insight into all of the above aspects of a company. The idea is any employee, regardless of position, takes time to learn how to carry out a specific task or duty. The amount of time needed to produce the associated output is high. Then, as the task is repeated, the employee learns how to complete it quickly and reduces the amount of time needed for a unit of output.

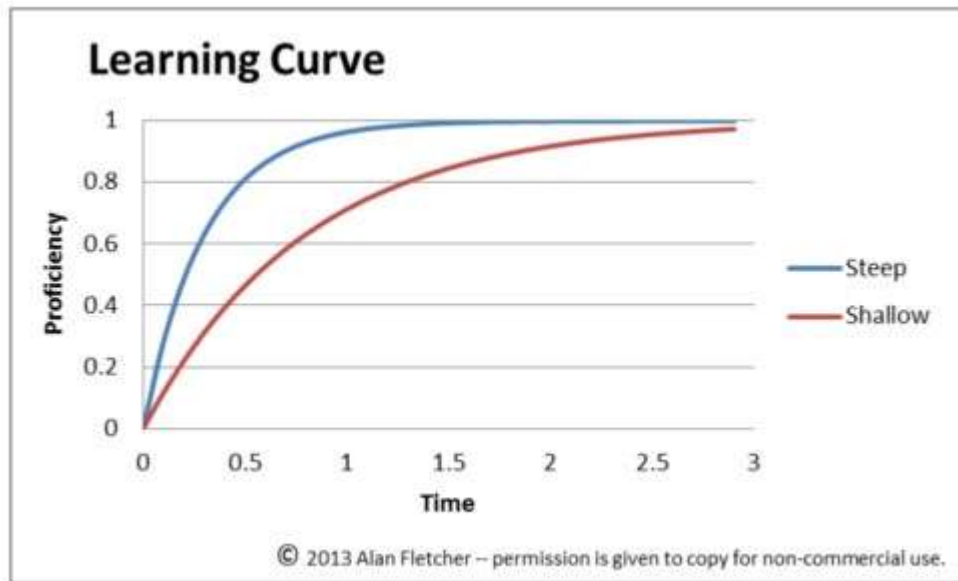
This is why the learning curve is downward sloping in the beginning with a flat slope toward the end, with the cost per unit on the Y-axis and total output on the X-axis. As learning increases, it decreases the cost per unit of output initially before flattening out, as it becomes harder to increase the efficiencies gained through learning.

Benefits of Using the Learning Curve

The learning curve does a good job of depicting the cost per unit of output over time. Companies know how much an employee earns per hour and can derive the cost of producing a single unit of output based on the amount of hours needed. A well-placed employee who is set up for success should decrease the company's costs per unit of output over time. Businesses can use the learning curve to conduct production planning, cost forecasting and logistic schedules.

The slope of the learning curve represents the rate in which learning translates into cost savings for a company. The steeper the slope, the higher the cost savings per unit of output. This standard learning curve is known as the 80% learning curve. It shows that for every doubling of a company's output, the cost of the new output is 80% of the prior output. As output increases, it

becomes harder and harder to double a company's previous output, depicted using the slope of the curve, which means cost savings slow over time.



In informal usage, a **"steep learning curve"** means something that is difficult (and takes much effort) to learn. It seems that people are thinking of something like climbing a **steep curve** (mountain) — it's difficult and takes effort

STAGES

Normally learning curve comprises of four stages.

- Initial stage- It is also called lag phase. In lag phase the learning is merely zero for first few practices.
- Steep up stage- This is the second stage. It is also called log or exponential phase. In this stage the learning is suddenly increased and rate of improvement is substantial.
- Intermediate stage-
- It is also called Stationary Phase. Now, there is no progress in learning or improvement is arrested. So, it is called Plateau. Skinner says 'a plateau is a horizontal stretch indicative of

apparent progress'. It places an important role in learning process because when such a stage is reached, a learning curve becomes almost flat.

Types of curves

There are three types of learning curve based on the units which plotted.

- Concave curve- This learning curve is also called positively accelerated curve. It depicts slow initial improvement in learning that increases with time leading towards the mastery of learning materials. At the initial the rate of progress may be slower, but at the final the learning rate increases noticeably. This learning curve is often occurring in the learning situation. Here the task may be new one or difficult one to the student at the beginning. But with the increasing practice he is mastery over that at the end.
- Convex curve- This learning curve is also called negatively accelerated curve. It depicts rapid initial improvement in learning that decreases with time. At the initial the rate of progress maybe faster, but at the final the learning rate slows down noticeably. This learning curve is occurring in the learning situations where the task is simple or learner has had previous practice on a similar task.
- Cancave and convex curve- The third curve involves the combination of the first two concave and convex curves, is known as Concave-Convex Curve. It looks like an English letter 'S'. So called S-shaped curve. In the beginning this is depending upon the nature of the learner, learning material and the learning environment. It is normally obtained where the situation the learner study the entire learning from zero performance to its mastery.

Part A (ONE Mark)

**Multiple Choice Questions
Online Examination
Part B**

(2 Marks)

1. Draw a chart showing the classification of elements of cost?
2. What is meant by costing?
3. Define Strategic cost management
4. Give the meaning for value analysis?
5. List out the different methods of costing?
6. Define quality circle
7. Define learning curve
8. What is meant by cost reduction?
9. Give the meaning of productivity?
10. Define productivity

Part C (8 Marks)

1. Define costing and discuss briefly its objectives and advantages.
2. "A good system of costing serves as a means of control over expenditure and helps to secure economy in manufacture" Discuss.
3. What are the main benefits that may be expected from the installation of costing system in a manufacturing business.
4. Describe, in brief, the various methods of costing.
5. Distinguish between :
 - (a) controllable costs and uncontrollable costs.
 - (b) Variable cost and direct cost.
 - (c) Cost control and profit control
 - (d) Sunk cost and Out of Pocket cost.
 - (e) Job costing and process costing.
6. "Costs may be classified in a variety of ways accord to their nature and the information needs of management". Explain and discuss this statement giving examples of classifications required for different purposes

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7. "Accounting provides information various users". Discuss accounting as an information system.

8. "It is commended that competition governs price and that where production efficiency is good, there is no need for a proper system of costing" What arguments would you advance to elucidate this opinion?

9. "Learning Curve is a positive approach for measuring the performance" Justify

10. "A Factory makes only one production quality and size. The owner says that the financial accounts easily find him the material, labour and other cost per unit and as such he does not need a costing system" State your argument to convince him the need to introduce a cost accounting system

11. "Learning Curve is used to measure production efficiency and also to forecast cost" Justify this statement

12. "Costing is a system of foresight and not a post-mortem examination, it turns losses into profits, speeds up activities and eliminates wastes" Elaborate

13. "Value analysis is a systematic and disciplined approach to curtail cost" Justify this statement

14. Costing has come to an essential tool of the management" Comment

15. Discuss the phases, merits and limitations of value analysis?

Part D (11 Marks)

1. Find the Prime Cost, Works Cost, Cost of production, total Cost and profit from the following:- Direct Materials Rs.20000; Direct Labour Rs. 10000; Factory Expenses Rs. 7000; Administration Expenses Rs. 5000; Selling Expenses Rs. 7000 and Sales Rs.60,000.

2. Calculate Prime Cost, Factory Cost, Cost of Production, Cost of Sales and profit from the following particulars:

	Rs	Rs.
Direct Materials	1,00,000	Consumable stores2,500
Direct Wages	30,000	Manager's Salary5,000
Wages of Foreman	2,500	Directors' fees1,250
Electric power	500	Office Stationery500
Lighting: Factory	1,500	Telephone Charges125
Office	500	Postage and Telegrams250
Storekeeper's wages	1,000	Salesmen's salary1,250

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE

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Oil and water	500	Travelling expenses	500
Rent: Factory	5,000	Advertising	1,250
Office	2,500	Warehouse charges	500
Repairs and Renewals:		Sales	1,89,500
Factory plant	3,500	Carriage outward	375
Transfer to Reserves	1,000	Dividend	2,000
Discount on shares written off	500	Depreciation: Factory Plant	500
Office Premises	1,250		

3. Define cost accounting and explain the objectives and scope of cost accounting?

11. The following extract of costing information relates to commodity 'A' for the half year ending 31st December, 2015

	Rs.		Rs.
Purchases of Raw Materials	1,20,000	Stock (31st Dec., 2015) :	22,240
Works Overheads	48,000	Raw Materials	32,000
Direct Wages	1,00,000	Finished Products (2,000 tons)	4,800
Carriage on Purchases	1,440	Work-in-Progress	4,800
Stock (1st July, 2015) :		(1 st July, 2015)	
Raw Materials	20,000	Work-in-Progress (31 st Dec 2015)	16,000
Finished Products (1,000 tons)	16,000	Sales – Finished Products	3,00,000

Selling and distribution overheads are Re. 1 per ton sold. 16,000 tons of commodity were produced during the period.

You are to ascertain (i) cost of raw materials used (ii) Cost of output for the period (iii) cost of sales (iv) Net profit for the period (v) Net profit per ton of the commodity

KARPAGAM ACADEMY OF HIGHER EDUCATION

DEPARTMENT OF MANAGEMENT

STRATEGIC COST MANAGEMENT (17MBAP301B)

UNIT –I (20*1=20) MARKS Multiple choice Questions

S. NO	Question	Option - I	Option - II	Option - III	Option - IV	Option - V	Option - VI	Answer
1	Costing is a technique of _____	Ascertainment of cost	analyzing of cost	utilization of cost	cost reduction			Ascertainment of cost
2	Cost accounting provide data for managerial _____	Planning	Organizing	Decision making	Decision Making and cost controlling			Decision Making and cost controlling
3	Cost accounting is a separate _____ of accounting.	No branch	Branch	Batch	No Batch			Branch
4	Cost accounting serves the information needs of _____	Management	Financial	Marketing	Owners			Management
5	Cost accounting has been developed because of _____ of financial accounting	Advantages	Limitations	Importance	Cost			Limitations
6	_____ accounting deals with monetary as well as non-monetary information	Cost	Financial	Management	Auditing			Management
7	Historical costing is also known as _____	Uniform costing	Standard costing	Traditional costing	Job costing			Traditional costing
8	_____ is a technique / process of ascertaining cost	Costing	Cost	Cost accounting	Management accounting			Costing
9	_____ is ascertainment of cost after they have been incurred.	Marginal costing	Historical costing	Direct costing	Indirect costing			Historical costing

10	_____ is used of same costing principle or practices by several undertaking for common control or comparison of costs	Uniform costing	Marginal costing	Standard costing	Job Costing			Uniform costing
11	_____ methods has been dropped from the latest CIMA terminology	Multiple costing	Farm costing	Operating costing	Job Costing			Farm costing
12	Cost accounting can be used only by _____ concerns	Big	Small	Big and Small	Trading			Big and Small
13	Many theories can be proved or disproved in the light of basic principles of	Cost accounting	Management accounting	Financial accounting.	Financial management			Financial accounting.
14	_____ cost are those costs incurred to maintain the earning capacity of the firm	Capital	Revenue	Direct	Indirect			Capital
15	The chief objective of management accounting is to serve -----	Public	Employees	Management	Government			Management
16	The term management accounting was first coined by the British team of accountants they visited the ----- -	USA	China	India	Japan			USA
17	Management accounting is ----- ----	An extension of financial accounting.	An extension of cost accounting.	An extension of auditing	An extension of cost accounting and Management accounting			An extension of cost accounting and Management accounting

18	The term of appointment of financial controller may be fixed by the -----	Board of Directors	Articles of association	Memorandum of Association	Chairman			Board of Directors and Articles of Association
19	Financial accounting deals with -----	Determination of costs	Determination of profits	Determination of prices	Determination of production			Determination of profits
20	The term management accounting was first used in the year -----	1910	1939	1950	1970			1950
21	Preparation of financial accounts is compulsory for - -----	Sole trader business	Partnership firm	Joint stock companies	Co-operative societies			Joint stock companies
22	_____ is the oldest branch of accounting.	Management accounting	Cost accounting	Financial accounting	Corporate accounting.			Financial accounting
23	Management accounting also comprises the preparation of financial reports for non-management groups such as ----	Shareholders	Creditors	Tax authorities	Tax authorities, Shareholders and Creditors			Tax authorities, Shareholders and Creditors
24	Management accounting and cost accounting are -----	Supplementary to each other	Complementary to each other	Independent to each other	Opposite to each other			Complementary to each other
25	_____ is also known as Management oriented accounting.	Management accounting	Cost accounting	Financial accounting	Corporate accounting			Management accounting
26	_____ is concerned with accounting information which is useful to management in maximizing profits or minimizing losses.	Management accounting	Cost accounting	Financial accounting	Corporate accounting			Management accounting
27	_____ is the general accounting which relates to the recording of business	Financial accounting	Cost accounting	Management accounting	Budgeting.			Financial accounting

	transactions in the books of business transactions and in the books of prime entry.							
28	_____ is the process and techniques of ascertaining costs.	Management accounting	Financial accounting	Cost accounting	Budgeting			Cost accounting
29	_____ is important part of management accounting	Budgeting	Fixing standards	Inventory control	Interpretation of data			Interpretation of data
30	The primary objective of----- ----- is to enable the management to maximize or minimize losses	Cost accounting	Financial accounting	Management accounting	Auditing			Management accounting
31	The main objective of management accounting is to present----- ----- information to the management	Cost	Financial	Auditing	Sales			Financial
32	Management accounting is a useful advice of managerial ----- -----	Planning	Control	Motivation	Forecasting			Control
33	Return on capital employed is one of the tools of ----- ----	Financial accounting	Cost accounting	Corporate accounting	Management accounting			Management accounting
34	_____ of data are considered as back bone of management accounting	Modification of data	Analysis and interpretation	Communication	Co-ordination			Analysis and interpretation
35	Management accounting is an important medium of _____	Motivation	Co-ordination	Communication	Delegation			Communication
36	_____ supplies analytical information regarding various alternatives and the choice of management is	Financial accounting	Management accounting	Cost accounting	Corporate accounting			Management accounting

	made easy.							
37	_____ is the essence of managerial activity	Co-ordination	Control	Motivation	Decision making			Co-ordination
38	Fixed cost per unit increases when ---- -----	Production volume decreases	Production volume increases	Variable cost per unit decreases	Sales Increases			Production volume decreases
39	Closing stock are valued at cost price or market price whichever is less in -----	Financial accounting	Cost accounting	Management accounting	Corporate Accounting			Financial accounting
40	Direct material+ Direct labour+ Direct expenses =	Fixed cost	Prime cost	Factory cost	Total cost			Prime cost
41	Salary of general manager is generally treated as -----	Factory overhead	Administrative overhead	Selling overhead	Distribution overhead			Administrative overhead
42	_____ of any product comprises of all direct cost	Work cost	Prime cost	Total cost	Factory Cost			Prime cost
43	_____ means and represents the factory cost plus administrative expenses	Prime cost	Work cost	Cost of production	Cost of sales			Cost of production
44	Indirect material + indirect labour + _____ = overhead	Indirect expenses	Direct labour	Direct expenses	Factory overhead			Indirect expenses
45	, _____ is the sales overhead	Office salaries	Advertisement expenses	Factory rent	Indirect material			Advertisement expenses
46	Prime cost =	Direct material+direct labour+direct expenses	Direct material+labour direct expenses	Materials+direct expenses	Materials+Indirect expenses			Direct material+direct labour+direct expenses
47	Works cost =	Prime cost+factory cost	Prime cost+Selling overhead	Prime cost+administrative overhead	Prime cost+Selling overhead			Prime cost+factory cost
48	Cost of production =	Work cost + factory cost	Work cost + prime cost	Work cost x prime cost	Work cost + administrative overhead			Work cost + administrative overhead

49	Which of the following is equal to total cost?	Cost of production +Selling and distribution expenses	Cost of sales+distribution overhead	Cost of production + administrative overhead	Cost of sales			Cost of production +Selling and distribution expenses
50	The work cost is also known -----	Factory cost	Prime Cost	cost of production	cost of sales			Factory cost
51	-----is the process of reducing total costs while improving the strategic position of a business	Cost management	Financial management	Strategic management	Strategic cost management			Strategic cost management
52	----- is a continuous process	Cost management	Financial management	Strategic management	Strategic cost management			Strategic cost management
53	-----deals with measuring and managing costs and aligning them to the business strategy	Cost management	Financial management	Strategic management	Strategic cost management			Strategic cost management
54	-----is a small group of people who voluntarily perform quality improvement activities at the work place	TQM	Quality circle	Value analysis	Learning curve			Quality circle
55	----- comprise the most widely published team approach to problem solving	TQM	Quality circle	Value analysis	Learning curve			Quality circle
56	The ----- ----identify the problems first and try to find out the solution	TQM	Quality circle	Value analysis	Learning curve			Quality circle
57	The efforts of ----- are ultimately directed towards quality improvement on a	TQM	Quality circle	Value analysis	Learning curve			Quality circle

	regular basis							
58	----- are voluntary association of persons having a common cause	TQM	Quality circle	Value analysis	Learning curve			Quality circle
59	----- were originally organized along the lines of the factors work centre	TQM	Quality circle	Value analysis	Learning curve			Quality circle
60	----- helps in improving human relations at the work centre	TQM	Quality circle	Value analysis	Learning curve			Quality circle

UNIT-II- Total Cost Management

SYLLABUS

Total Cost Management - Managing Process Cost - Managing Production Costs - Managing Delivery Costs - Managing Structural Cost. Target Costing - Cost as a source of competitive advantage - Life Cycle Costing.

Total Cost Management

Increased global competition has forced companies to think aggressively about effective Cost Management. A low cost high quality product has become an object of desire, to gain a competitive edge. It is essential that cost management addresses not just individual activities or cost centres but the entire value chain. Total Cost Management (TCM) is a systematic and structured approach to understand the costs of an organization, with the aim of providing a holistic framework to control, reduce and eliminate costs. Cost management is a philosophy, an attitude, and a set of techniques to create more value at lower cost. In this fast space competitive scenario, Cost Management information increases customer value.

Some of the important tools and techniques of Total Cost Management are as follows:-

- Activity Based Costing
- Activity Based Management
- Target Costing

The Seven Principles of Effective TOTAL Cost Management

Effective cost management is the central measure of accountability for business leadership. Cost management includes effective strategy implementation as well as providing the resources and process discipline to enable and ensure the highest possible level of quality, reliability and productivity at the lowest overall cost. It is not about “cost” in the sense of “cutting cost.” Rather, cost management is the process of optimizing performance. It is as much strategic as it is operational.

Passionately embraced and implemented, the following seven principles provide both a robust business model and the essence of a cost management ethos. Together they provide a road map to business success.

Provide Clear, Consistent Performance Objectives

The first step in any undertaking is to ensure clear and aligned expectations. This is especially true in cost management, where many managers' only cost experience is in "cost cutting," such as staff reductions, product and facilities rationalization, and cutting capital budgets. While these actions are sometimes necessary, effective cost management lies in an everyday process discipline that continually addresses the root cause of excess staff, unprofitable and overexpanded product lines, and the justification and implementation of marginally effective control systems. Effective cost management deals with the underlying systems which create the need for such structural cost elements.

For example, in an industry where low cost is the primary driver of business success, there are four pivotal drivers or determinants of cost: production scheduling, maintenance effectiveness, product offerings and technical knowledge. Each can be either a tool of cost effectiveness or a "root cause" of low value cost. Understanding this distinction is the first step in effective cost management.

The second element, aligned expectations, is equally important. Even with clear revenue expectations, an aggressive, well-meaning sales and marketing organization can offset its hardwon top-line successes by adding products, packaging options and channels to market that, in fact, add far more cost than the projected benefit of increased sales.

Similarly, there are potential cost trade-offs between traditional procurement cost saving processes and manufacturing's need for process stability and variation reduction. This is especially true in the pharmaceutical, alternative medicine, dietary supplements and food processing businesses where product integrity and consistency are the lifelines of business success. For effective cost management, performance expectation and objectives must be aligned so as not to offset one area's accomplishments by increasing costs in another.

Provide Knowledge, Tools To Succeed

The meanings of the words “knowledge” and “tools” depends on one’s beliefs about the basic motivations behind human behavior. If an organization’s executive leadership believes most employees arrive at work with the willingness and desire to do their best, the job of employee motivation and performance is abundantly straightforward. Each individual’s level of knowledge and capability becomes the essential component of the employee’s ability to perform well.

For example, if an organization wants to optimize the trade-offs between volume, margin and manufacturing cost, the sales force—the very people responsible for revenue and margin—must have a solid understanding of manufacturing, standard cost, and the impact of their product and customer-related decisions on the broader organization. The same is true of the planning (scheduling) and production side of decision making. They, too, must have the relevant understanding of how each of their actions affects the customer, cost, inventory and product lead-times.

This same principle applies within the management ranks. To enable and ensure effective cost control, managers need to know the specific cost drivers of their business. They need to understand the difference between efficiency and structural cost. They need to technically understand the production and sales process as well as having detailed knowledge of the systems that drive the company’s day-to-day activities.

The deeper the executive knowledge of their organization’s cost drivers, the greater the opportunity for effective cost management versus cost cutting.

Understand True Costs

Standard cost is the basic component in a vast majority of business decision-making, from budget preparation, pricing and variance reporting, to strategy formulation and performance-based incentive plans. Standard cost data drives most new product pricing, advertising, marketing and capital investment decision making. The importance of accurate standard cost data cannot be overstated.

It is well-known and -accepted that when average applied overhead systems of standard costing are used, high volume product costs are overstated and low volume product costs are understated. What is less recognized, or at least acknowledged, is that the low volume product costs in such systems are

often undercharged by as much as five to 10 times. To understand and accept the need for accurate product costing has always been a challenging management task.

It is extremely difficult to accept that the base data used for many years of decision making may be the root cause of many business shortfalls. This is especially true in product costing and pricing and in new product justification and introduction.

In study after study, the average applied overhead analysis targeted at the lower 50 percent (in volume) of all products offered account for less than 5 percent of sales volume and productive labor, are therefore assigned less than 5 percent of all overheads, yet account for 20 percent to 30 percent of all non-material cost. In other words, over 50 percent of products are sold at a loss. Until this cost distortion is acknowledged and corrected, major management decision systems—including long-term strategy formulation—remain extremely difficult to validate. Accepting such reality has been all but impossible for many of our finest executives.

Excellence: The Only Acceptable Performance Target

Organizations once based performance improvements on a simple comparison of past and current performance, what most call continuous improvement. Today, customers do not expect nor do they accept performance defects; they expect performance excellence.

One of the most important keys to effective cost management is to set the bar at excellence: minimum 1.33 Cpk quality; zero injury safety; zero late delivery; year-over-year product cost reduction; and predictable, regular technical up-skilling.

Technical knowledge, well-understood and aligned performance systems and absolute data integrity are all adding up to a performance culture, a cost management behavior ethos.

Reduce Organizational Complexity

Yesterday's luxuries are today's burdens. Today, the term "high-value" can be used to describe only the most basic of essential activities. In many industries, most organizations can afford only the highest contributing activities.

Organizations with the most effective cost management are constantly and boldly applying the test of relevance and value to every daily activity. They question everything. What does this activity do to create and maintain sales or improve margins? What additional costs will this activity add? What does this investment do to improve quality or provide added production flexibility? Products, customers, etc., that do not meet these standards must go.

For instance, if a sophisticated maintenance management system is not working, it is often better to shut it down and go back to the basics than to add the ongoing cost of fixing and maintaining a low value system.

Looking back at standard cost, if the 50 percent of product variety accounts for less than 5 percent of total sales, yet creates 20 percent to 30 percent of non-material variable cost, then product by product, they too must pass the test of contribution value.

There are two very important reasons to focus on knowledge and involvement. The first is the simple truth that people who are not involved will not easily give their commitment. The second is that the ability to truly lead is not positional. It is earned through knowledge and respect. These two success elements, leadership and commitment, are central keys to cost-effective excellence.

Standard cost, complexity reduction, and maintaining a valued and credible performance system are all driven by the common denominator of knowledge-driven involvement. Only employees with the knowledge and opportunity to be successful decision-makers can pave the way for future business success.

The most important principle of effective cost management is leadership's understanding and acceptance of the reality that the majority of all organizational cost is structural. That is, costs are built into an organization by management systems and management decisions.

Decisions about the number of products, the customers they serve and the way the business is run all drive cost. It is "What We Do" versus "How Well We Do It" that determines the vast majority of an organization's cost.

Therefore, the second part of this reality lies in management's ability to accept change, to challenge their own past decisions and to aggressively embrace the power and potential of their employees. It

lies in the ability to accept the fact that most organizational cost has been created and supported by past leadership decision making.

In the end, effective, process-driven cost management is founded in the culture of the company. It is a way of life. In many cases it is also the only path to organizational survival.

Process Cost Management

Process Cost management is an approach that is used to determine the costs of existing processes by which goods and services are designed, procured, delivered, and supported. It can be done for benchmarking, activity cost analysis, or product costing. It is also used to simulate resource consumption levels for future process and product configurations based on cost driver relationships derived from product attributes and process parameters. Managers perform these simulations to be able to deploy and align resources with anticipated activity demands as well as respond to new business opportunities.

In the past, ABC has provided accurate product costs and a better understanding of long term relationships between activity drivers and resource levels, but there has never been a tool that links changes in products or processes to potential changes in resource levels. Information usually flows from resource to product, but emphasis now is being placed on the ability to reverse the flow of information. It's a shift from the consumption model (product costing) to the spending model (resource decisions).

Here are 5 problems in existing approaches that a new cost system design must overcome to provide a true simulation capability.

1. The pooling of activity costs by cost drivers obscures the costs of individual resources.
2. The assumptions that the relationship between changes in cost drivers and the consumption of resources within activities is linear.
3. Failure to acknowledge the effects of changes in process parameters that are independent of product identities.

4. The inability to consider compound effects between the consumption of a resource at a particular activity and multiple cost drivers and
5. The inability to explicitly cost alternative process segments as opposed to making simple inferences about the nature of a functionally decomposed group of activities.

PCM focuses on the process hierarchy for product costing and resource spending simulations. Product costing is when at the activity level, resources from the organizational structure are used for the production of goods/services. Resource spending simulation on the other hand goes from cost objects back through activities and then back to resource levels. This facilitates process costing, product costing, and resource management.

Spending simulation works backwards. It goes from cost objects back to the activities that comprise business processes and then back to the specific organizational resources that are affected. Analysts want to know what impact the changes in products and processes have on resources (spending) so they must focus on the relationships between cost drivers and resource consumption.

This example shows the effect a change in the setup activity has on its resources of labor and tooling. The setup activity is influenced by both product cost drivers and process cost drivers.

Product cost drivers affect activities by changes of product attributes or characteristics (such as product design, volume, mix, or batch size). In this example the product batch size is reduced so therefore the products will need to be set up more often and the amount of set up activity required will increase.

Process cost drivers affect the efficiency or effectiveness of a process and are process parameters. They affect the process cost independently of any product mix. A simple improvement in the setup activity would affect the resources required to perform the setups, but in this example the efficiency of the setup activities does not change.

Product attributes and process parameters both drive activity consumption which in turn consumes resources. Resources are expense categories that supply the performance of the activities. When an

activity is activated through the simulation you must know which resources are affected and how. For example, capital resources may be fixed over some range of activity volume while people resources may vary over the same range. Activities compromise multiple resource categories and each has their own cost profile.

Effects of reducing batch size. In this example, the setup activity consumes only two resources, labor and tooling. If the only change is a reduction in the product batch size then the number of setups will increase. Management needs to know if the change will call for additional resources for that setup activity. Since resources are purchased in lumps, the resource categories must be expressed in terms of their actual cost behaviors which will usually be step functions. Both labor and tooling are step functions which mean that there is both a fixed and variable component for each step function level and an increase in an activity may or may not need an increase in capacity. For example, each additional employee requires an additional outlay of cost whereas since tooling has additional unused capacity, an increase in setup activity will not necessarily require new tooling.

Increasing capacity of constrained activities usually corresponds to increases in output. A process improvement occurs when the output satisfies a customer demand by using only the available capacity of a particular resource. A productivity improvement has occurred if there was an increase in output without an increase in resource spending. In this example the setup related cost drivers don't change except for the decrease in average batch size. Managers usually model resource demands from more complex simulations that have several cost driver changes such as an increase in setup efficiency along with a simultaneous reduction in average batch size. PCM accommodates complex situations by predicting future resource levels and capacity usage.

Advantages of using resource spending profile

Instead of broad generalizations about the impact on spending of alternative product and process designs, PCM generates simulations that incorporate non proportional spending functions like the ones found in the real world.

Volume based costing techniques results in distortions on typical make-versus-buy decisions. For example, marginal cost of excess labor or machine capacity is assessed at the full overhead burden rate and therefore favors outsourcing when in reality, the marginal cost of activities that consume committed but unused resources is zero.

PCM requires more specification than a typical ABM implementation. In PCM the system must support both macro and micro levels of detail. The main objective is to attain sufficient level of cost resolution to accurately portray product, activity, and process costs within reasonable time and cost. To allow firms to study particular process segments in detail, the data structures that support the process cost system are fully relational and modular. The decision support system should be flexible and allow users to switch to more resolute process cost models when they have more focused decision needs.

An extended example with multiple activities. Multiple activities are tied together in networks that form the processes that design, procure, produce, and distribute goods and services. This next example is based on a company that takes orders for wall plaques, designs, engraves, and then assembles them.

Step 1: Model the activity network.

There are three types of products each with different engraving operations and with different resource demands. The first type uses regular engraving, the second uses laser engraving, and the third type of product uses photo engraving. We then allocate the resources to the activities. Here are the resources and their codes; equipment 01, tools and supplies 02, labor 05, utilities 07, outside services 08, scrap and material rework 12. These resources are first assigned to organizational units through the budget process and then they are assigned to the activities. Resource categories are not pooled together; instead they maintain their integrity inside the activities. The activity network used in this example is the production process segment. It was developed from the bill of activities to analyze interactions between activities and to show successor relationships, process input/output boundary interdependencies, and information flow channels. PCM allows managers to identify “event-dependent cost drivers” and “boundary conditions” that must be controlled to manage the

processes better. After the process hierarchy and activity costs are defined, the reporting capabilities are extensive. You can construct a costed bill of activities along process lines, or you can highlight the functional departmental costs to support a specific process.

Step 2: Identify relevant product and process cost drivers.

Managers notice a growing trend towards laser engraving and wondered how it would affect resource use. (Which resources will be overburdened or have excess capacity, and will new equipment be needed or new people hired, trained, or redeployed?). To anticipate the requirements PCM helps managers simulate the impact of alternative demand/mix forecasts. The product cost drivers for these three products are the activity times (average completion times for engraving, order processing assembly, and inspection activities) and these products are diverse in terms of demand, batch size, complexity, and technology. Process improvements can change these times either individually or across all products. The process cost drivers are process parameters that are not product specific and provide essential information about the practical capacity of the process (like production hours per shift, set up times, and activities that are common to all the products like shearing operations in our example).

Step 3 Simulate resource consumption levels for each process scenario. After identifying the product and process cost drivers, you can find out what resources are required to support the activity network. In this example, direct labor resource is determined for the planned cost driver levels. Since direct labor is a resource that is common to all four activities (engraving, shearing, assembly, and quality control) the total requirement for direct labor hours can be simulated by calculating the projected consumption for each activity and summing the results across the four.

Step 4 Determine resource spending requirements After determining the total resource commitment, the “resource spending profile” for the direct labor resource can be entered to yield the results of the simulation. You must reconcile the new resource requirements against the spending profiles for each resource category.

A complete spending simulation model will also include cost driver effects on all the other resources including capital.

Process improvement and process cost management

Accounting has not lost its purpose at all. In order to achieve aggressive target cost reductions and continuously improve business processes, cost management ownership should be driven down to lower levels in organizations and linked to the processes that deliver the outputs. The purpose of process cost management is to support management's decisions and provide modeling tools to help evaluate alternative products and process designs. PCM can be viewed as a what-if analysis tool to model new opportunities. PCM is also being used by kaizen production teams to understand and control process costs because it allows them to quickly assess the cost advantages of several suggestions. It also ties financial goals to quality and process improvement objectives. Management uses it as a tool to make strategic decisions about resources. Finally PCM can also help make investment decisions by estimating the cost savings from different process and showing which projects should be given priority.

In conclusion, ABC Management has gone from concerns about product costing to the broader issue of improving competitiveness. PCM helps improve competitiveness by providing methods for evaluating the impact of product and process cost drivers on resource spending. It's concerned with the relationship between processes of an organization, resources, and cost drivers and lets managers find the spending impact of what-if scenarios.

Procedure of Process Cost Accounting!

1. Separate account is opened for each process or department. All costs (both direct and indirect) are charged to each such process or department.
2. The physical units (quantity) of output in each process are recorded in the respective process accounts.
3. The cost per unit of output is determined by dividing the total cost of each process by total production at the end of each period.

4. The total cost of one process is transferred to the next process as an initial cost till the production is completed. The cumulative costs of different processes determine the total cost and per unit cost at the final stage.

5. When there is work in progress at the end of the period, the stage of completion of the incomplete work is determined, and the computation of inventory is in terms of equivalent production units. For example, if 100 units are 40% complete, they are taken as equivalent to 40 completed units. The total number of completed units divides the total cost and the unit cost is obtained for the process.

6. In case of any normal loss in the process, the units produced in that process bear that loss. Accordingly the average cost of that process is increased. In case of any abnormal loss, it is treated as general business loss and transferred to costing profit and loss account.

PRODUCTION COST

Production cost refers to the cost incurred by a business when manufacturing a good or providing a service. Production costs include a variety of expenses including, but not limited to, labor, raw materials, consumable manufacturing supplies and general overhead.

Production cost refers to the cost incurred by a business when manufacturing a good or providing a service. Production costs include a variety of expenses including, but not limited to, labor, raw materials, consumable manufacturing supplies and general overhead. Additionally, any taxes levied by the government or royalties owed by natural resource extracting companies are also considered production costs.

Also referred to as the cost of production, production costs include expenditures relating to the manufacturing or creation of goods or services. For a cost to qualify as a production cost it must be directly tied to the generation of revenue for the company. Manufacturers experience product costs relating to both the materials required to create an item as well as the labor need to create it. Service industries experience production costs in regards to the labor required to provide the service as well as any materials costs involved in providing the aforementioned service.

In production, there are [direct costs](#) and indirect costs. For example, direct costs for manufacturing an automobile are materials such as the plastic and metal materials used as well as the labor required to produce the finished product. Indirect costs include overhead such as rent, administrative salaries or utility expenses

In [managerial accounting](#) and [cost accounting](#), *production costs* are the direct materials, direct labor, and [manufacturing overhead](#) used to manufacture products. The production costs are also referred to as manufacturing costs, product costs, a manufacturer's inventoriable costs, or the costs occurring in the factory.

Production costs are often classified as direct or indirect product costs. For example, direct materials and direct labor are *direct product costs* because they can be easily and economically traced to the products being manufactured. On the other hand, manufacturing overhead costs are *indirect product costs* because they are not easily or economically traceable directly to the products. Instead, the manufacturing overhead costs must be allocated or assigned to the products often through a predetermined overhead rate.

Production costs can also be classified as direct or indirect as to a factory department. For example, the costs of the factory maintenance staff is a direct cost of the factory maintenance department, while at the same time being an indirect product cost.

Cost of production refers to the total sum of money needed for the production of a particular quantity of output. As defined by Gulhrie and Wallace, "In Economics, cost of production features a special meaning. It is all about the payments or expenditures essential to get the factors of production of land, labor, capital and management needed to produce a commodity. It signifies the money costs which are to be incurred for acquisition of the factors of production." In the words of Campbell, "Production Costs are the costs which should be essentially received by resource owners so as to presume that they will continue to supply them in a specific period of time."

Elements of Production Cost

The key elements included in the production costs are as follows:

- Purchase of raw machinery
- Installation of plant and machinery

- Wages of labor
- Building rent
- Interest on capital
- Wear and tear of building and machinery
- Advertisement expenses
- Payment of taxes
- Insurance charges
- The imputed value of factor of production owned by the firm itself is also added in the production cost.
- The production cost also includes the normal profit of the entrepreneur.

Formula for computing Production Costs

The general formula used for computing production cost is:

Production cost per item = Fixed Cost (FC) + Variable cost (VC) / No. of units produced

Calculating production cost

The key steps involved in computation of production cost are:

- Determine the fixed cost. These are the costs which do not alter on the basis of the number of products produced. This includes the rent paid for building, salaries of the employees, and utility costs.
- Estimate the variable costs. These are the costs that change with a change in the quantity of production. For example, if you are making a cake, some of the variable costs would be flour, eggs, and sugar.
- Add the fixed costs to the variable costs and divide this number by the number of items produced thus reaching the production cost for one item.

Definition: Cost of production is the total price paid for resources used to manufacture a product or create a service to sell to consumers including raw materials, labor, and overhead.

What Does Production Cost Mean?

For a business owner, knowing their cost of production is a vital step in creating and maintaining a profitable business. By knowing the cost of every step in production, management can optimize

production processes, delivery schedules, and general business activities in an effort to make better products more efficiently than in the past.

Management accountants analyze product processes and track this metric in order to properly price their goods and services to achieve an appropriate margin. For example, an orange juice company management will track the price of oranges, sugar, and other [commodities](#) used in the production of their juice. If any of these goods' prices increase, the juice manufacturer will also have to increase their prices to maintain the same level of profits.

Let's look at an example.

Example

Marcus is the Chief Operating Officer of a large manufacturing company that creates keyboards. Since he is in charge of the manufacturing, he knows every component of the keyboard: the plastic, the paint, metal, and electronics. He knows each supplier, and he wants to conduct his annual review of the firm's costs of production.

He looks through the firm's records, and finds the plastic for the keyboard costs \$3.00 per board, while the paint costs \$0.50. The electronics within the board costs the most, at \$10.00 per keyboard, while the metal is a close second, at \$8.00 per board. Summing up all of the costs, which include production, he sees that each keyboard costs $(\$3.00 + \$0.50 + \$8.00 + \$10.00) = \$21.50$ to produce.

With keyboards selling at \$30 in store, and even more for a custom-built keyboard, he sees that the firm still has a reasonable cushion for profit. Additionally, he decides that this cost of production method is the one he will continue to use, as it allows him to get detailed and specific answers to his questions.

Production Costs and Firm Profits

The firm's primary objective in producing output is to maximize profits. The production of output, however, involves certain costs that reduce the profits a firm can make. The relationship between costs and profits is therefore critical to the firm's determination of how much output to produce.

Explicit and implicit costs. A firm's **explicit costs** comprise all explicit payments to the factors of production the firm uses. Wages paid to workers, payments to suppliers of raw materials, and fees paid to bankers and lawyers are all included among the firm's explicit costs.

A firm's **implicit costs** consist of the **opportunity costs** of using the firm's own resources without receiving any explicit compensation for those resources. For example, a firm that uses its own building for production purposes forgoes the income that it might receive from renting the building out. As another example, consider the owner of a firm who works along with his employees but does not draw a salary; the owner forgoes the opportunity to earn a wage working for someone else. These implicit costs are not regarded as costs in an accounting sense, but they are a part of the firm's costs of doing business, nonetheless. When economists discuss *costs*, they have in mind *both* explicit and implicit costs.

Accounting profits, economic profits, and normal profits. The difference between explicit and implicit costs is crucial to understanding the difference between accounting profits and economic profits. **Accounting profits** are the firm's total revenues from sales of its output, minus the firm's explicit costs. **Economic profits** are total revenues minus explicit and implicit costs. Alternatively stated, economic profits are accounting profits minus implicit costs. Thus, the difference between economic profits and accounting profits is that economic profits include the firm's implicit costs and accounting profits do not.

A firm is said to make **normal profits** when its economic profits are *zero*. The fact that economic profits are zero implies that the firm's reserves are enough to cover the firm's explicit costs and all of its implicit costs, such as the rent that could be earned on the firm's building or the salary the owner of the firm could earn elsewhere. These implicit costs add up to the profits the firm would normally receive if it were properly compensated for the use of its own resources—hence the name, normal profits.

Fixed and variable costs. In the short-run, some of the input factors the firm uses in production are fixed. The cost of these fixed factors are the firm's **fixed costs**. The firm's fixed costs do not vary with increases in the firm's output.

The firm also employs a number of variable factors of production. The cost of these variable factors of production are the firm's **variable costs**. In order to increase output, the firm must increase the number of variable factors of production that it employs. Therefore, as firm output increases, the firm's variable costs must also increase.

To illustrate the concepts of fixed and variable costs, consider again the example of a single firm operating in the short-run with a fixed amount of capital, 1 unit, and a variable amount of labor. Suppose the cost of the single unit of capital is \$100 and the cost of hiring each worker is \$20. The firm's fixed and variable costs are reported in Table .

TABLE 1 Firm Output and Costs

Labor input	Capital input	Total product	Variable cost	Fixed cost	Total cost	Marginal cost
0	1	0	\$0	\$100	\$100	-
1	1	5	20	100	120	\$4.0
2	1	15	40	100	140	2.0
3	1	23	60	100	160	2.5
4	1	27	80	100	180	5.0
5	1	29	100	100	200	10.0
6	1	30	120	100	220	20.0

The fourth column of Table reports the variable cost that the firm incurs from hiring 1 to 6 workers at \$20 each, while the fifth column reports the fixed cost of the single unit of capital that the firm

employs. The fixed cost of \$100 is the same—no matter how many units of output the firm produces.

Total and marginal costs. The firm's **total cost** of production is the *sum of all its variable and fixed costs*. The firm's **marginal cost** is the *per unit change in total cost that results from a change in total product*. The concepts of total and marginal cost are illustrated in Table . The sixth column of this table reports the firm's total costs, which are simply the sum of its variable and fixed costs. The seventh column reports the marginal cost associated with different levels of output.

For example, when the firm increases its total product from 0 to 5 units of output, the change in the firm's total costs is $\$120 - \$100 = \$20$. The marginal cost for the first 5 units of output is therefore $\$20/5 = \4 . Similarly, when the firm increases its total product by 10 units, from 5 to 15 units of output, its total costs increase by $\$140 - \$120 = \$20$. The marginal cost for the next 10 units produced is therefore $\$20/10 = \2 .

Marginal cost and marginal product. The firm's **marginal cost** is related to its **marginal product**. If one calculates the change in total cost for each different level of total product reported and divides by the corresponding marginal product of labor reported, one arrives at the marginal cost figure. The marginal cost falls at first, then starts to rise. This behavior is a consequence of the relationship between marginal cost and marginal product and the law of diminishing returns. As the marginal product of the variable input—labor—*rises*, the firm's total product increases at a rate that is greater than the rate of new workers hired. Consequently, the firm's marginal costs will be decreasing. Eventually, however, by the law of diminishing returns, the marginal product of the variable factor will begin to decline; the firm's total product will increase at a rate less than the rate at which new workers are hired. The result is that the firm's marginal costs will begin rising.

Average variable, average fixed, and average total costs. The firm's variable, fixed, and total costs can all be calculated on an *average* or *per unit* basis. Table reports the **average variable costs**, **average fixed costs**, and **average total costs** for the numerical example of Table .

TABLE 2 Firm Output and Average Costs

Total product	Average variable cost	Average fixed cost	Average total cost
0	—	—	—
5	\$4.00	\$20.00	\$24.00
15	2.66	6.66	9.33
23	2.61	4.35	6.96
27	2.96	3.70	6.66
29	3.45	3.45	6.90
30	4.00	3.33	7.33

When the firm produces 27 units of output, for example, the firm's variable costs from Table are \$80. The *average* variable cost per unit of output is therefore $\$80/27 = \2.96 , as reported in Table. The fixed cost corresponding to 27 units of output is \$100; therefore, the average fixed cost per unit of output is $\$100/27 = \3.70 . The total cost of 27 units of output is \$180; so, the average total cost is $\$180/27 = \6.66 .

Graphical depiction of costs. The variable, fixed, and total costs reported in Table are shown in Figure. The marginal cost reported in Table along with the average variable, average fixed, and average total costs reported in Table are shown in the graph in Figure (b).

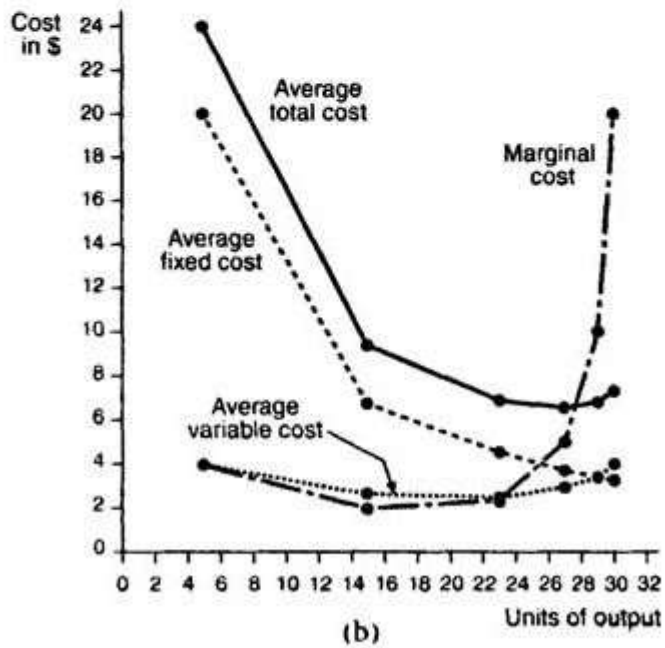
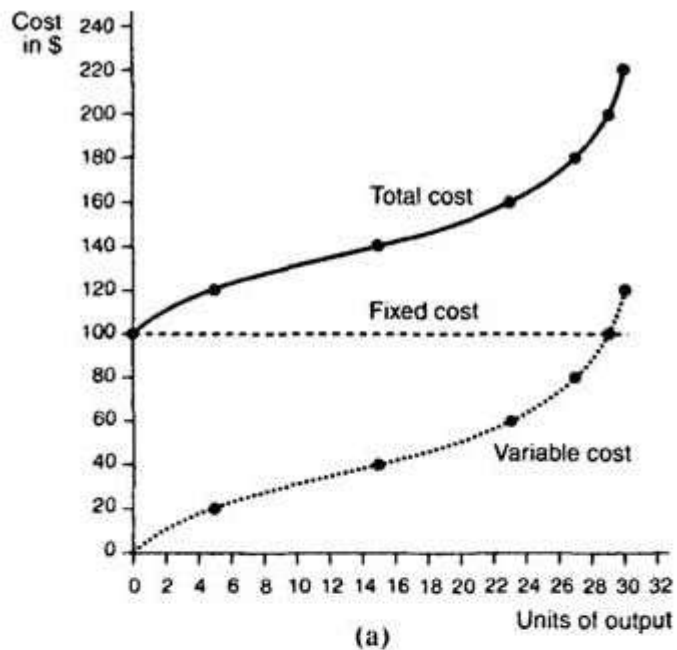


Figure 1
Cost Curves

When costs are depicted graphically, they are referred to as **cost curves**. Figures (a) and (b) reveal some of the interesting relationships that exist among the various cost curves. Note first that the **total cost curve** is just the vertical summation of the **variable cost curve** and the **fixed cost curve**. This also holds true for the **average total cost curve**, which is just the vertical summation of the **average variable cost curve** and the **average fixed cost curve**.

Second, note the relationship between the **marginal cost curve** and the total and variable cost curves. The **marginal cost curve** reaches its *minimum* at the inflection point of the total and variable cost curves. This should not be surprising because the slope of the total and variable cost curves reveals the rate at which the firm's costs change as output increases, which is precisely what marginal cost measures.

Finally, notice that the marginal cost curve intersects both the average variable cost curve and the average total cost curve at the minimum points of both curves. This is in accordance with the **marginal-average rule**, which states that when marginal cost lies *below* average cost, average cost is *falling*. When marginal cost lies *above* average cost, average cost is *rising*. It follows, then, that the marginal cost curve will intersect the average variable and average total cost curves at each of these curves' minimum points.

Production Cost: Different Types of Costs of Production

Article shared by **Smriti Chand**

Different Types of Costs of Production!

Productivity and advances in technology both would be likely to reduce a firm's average cost of production.

Total and Average Cost:

Total cost (TC), as its name implies, is the total cost of producing a given output. The more the output is produced, the higher the total cost of production. Producing more units requires the use of more resources. Average cost (AC) is also referred to as unit cost and is given as total cost divided by output. Table 1 shows the relationship between output, total cost and average cost.

Table 1 Total and average cost.

Output	Total cost (\$)	Average cost (4)
0	10	–
1	30	30
2	48	24
3	60	20
4	88	22
5	125	25

Fixed Costs:

Table 1 indicates that there is a cost even when output is zero. In the short run, some factors of production are in fixed supply. When a firm changes its output, the costs of these factors remain unchanged – they are fixed. For instance, if a firm raised its output, the interest it pays on past loans would remain unchanged.

If it closed Total fixed cost down during a holiday period, it may still have to pay for security and rent for buildings. Fig. 1 shows that total fixed cost (TFC) remains unchanged as output changes.

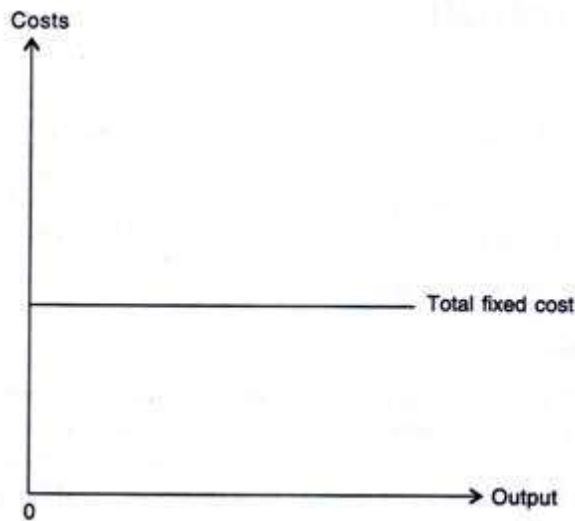


Fig. 1 Total fixed cost

Fixed costs (FC) are also sometimes referred to as overheads or indirect costs.

Average Fixed Cost:

Average fixed cost (AFC) is total fixed cost divided by output. As fixed cost is constant, average fixed cost is divided by higher output. Table 2 and Fig. 2 show how average fixed cost falls as output increases.

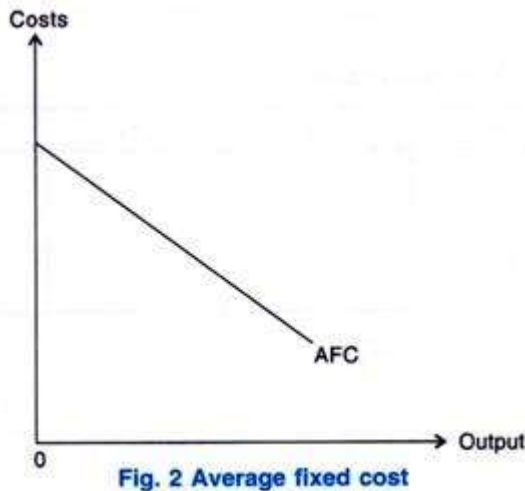


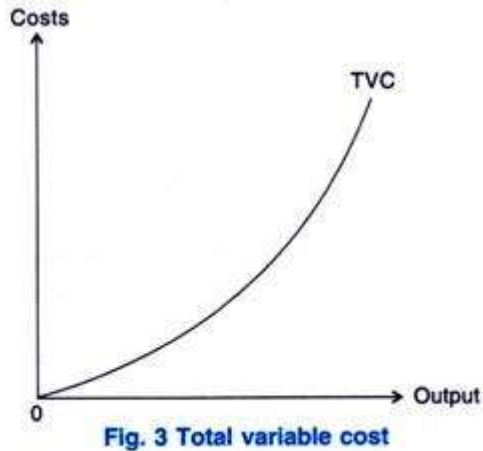
Table 2. Average fixed cost:

Output	Total fixed cost (\$)	Average fixed cost (\$)
0	10	–
1	10	10
2	10	5
3	10	3.33
4	10	2.5
5	10	2

Variable Costs:

Variable costs (VC), also sometimes called direct costs, are the costs of the variable factors. They vary directly as output changes. Production and sale of more cars will involve an increased expenditure on component parts, electricity, wages and transport for a car firm. As output increases, total variable cost rises. It usually tends to rise slowly at first and then rise more rapidly. This is because productivity often rises at first and then begins to decline after a certain output.

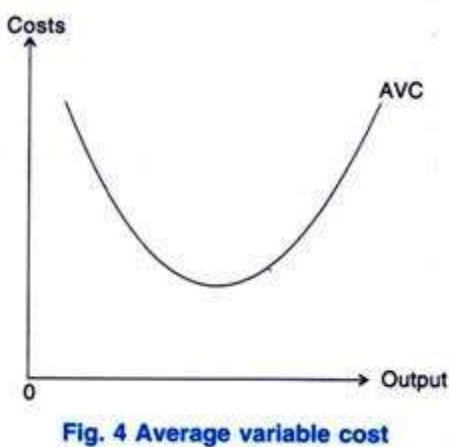
Fig. 3 shows the change of total variable cost (TVC) with output:

**Average Variable Cost:**

Average variable cost (AVC) is total variable cost divided by output. As output increases in the short run, average variable cost tends to fall and then rise. This is for the same reason which accounts for an increase in total variable cost at different rates with increase in output. Table 3 and Fig. 4 show the change in average variable cost with output.

Table 3. Average variable cost:

Output	Total variable cost (\$)	Average variable cost (\$)
1	40	40
2	70	35
3	90	30
4	120	30
5	175	35



Fixed and Variable Costs:

In practice, it is not always easy to decide whether a cost is fixed or variable. This is particularly true of payments to workers. It is clear that overtime payments and the wages of temporary workers are variable costs as they vary directly with output.

The basic wage or salary paid to workers, however, may be regarded as a fixed cost since it has to be paid irrespective of the amount of output. Sum of total fixed cost and total variable cost equals total cost. For instance, if fixed costs are \$800 and variable costs are \$4,200 a week, the total cost of production would be \$5,000 a week.

Fig. 5 depicts the constitution of total cost including fixed and “variable costs:

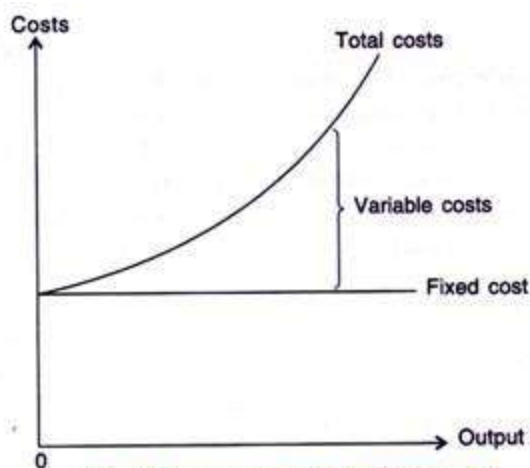
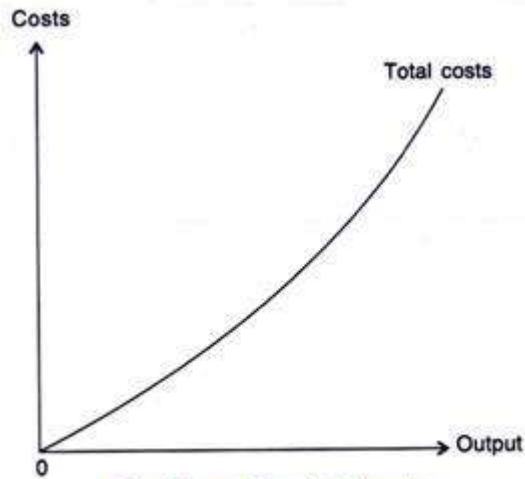


Fig. 5 The composition of total cost

In the long run, however, all costs are variable. This is because all factors of production can be altered, if sufficient time is available. For instance, a firm can increase the size of its factory, office or farm. Therefore its rent and business rates would rise and it can hire more workers, pushing up the wage bill.

Fig. 6. depicts total cost in the long run:

**Fig. 6 Long-term total cost****Average Cost:**

In the short run, average cost consists of average fixed cost and average variable cost. The shape of the short run average cost curve is usually U-shaped. The long run average cost curve is also usually U-shaped. This can be explained as follows. As a firm alters its scale of production, it first experiences economies of scale and then, after reaching a certain output, it may encounter diseconomies of scale.

When it comes to “modern” manufacturing intelligence, a lot has changed in recent years. Manufacturing issues have only grown more complex, while the new technologies that have evolved to meet these challenges now require new knowledge to understand, implement and leverage effectively. Companies now find themselves under pressure for more rapid product introductions, adaptation to local market conditions and continuous improvement to optimize costs, quality and efficiency.

As a result, manufacturing executives need unprecedented visibility and control over the entire production process while creating cost efficiencies at the same time. The objective to improving visibility is primarily to gain information faster, which can then be converted into intelligence and better decision support. The suggestion to get “smarter” with how we operate starts with a quest for “ultimate” visibility.

With this in mind, let’s take a look at some common measures and visibility benefits that are now possible with a “modern” manufacturing intelligence solution, which can help executives better

manage their manufacturing assets in a way that meets customer demand and might actually also help a company to save some money.

I would propose that the time-tested [DuPont model](#) is still a viable approach to break down the Return-on-Asset (ROA) equation into component parts to optimize capital investment and measure your [manufacturing operations management](#) performance. Specifically, the components include increasing revenue for more asset turns, reducing costs for more payback, and lowering the asset base for higher productivity. Better decision making – and the tools that support it – offer the potential to improve in each of these areas, so can justify investment in the technology that supports it.

Consider taking a closer look at the following areas to drive better efficiency in manufacturing operations.

1. **Process optimization.** Before talking about cost, you need to look at your entire process. Focusing on the process rather on the product or product-related cost might be the initial important departure from your current (usual) practice. Getting all great details of the (even not-yet optimized) process characteristics – prior to any improvement attempt might force you to draw a bigger picture than you are used to. This helps to manage the whole and not a part, avoiding partial process optimization or improving a process part but (unintentional) damaging another (maybe down-stream) part and sometimes making output even much worse.
2. **Workforce optimization.** By taking a demand-calibrated versus a capacity utilization approach to production decisions, companies can better balance workforce requirements and optimize labor costs. Reduced overtime expense can be a major source of savings.
3. **Energy consumption.** For many manufacturers, energy represents the first or second highest (with labor being the highest) cost element. By making demand-driven decisions, companies can choose to run slower to save energy without sacrificing customer service or output. Real-time, accurate visibility into the operating conditions is critical.
4. **Lower cost of Quality.** With better access to enterprise quality intelligence, as a component of overall manufacturing intelligence, companies can improve root cause analysis, take corrective

actions more quickly, and even proactively prevent spills or quarantines from occurring in the first place.

5. **Lower cost of regulatory compliance.** As a continuation of improving quality and real-time visibility to how quality processes are executed and managed, it follows that the benefits not only reduce the cost of compliance, but also help to avoid production mistakes in the first place, which can cost a fortune to correct.
6. **Inventory carrying costs.** Storing product inventory for a long period of time comes at a cost. Manufacturers need to consider the cost of storage, any necessary insurance, maintenance and other factors. Whenever possible, manufacturers will benefit from nimble and responsive manufacturing operations to avoid overproduction and the resulting excess storage costs and risk. By calibrating operating cadence to customer demand, companies can avoid “out-of-stock” occurrences without storing excess inventory.

Identifying and putting in place common production measures like these will help manufacturing executives attack costs network wide and create a mechanism for prioritizing continuous improvement projects while continuing to meet customer demand.

These 6 areas form the solid foundation for manufacturing excellence. They also determine the dimensions and detailed scope of the imperative operational visibility, which will be the main subject of my next blog post!

To reduce manufacturing cost

If physical labor is the biggest expense in manufacturing your product, controlling labor costs will give you the quickest path to increased profits. Labor cost reductions can be generated by lowering the dollars paid to factory workers or by making workers more efficient. Although low-cost labor can be obtained by employing unskilled labor, another way to decrease labor costs is to improve the efficiency of experienced labor. Study all production practices to eliminate wasted steps in the process. Reduce the time required to produce an average unit by providing specialized training that allows employees to work at a faster pace. Offer incentives to employees who can introduce labor-saving techniques into your production facility.

Reduce Material Costs

When material costs dominate product expense, focus on ways to procure materials for less money or find ways to use less material in the building process. Purchase materials in large lots to drive down unit costs. Research and determine the right type of material required; if features are not vital to the function or quality of your goods, don't pay for them. Provide documentation, training and proper tooling to reduce the amount of material scrapped during production. Deploy lean manufacturing initiatives such as like Six Sigma to evaluate opportunities for savings.

Reduce Overhead Costs

Monitor and control the expenses associated with running the factory – often referred to as overhead costs. Building, utility, supply, storage, handling, travel, supervisory and administrative costs all add to manufacturing costs. Set budgets for these support costs and review them on a weekly, monthly and yearly basis. Research purchase versus rental options for cost savings. Limit employee costs to those that benefit production or increase sales. Keep debt and interest expense as low as possible. Review and shop for the lowest employee benefit costs each year. Monitor tooling and supply costs, and keep them in a secure area to deter loss.

Invest in Capital

Sometimes the way to save money is to spend money. Investing in equipment that makes the manufacturing process faster can actually lower the production costs in the long run. Likewise, machinery that uses less material can also lower costs. However, it is imperative to thoroughly research potential capital investment benefits versus costs required before purchasing new equipment. Determine the return on investment by computing the gain from the investment less the cost of the investment divided by the cost of the investment.

DELIVERY COST

Total Delivered Cost (TDC) is the amount of [money](#) it takes for a [company](#) to [manufacture](#) and deliver a [product](#). Its components are:

- **Total Manufacturing Cost:** Costs incurred up to and inclusive of the production of finished and wrapped pallets or unit loads, fit for introduction into the warehousing and distribution chain.
- **Product Supply Non-Manufacturing Expense:** Administrative and developmental costs associated with the purchase of materials, engineering, design of a plant worthy production process, and administrative costs required to manage it.
- **Finished Product Logistics Costs:** Costs incurred from the entry of finished, wrapped pallets, or unit loads to the warehousing and distribution chain, until delivery of cases to the customer's receiving dock.

Profitability is the engine that drives all successful businesses. To manage profitability, a company must understand and have good control of both its revenues and its costs.

For a long time, companies have had a good understanding of the revenue side of the business at a detailed customer and product level. It is only in recent years, however, that they have begun to understand their costs at the same detailed level by customer and product. To gain that insight, many companies use total delivered cost (TDC)—the complete cost of sourcing, producing, and delivering products to customers. TDC, in turn, has become a critical metric in guiding supply chain planning decisions.

Total delivered cost is indeed an important tool in supply chain planning. However, we have observed that many companies do not make the best use of TDC in their supply chain planning process because of three common errors or oversights. First, many of them use a historical TDC metric, rather than a metric that is based on the supply chain costs they will incur now and in the future. Second, they often make oversimplified assumptions, ignore certain components of TDC, or use average accounting allocations rather than product-specific operational data when computing TDC. And third, companies often fail to use optimization technology to simultaneously make, for each product, the interdependent decisions in sourcing, production, warehousing, transportation, and distribution that will have an impact on TDC and yield the best overall future plan.

Benefits of total delivered cost

Total delivered cost is the complete cost of producing and delivering products to your customers. It

includes the cost of sourcing raw materials, manufacturing bulk and intermediate products, packaging of finished goods, inventory holding costs, transportation, distribution, and final delivery to the customer. Some elements of TDC are built from per-unit variable costs associated with the specific product and customer, while others are allocated fixed costs from production lines, plants, or other fixed assets used in the manufacturing, storage, and delivery of the product. TDC typically is reported as a per-unit cost for each product at each customer. However, for customers that purchase a large number of products, the aggregate delivered cost or aggregate gross profit are better measures to use to determine the attractiveness of a given customer/product portfolio.

Many companies compute some variant of TDC using historical data. This is a very informative exercise to help a business determine how its profits and losses developed from recent activities. Based on our experience, however, we believe there are a number of flaws in some of these types of analyses. First, we have seen TDC computed at a "product family" or "customer hierarchy" level without diving into the details at the individual product or customer ship-to level. This type of analysis can point the business in the direction of large groups of products or customers that are not meeting profitability targets, but they don't adequately identify which products or which customers are the real drivers of business profitability. Second, this historical TDC tells a company where it has been, but it doesn't necessarily tell it where it should be going.

Leading companies have begun to integrate this computation into their supply chain planning processes, especially their network design and analysis activities. By using TDC as a metric in analyzing supply chain network configuration and operations, companies are able to determine the profit margin on each sale at the customer and product level of detail. This enables them to evaluate both the costs of supplying products through their supply chain network and the revenue those products produce, across a number of different network options. Conversely, pairing TDC with expected pricing allows a company to evaluate the impact of imposing a minimum gross profit-margin target on the structure of the network. Thus, a company can consider important business decisions like:

- What is the appropriate price for a particular product/customer location combination to meet profitability targets?

- What is the true walk-away price during a competitive negotiation?
- What is the best allocation of production capacity among different product families?
- What is the impact of increasing volume and dropping price (and vice versa) for a given customer?
- For which products, industries, and regions should we be looking to sell additional volume?

While TDC is not the only criterion in determining the answer to critical business decisions like those listed above, it is an essential factor in arriving at the best strategic decisions for a company. In addition, the ability to identify profitability at a product/customer level provides critical information to effectively maximize profit by ensuring that:

- Constrained capacity resources are directed toward the most profitable products and customers
- Negotiated prices meet target rates of profit
- Data-based decisions are used when sales or marketing managers suggest "strategic reasons" for serving a particular customer
- Growth is directed toward the best products and geographies

Focusing on the product/customer level of detail also improves a company's ability to manage aggregate profitability across existing and potential portfolios of products and customers. For example, when a large-volume customer is threatening to walk away during tough price negotiations, the real decision for the seller usually is not what will happen if all that volume is lost, but rather how it will impact the business if that volume (or capacity) is sold to a different customer. Having that product/customer level of detail allows the seller to develop a pricing strategy informed by a set of alternatives across the entire network, thus it will be able to forecast the impact of a potential change like the one just described.

As is true with all things measured, precision is overrated, accuracy is essential. Such is the case with computing TDC. Calculating TDC is not a precise science, because there are too many fixed costs involved in the manufacturing and delivery of products that need to be allocated to products

and customers. That is no excuse, however, for avoiding the work required to ensure that a TDC calculation is sufficiently accurate.

The consequences of not doing the necessary work are clear. Many companies find it too difficult to get accurate costs or to implement a sound costing methodology, so they end up using oversimplified proxies for TDC that more often than not lead to faulty decision making that is based on sloppy data and/or analysis. Almost unbelievably, we have seen companies build up a "cost to serve" by applying a single average freight rate for all of the products that are sourced from a given plant to any of its customers. Likewise, we have seen many instances when the "average manufacturing cost" is used across all products, regardless of significant differences in processing times or manufacturing difficulty.

There is no question that accurately calculating TDC is challenging. It's even harder to make sure the analysis produces data that will be useful for planning future business. To help in this regard, the following sections outline the key components of TDC, some common pitfalls associated with each one, and suggestions for the best way to compute each component. Following these recommendations will provide the forward-looking estimate of the TDC that is necessary to make the best supply chain planning decisions.

Manufacturing, packaging, warehousing, and distribution costs: Financial systems often store some form of variable and fixed costs for manufacturing, packaging, warehousing, and distribution operations. Typically these are based on some sort of averages and/or standard costs that do not reflect the true marginal cost of incremental activities. For example, consider a 10-truck distribution fleet that is expected to log 400,000 miles in the coming year. If the combined cost of the truck leases, maintenance, fuel, drivers, insurance, and other factors is budgeted at US \$1 million, then the average projected cost would be \$2.50 per mile. However, assuming the fleet could serve additional customers, which would require another 50,000 miles, without adding more trucks or drivers, the actual added cost would be significantly less than \$125,000 ($50,000 \times \2.50).

Thus, it is important to properly split the fixed and variable costs in a supply chain to provide the best information to develop future plans. People tend to use the same basic approach when

calculating the appropriate planning costs for manufacturing, packaging, warehousing, or distribution operations, but the unique characteristics of those activities should be taken into account. For example, to appropriately capture the TDC of manufacturing activities, it is best to determine which costs are truly variable in the manufacturing operations across the volumes that are "in play" in the analysis; that is to say, costs that would not be incurred if the manufacturing operation does not occur. These are the volume-related variable costs. To illustrate this, let's look at two different examples.

Plant A has three production lines, each capable of producing 1 million units per month. The decision has already been made to operate all three production lines in the coming year, so there is some level of expense for items that typically are categorized as "variable" in accounting analyses—personnel, maintenance, utilities, supplies, and so forth—that will be incurred just because each line will be in operation. There is also likely a minimum volume level under which a given line cannot be run efficiently. Thus, the total cost to run the line at its minimum volume should be thought of as a fixed cost when it comes to decision-making. Then, the projected variable cost per unit becomes the incremental cost to produce each additional unit on the line over the range from the minimum volume to the maximum capacity of the line. Therefore, we suggest that the variable operating cost should be calculated as:

In the second example, Plant A has the same three lines, but the question is how many lines must be in operation in order to maximize profit or minimize cost. In this example, we suggest making the same calculation for the variable cost and also calculating the total cost that would be saved if a given line were to be shut down. This would represent the "line fixed cost." Again, this cost may be very different from the costs calculated by a company's accounting department.

Additionally, those costs that truly qualify as overhead—that is, they occur whether the manufacturing (or distribution) activity happens or not—represent fixed costs for either the asset or the location being used. It is important to get these distinctions correct in order to accurately project the TDC by product and customer.

Finally, when determining any of these costs, consideration should be given to the volume of product that can be moved through the plant, line, warehouse, or distribution fleet on a single shift or straight time versus the volume that can be moved by changing to two shifts or with overtime. Adding a shift will increase capacity as well as the fixed cost, and it may or may not change the variable cost per unit of throughput, whereas adding overtime will generally increase only the variable costs.

Fixed costs: In order to capture the total delivered cost of a specific product to a specific customer, TDC must include allocated fixed costs associated with the assets used to make (and possibly to ship and warehouse) the product. However, there are some challenges companies commonly encounter when making those calculations.

The first is how to properly allocate manufacturing costs. Many companies allocate manufacturing costs by volume, but in many cases that is incorrect. More often than not, capacity is a function of time, and therefore the fixed costs should be allocated by time consumed on the asset. This way, slow-running products will, appropriately, be allocated more of the fixed cost than will fast-running products. For example, a chemical product that has a batch cycle time of six hours for a 5,000-gallon batch should receive twice the asset allocation as a product that has a cycle time of three hours per 5,000-gallon batch. It is important to identify the unit of measure in which capacity constraints exist, and allocate based on that unit of measure.

The second challenge is how to correctly allocate fixed costs when assets are underutilized in some time periods and not in others. Should the fixed costs be allocated by time periods to only those products made on the asset within the given time period, should they be allocated to all production across the entire production horizon, or should it be something in between? There is no one-size-fits-all answer to this question. Making sure the approach is accurate and understandable should be the priority. Most often, the most effective way to make this allocation is to use the same time bucket that's used in the planning process, because the business will already have a sense of the cost to run the asset for that amount of time.

Inventory carrying costs: The activities of sourcing raw materials, manufacturing intermediates and finished goods, and then transporting them to a distribution center or warehouse all accrue costs that are included in the final TDC calculation. But what happens when the product is held in the warehouse for an extended period of time as part of a planned inventory build-up? The total delivered cost associated with those units of inventory increases because the holding cost of that inventory becomes part of the TDC. And then when it finally comes time to draw down the inventory and deliver those products to customers, that accrued inventory holding cost must be accurately reflected in the product delivered to the customer.

This carrying forward of TDC from the time the product enters inventory until the time it is pulled from inventory and delivered is one of the most overlooked aspects of TDC analysis, especially when used as part of a planning process. Unfortunately, this oversight can have a big impact and distort the TDC picture. A key to using TDC successfully is to ensure that the methodology is able to account for the costs of both creating and holding inventory, and then allocating those costs to products and customers that are served from inventory.

Raw material supply costs: Raw material supply costs are often integrated into standard costs in financial accounting systems, which can lead to poor decisions in a traditional cost-to-serve analysis. It's not a big problem when each raw material is supplied from a single source to a single location in the manufacturing footprint; in such cases the practice of using standard costs works just fine. However, for materials that are sourced from multiple suppliers and have different costs based on where they enter the manufacturing supply chain—because of differences in pricing across suppliers, freight, duty, or other factors—using average supplier costs will result in inaccurate TDC calculations. Those companies that are able to most accurately compute TDC are breaking out supply costs from the largest-volume raw materials based on bill-of-material consumption, by supplier and by the locations where they enter the manufacturing network.

Transportation costs: On many occasions we have seen businesses understate their total transportation cost by ignoring the cost of the rolling assets, such as rail cars or specialized trailers and containers. We have also seen companies ignore the cost of product inventory that is tied up in a given move. This is of little consequence when a shipment moves from warehouse to customer via

parcel express or to a location within a few hours' drive from the warehouse. For ocean or rail shipments, however, such an oversight can represent a significant inaccuracy in the total cost. As an illustration of the potential magnitude of this error, we found that one of our clients was including only the line-haul freight cost for decision making; as a result, it was understating its total cost by 35 percent.

To avoid these pitfalls, we recommend building "all-in" transportation costs for each lane that will be considered in the analysis. These costs should include the line-haul, rolling-asset lease cost, inventory cost, and any assessorial costs that are routinely incurred on a movement. For example, a rail movement should include the following elements:

- Line-haul freight
- Fuel surcharge, switching, and any other fees paid to the rail carrier
- The cost of the rail car (car lease per day x the sum of the loaded transit, the dwell time at destination, the empty transit, and the dwell time at the loading point before the next reload of the car)
- The cost of the inventory tied up in the movement
- The cost of cleaning the car

TDC and decisions about the future

Up to this point, we have defined the elements of total delivered cost and have suggested an approach for developing estimates of the individual costs that will determine the projected customer/product-level TDC. Now, we will explain how optimization technology, combined with computing TDC at the product/customer level, can produce better supply chain planning decisions.

A leading-edge planning process will investigate and compare a number of different future options or scenarios in order to come up with the best future plan. Different scenarios may include an upside or downside demand forecast, changes in cost or price, plant relocations or shutdowns, or the launch of a new product. In each of these scenarios, an optimization model is used to simultaneously make the interdependent decisions in sourcing, production, warehousing, transportation, and distribution to

generate the best path through the supply chain for raw materials to be transformed into finished goods and delivered to the customers.

By definition, optimization is the choice of the best set of decisions to either maximize or minimize a mathematical function that defines the objective of the system. In fact, the "objective function" in traditional network optimization and in production and distribution planning models minimizes the total cost to deliver the forecasted demand—or, put slightly differently, to minimize total delivered cost. At a conceptual level, then, we have been using TDC for years in the network design process. What's new is the ability to generate TDC at the customer/product level of detail. The ability to view projected TDC at this level of detail opens up a whole new discussion during the supply chain planning process, as the following examples demonstrate.

An example using TDC in the strategic network design process: In a recent engagement, we worked with a client that wanted to reduce the cost to serve its customers while strengthening the specialty segment of its business. Because management had decided not to invest in new manufacturing capacity, any new volume gained on the specialty side of the business would require a reduction in volume on the commodity side. However, because the specialty grades of the product tended to have a higher TDC than the commodity grades, the client needed to ensure that any changes to the split between specialty and commodity grades would result in increased profitability. Thus, our optimization model was developed using projected demands, prices, and costs, and it constrained the manufacturing plants to their maximum achievable capacities. To understand the impact of growing the new business segment we included deliveries to a number of potential specialty customers at a projected price per unit.

During the scenario analysis, managers on the commodity side of the business argued in favor of using the commodity volume to absorb the plant's fixed costs, thereby helping to keep the cost per unit across all products at a reasonable level. Because we were able to compute the TDC for each product delivered to each customer, we were able to have frank, data-based discussions and were able to demonstrate that, within the volume shifts we were suggesting, that approach was irrelevant and would not improve profitability.

An example using TDC in the sales and operations planning process: Scenario analysis has become a critical part of a good sales and operations planning (S&OP) process. Often the S&OP process identifies short-term shortfalls of product, and a company must choose which customers to serve, and at what cost. One method used by most companies to address near-term supply shortfalls is to utilize a premium freight service, like air or expedited trucking, to curtail long lead times and deliver enough product to last until adequate supply is once again available. But such freight services are costly, and to make optimal decisions about using premium freight because of capacity constraints in supply or manufacturing, it is necessary to have accurate TDC information by product and customer.

In one case we know of, a large technology company that sources most of its product from Asia into North America and Europe uses weekly TDC cost calculations to manage its premium freight spend. By using TDC to analyze the trade-off of inventory and premium freight, the company is able to more effectively assign manufacturing capacity to the right customers and products. As a result, it has reduced premium freight costs by more than 10 percent—all with no negative impact on overall customer service.

A prediction is a forecast of what is expected to happen, and as we all know, for many reasons forecasts rarely (if ever) turn out to be truly accurate. To minimize forecast error, we recommend investigating a number of different sensitivities around the key assumptions in the model.

There is no single best answer in a strategic network analysis. Rather, there are a number of good solutions, each of which comes with a certain level of risk. Our job as supply chain professionals is to understand which sensitivities to run and how to choose the "most good" scenario that contains an appropriate level of downside risk if the forecast should turn out to be wrong. Thus, we should ask ourselves, "What if my demand forecast is off by ± 10 percent?" or "What if the cost of a key raw material increases or decreases?" and other, similar questions before making a final decision.

STRCUTURAL COST

Cost structure refers to the types and relative proportions of fixed and variable **costs** that a business incurs. The concept can be defined in smaller units, such as by product, service, product line, customer, division, or geographic region.

TARGET COST

Target cost is the maximum amount of cost that can be incurred on a product, however, the firm can still earn the required profit margin from that product at a particular selling price. Target costing decomposes the target cost from product level to component level.

Broadly speaking, a target costing system has three objectives:

- a. To lower the costs of new products so that the required profit level can be ensured.
- b. The new products meet the levels of quality, delivery timing and price required by the market.
- c. To motivate all company employees to achieve the target profit during new product development by making target costing a companywide profit management activity.

For any system to be effective in supporting decision making in an organization, the staff from the relevant departments must come together in order to tap their creativity so as to achieve goals. In other words, the company requires a non-conflicting and rational system for consensus building and decision-making.

5. Target Costing Process:

Just as there is no single definition of target costing, there is no single target costing process.

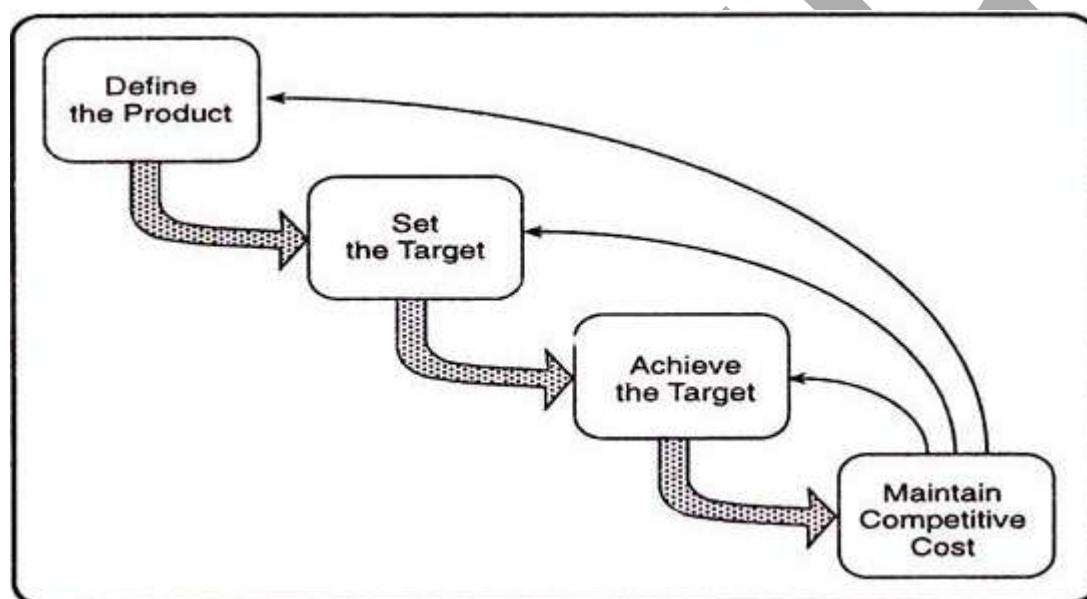
Nevertheless, all companies share a series of general steps:

- a. Establishing the target price in the context of market needs and competition;
- b. Establishing the target profit margin;
- c. Determining the allowable cost that must be achieved; this cost should motivate all personnel to achieve;
- d. Calculating the probable cost of current products and processes; and finally,

e. Establishing the target amount by which current costs must be reduced.

Once the target cost has been calculated, companies take the following steps to achieve it:

- Establishing a cross functional team, which is involved in the implementation process from the earliest design stages,
- Using tools such as value engineering in the design process; and
- Pursuing cost reductions using “**kaizen costing**” once production has started.



A number of techniques and tools facilitate an effective and efficient costing process. Three externally oriented analyses market assessment tools, industry and competitive analysis and reverse engineering provide a firm with a foundation for defining the proposed new product and establishing its price.

The determination of the target profit margin relies heavily on the comprehensive and detailed financial planning and statement analysis. Every firm has relationship between prices, volumes and revenues; costs and investments, in the aggregate and for specific product lines and individual products. The management team should explore other tools like value engineering and quality function deployment.

6. Advantages of Target Costing:

Main advantages of target costing are:

- a. It reinforces top to bottom commitment to process and product innovation to achieve some competitive advantages.
- b. It helps to create a company's market-driven management for designing and manufacturing products that meet the price required for the market success.
- c. It uses management control system to support and reinforce manufacturing strategies, and to identify market opportunities that can be converted into real saving to achieve the best value for money rather than simply achieving the lowest cost.
- d. Assures that products are better matched to their customers' needs.
- e. Aligns the costs of features with customers' willingness to pay for them.
- f. Reduces the development cycle of a product.
- g. Reduces the costs of products significantly.
- h. Increases the teamwork among all internal organizations associated with conceiving, marketing, planning, developing, manufacturing, selling, distributing and installing a product.
- i. Engages customers and suppliers to design the right product and to more effectively integrate the entire supply chain.

7. Reasons for the Late Development of Target Costing:

Although target costing emerged more than 30 years ago, yet only in 1990's this system came into notice. Main reasons for late popularity of target costing could possibly be that target costing focuses heavily on new product development and Japanese companies which practice the system most are very secretive about their new products/activities.

Also, popularity of Japanese Just-in-time inventory system had dominated the attention of industry in 1980's and, therefore, target costing got the second seat.

8. Problems with Target Costing:

Talk with customers about a new product concept, find out which features they like and don't like, and find out how much they would pay. Subtract an acceptable profit margin, and you're left with the target cost of the product. Now all you have to do is get everyone inside and outside the company to adhere to this number. It sounds simple enough.

It is easier said than done. Yet, target costing-a cost-management process imported from Japan—is helping a few dozen companies in the United States gain an edge by having them listen harder to customers to gauge the right product or service price.

Boeing, Eastman Kodak, and Honda of America, for example, as well as pioneers Daimler Chrysler and Caterpillar, have implemented the strategy, reversing the way they traditionally design, price, and sell new products.

Companies that have implemented the cost-management strategy insist they have boosted profitability. But, although virtually the entire Japanese manufacturing sector has gone the target-costing route since its inception in the 1970s, it hasn't exactly taken root here in India.

Target Costing has a few problems that one should be aware of and guard against. These problems are as follows:

a. The development of the process can be lengthened to a considerable extent since the design team may require a number of design iterations before it can devise low cost product that meets the target cost and margin criteria. This occurrence is most common when the project manager is unwilling to discontinue a design project that cannot meet its costing goals within a reasonable time frame.

Usually, If there is no evidence, it is better to either drop a project or at least shelve it for a short time and then try again, on the belief that new cost reduction methods or less expensive materials will be available in the near future that will make the target cost an achievable one.

b. A large amount of mandatory cost cutting can result in finger pointing in various parts of the company; especially if employees in one area feel they are being called on to provide a disproportionately large part of the saving.

For example the industrial staff will not be happy if it is required to completely alter the production layout in order to generate cost saving, while the purchase staff is not required to make any cost reductions through supplier negotiations. Avoiding this problem requires strong interpersonal and negotiation skills on the part of the project manager.

c. A design team having representatives from the number of departments can sometimes make it more difficult to reach a consensus on the proper design because there are too many opinions regarding design issues.

Life-Cycle Costing

Life-Cycle Costs are all the costs associated with the product for its entire life cycle. Product life cycle costing traces costs and revenues of each product over several calendar periods throughout their entire life cycle.

The costs are included in different stages of the product life cycle.

Development phase -R&D cost/Design cost.

Introduction phase – Promotional cost/Capacity costs.

Growth phase/Maturity – Manufacturing cost/Distribution costs/Product support cost.

Decline/Replacement phase – Plants reused/sold/scrapped/related costs.

Manufacturers would base life cycle costing expense allocations on an expected number of units to be sold over the product's life. Each period's internal income statement using life cycle costing would show revenues on a life-to-date basis along-with total cost of goods sold, total R and D project costs and total distribution and other marketing costs.

Benefits:

The following are the benefits of product life cycle costing:

(i) It results in earlier actions to generate revenue or to lower costs than otherwise might be considered.

(ii) It ensures better decision from a more accurate and realistic assessment of revenues and costs, at-least within a particular life cycle stage.

(iii) It promotes long-term rewarding.

(iv) It provides an overall framework for considering total incremental costs over the life span of the product.

Effects of Life-Cycle Costing:

Life cycle costing helps companies to be aware of where their products are in their life cycles, because in addition to the sales effects, the life-cycle stage may have a tremendous impact on costs and profits. The life-cycle impact on each of these items is shown in the following table

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE**Class: II MBA****Course Name: Strategic Cost Management****Course Code: 17MBAPF301****Unit II****Semester: III****Year: 2017-19 Batch**

Stage	Costs	Approach to Costing	Sales	Profits
Development	No production costs, but R&D costs very high	Target costing	None	None; large loss on product due to expensing of R&D costs
Introduction	Production cost per unit; probably engineering change costs; high advertising cost	Kaizen costing	Very low unit sales; selling price may be high (for early profits) or low (for gaining market share)	Typically losses are incurred partially due to expensing of advertising
Growth	Production cost per unit decreases (due to learning curve and spreading fixed overhead over many units)	Kaizen costing	Rising unit sales; selling price is adjusted to meet competition	High
Maturity	Production cost per unit stable; costs of increasing product mix begin to rise	Standard costing	Peak unit sales; reduced selling price	Falling
Decline	Production cost per unit increases (due to fixed overhead being spread over a lower volume)	Standard costing	Falling unit sales; selling price may be increased in an attempt to raise profits or lowered in an attempt to raise volume	May return to losses

Part A (ONE Mark)

**Multiple Choice Questions
Online Examination
Part B(2 Marks)**

1. Define target costing
2. What is meant by life cycle cost?
3. Define total cost
4. Give the meaning for delivery cost
5. Define process cost
6. What is meant by normal gain?
7. What is meant by abnormal gain?
8. What is meant by normal loss?
9. What is meant by abnormal loss?
10. Define production cost

PART C (8 Marks)

1. "Total Cost Management is a valuable aid for managerial decision" Justify
2. "Profitability is the engine that drive all successful businesses, to manage profitability, a company should have good control over delivery cost" Explain
3. What do you mean by process costing ? In what types of industries is process costing generally applied ?
4. Describe the features of Process Costing . How is unit cost determined in process costing ?
5. What do you understand by the term "inter-process profits"? What is the utility of transferring the output of one process to another process at more than cost?

PART D (11Marks)

1. In a manufacturing concern with several departments, the finished product of one department becomes the raw material of the next department. Would you advocate inclusion of profit in the transfer price of the material? What would be the effect of this in the profit and loss account of the manufacturing concern as a whole?

2. “Total cost incurred for manufacturing a product plays a vital role for fixing the selling price” Do you agree this statement? Give reason
3. “Target cost is an approach to determine a product life cycle cost which is sufficient to develop specified functionality and quality” Discuss
4. Structural cost should be managed and planned according to quantitative and qualitative required for internal activities not related to product standard of performance” Elaborate
5. Explain the advantages and disadvantages of managing total cost?
6. Describe the benefits of Target Costing.
7. Describe the major characteristics of product life cycle concept?

KARPAGAM ACADEMY OF HIGHER EDUCATION

DEPARTMENT OF MANAGEMENT

STRATEGIC COST MANAGEMENT (17MBAPF301B)

UNIT –II (20*1=20) MARKS Multiple choice Questions

S. NO	Question	Option - I	Option - II	Option - III	Option - IV	Option - V	Option - VI	Answer
1	----- is a cost management tool for reducing the overall cost of a product	Target Costing	Job Costing	Batch Costing	Marginal Costing			Target Costing
2	----- will help to reduce the overall cost of a product over its entire life cycle with the help of production, engineering, research and design	Target Costing	Job Costing	Batch Costing	Marginal Costing			Target Costing
3	----- is driven by external market factors	Target Costing	Job Costing	Batch Costing	Marginal Costing			Target Costing
4	Target costing which has been widely used by ----- firms since 1970's	Japanese	Germany	Britain	USA			Japanese
5	Target costing which has been widely used by firms since-----	1980's	1970's	1960's	1990's			1970's
6	----- allows the profitability of a product to be	Target Costing	Job Costing	Batch Costing	Marginal Costing			Target Costing

	determined before it is produced							
7	In-----, profit will be determined before designing and introducing the product	Target Costing	Job Costing	Batch Costing	Marginal Costing			Target Costing
8	----- is the maximum amount of cost that can be incurred on a product	Target Costing	Job Costing	Batch Costing	Marginal Costing			Target Costing
9	Target costing system has --- objectives	3	4	8	7			3
10	Target costing has ----- process	8	4	3	7			4
11	----- is the first process in Target costing	Define the product	Set the target	Achieve the target	Maintain competitive cost			Define the product
12	----- is the second process in Target costing	Define the product	Set the target	Achieve the target	Maintain competitive cost			Set the target
13	----- is the third process in Target costing	Define the product	Set the target	Achieve the target	Maintain competitive cost			Achieve the target
14	----- is the fourth process in Target costing	Define the product	Set the target	Achieve the target	Maintain competitive cost			Maintain competitive cost
15	Target costing =	sales-total cost	Anticipated selling price - desired profit	Anticipated selling price + desired profit	Sales - Fixed cost			Anticipated selling price - desired profit
16	Procurement and production costing technique that	Target cost	Life cycle cost	Product cost	Job cost			Life cycle cost

	considers all - ----- -----							
17	----- - aims to determine the lowest cost of ownership of a fixed asset	Target cost	Life cycle cost	Product cost	Job cost			Life cycle cost
18	In manufacturing, ----- ----- aims to estimate not only the production costs, but also how much revenue a product will generate	Target cost	Life cycle cost	Product cost	Job cost			Life cycle cost
19	The determination of ----- ----- is an integral part of the asset management process	Target cost	Life cycle cost	Product cost	Job cost			Life cycle cost
20	Life cycle begins with--- ----- -----	Introduction of new product	Maturity	Growth	Decline			Introduction of new product
21	The second stage of life cycle cost is - -----	Decline	Growth	Maturity	Introduction of new product			Growth
22	The third stage of life cycle cost is - -----	Decline	Growth	Maturity	Introduction of new product			Maturity
23	The fourth stage of life cycle cost is - -----	Introduction of new product	Maturity	Growth	Decline			Decline
24	----- ----- is a conceptual representation	Product life cycle	ABC	Transfer price	Target cost			Product life cycle

25	To set a target cost for the products through the use of ----- ----- ---	VED Analysis	Value Engineering	Transfer price	Desired profit			Value Engineering
26	Target cost can be attained at the production stage by use of ----- ---	Job cost	Batch cost	Standard cost	Unit cost			Standard cost
27	Target cost = Anticipated selling price - ----- -----	Profit	Loss	Desired profit	Desired Loss			Desired profit
28	Target cost = ----- ----- - Desired profit	Profit	Loss	Anticipated selling price	Desired Loss			Anticipated selling price
29	_____ cost is the total of costs incurred in operation of a business undertaking other than the cost of manufacturing and production	Prime	Commercial	Factory	Administrative			Commercial
30	_____ cost is an irrecoverable cost	Total	Sunk	Operation	Process			Sunk
31	_____ cost is the cost of replacing a material or asset in current market	Total	Replacement	Policy	Shutdown			Replacement
32	Abnormal gain should reduce the normal loss and balance is	Profit and Loss	Revenue	Income	Balance sheet			Profit and Loss

	transferred to costing _____ account							
33	The method of costing applied in steel industries is costing	Operating	Process	Batch	Contract			Process
34	When actual loss is more than the estimated loss, the difference between the two is considered as _____ loss	Normal	Abnormal	Standard	Fixed			Abnormal
35	When the actual loss is less than the estimated loss it is considered as _____ gain	Abnormal	Normal	Standard	Fixed			Abnormal
36	When 1000 units are 60% complete in a process, it is equivalent to _____ completed units.	600	400	60	6			600
37	Equivalent unit represent the production of a process in terms of _____ units	Incomplete	Completed	Standard	Fixed			Completed
38	In each process, an estimate is made of the degree of completion of _____ in terms of	Finished Products	Estimated Products	Standard Products	Work-in-progress			Work-in-progress

	percentage							
39	Scrap value of _____ is deducted from the material cost	Normal Loss	Abnormal Loss	Abnormal Gain	Normal Gain			Normal Loss
40	_____ process loss should be transferred to costing profit and loss account	Abnormal	Normal	Actual	standard			Normal
41	Where actual loss in a process is less than the anticipated loss, the difference between the two is considered to be _____	Normal gain	Abnormal gain	Normal loss	Abnormal loss			Abnormal gain
42	The normal process loss represents the loss would be expected under _____ conditions	Normal	Abnormal	Standard	Contingency			Normal
43	_____ costing mainly deals with continuous type of production	Job	Contract	Process	Unit			Process
44	Units of abnormal gain are represented by _____	Work-in-progress	Finished Product	Materials	Goods			Finished Product
45	Costs are accumulated for each process for a period in _____ costing	Process	Unit	Batch	Job			Process

46	_____ cost drivers are structural and executional in nature	Economic	Political	Organizational	Social			Organizational
47	_____ cost drivers are those determinants of a firm's cost position the hinge on its ability to execute successfully	Executional	Structural	Organizational	Transport			Executional
48	_____ aims at reducing inefficiencies and wastages and setting up determined costs and in achieving them	Cost Control	Planning	Scheduling	Cost control and scheduling			Cost Control
49	Profit can be maximized by reducing	Sales	Cost	Production	Productivity			Cost
50	_____ aims an improvement of human efforts	Cost Reduction	Cost Control	Planning	Scheduling			Cost Reduction
51	CPU -	Cost Per Unit	Central processing Unit	Control Production Unit	Control per Unit			Cost Per Unit
52	WIP -	Waste in Product	Work In Progress	Work in production	Work internal Product			Work In Progress
53	_____ refers to a conversion of part completed units into equivalent number of wholly completed units	Production	Productivity	Equivalent units	Units			Equivalent units

54	_____ refers to the cost incurred by a business when manufacturing a goods or providing services	Total cost	Production cost	Fixed cost	Variable cost			Production cost
55	Production cost are classified into _____	4	3	2	7			2
56	Implicit cost is also known as _____	Explicit cost	Fixed cost	Historical cost	Opportunity cost			Opportunity cost
57	_____ is total variable cost divided by output	Average variable cost	Average total cost	Average cost	Average fixed cost			Average variable cost
58	_____ is total fixed cost divided by output	Average variable cost	Average total cost	Average cost	Average fixed cost			Average fixed cost
59	_____ is an example for direct cost	Salary	Wages	Advertising	Stationery			Wages
60	_____ is an example for indirect cost	Wages	Carriage inwards	Power	Salary			Salary

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UNIT-III- Activity Based Costing

SYLLABUS

Activity Based Costing - Drawbacks of Conventional Costing- Methodology of ABC - Merits, demerits suitability of ABC - Implementation of ABC. Management Control Systems - Evaluating Management Control Systems - Responsibility Centers- Evaluation of the Performance of Different Responsibility Centers.

ACTIVITY BASED COSTING

Activity-Based Costing (ABC) is a costing model that identifies activities in an organization and allocates the indirect resources to each activity for completion of the production of goods and services. It relates indirect cost to the activities that drive them to be incurred.

In traditional costing system, the indirect costs are allocated on the basis of volume of output. Over a period of time, the technology has been improved and it requires adopting a change in method of cost structures for the allocation of overhead on the basis of cost drivers.

Definition

Activity Based costing is “A method of measuring the cost and performance of activities and cost objects. Assigns cost to activities based on their use of resources and assigns cost to cost objects based on their use of activities. ABC recognizes the causal relationship of cost drivers to activities.”

-- Peter B. B. Turney

Some examples of indirect costs and their drivers are:

1. **Maintenance costs** are indirect costs and the possible driver of this cost may be *the number of machine hours*,
2. **Handling raw-material cost** is another indirect cost that may be driven by *the number of orders received*,

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3. **Inspection costs** that are driven by *the number of inspections or the hours of inspection or production runs.*

Generally, the cost driver for short term indirect variable costs may be the volume of output/ activity; but for long term indirect variable costs, the cost drivers cannot be related to volume of output/ activity.

The basis of Activity Based Costing is

1. Identify the activities required to produce the cost of the product or service.
2. Allocate the resources on each activity
3. Establish the cost drivers on each activity and count its numbers,
4. Determine the cost per cost drivers,
5. Determine the amount of activity required for each product and service
6. Determine the real cost for a single product or services.

ACTIVITY

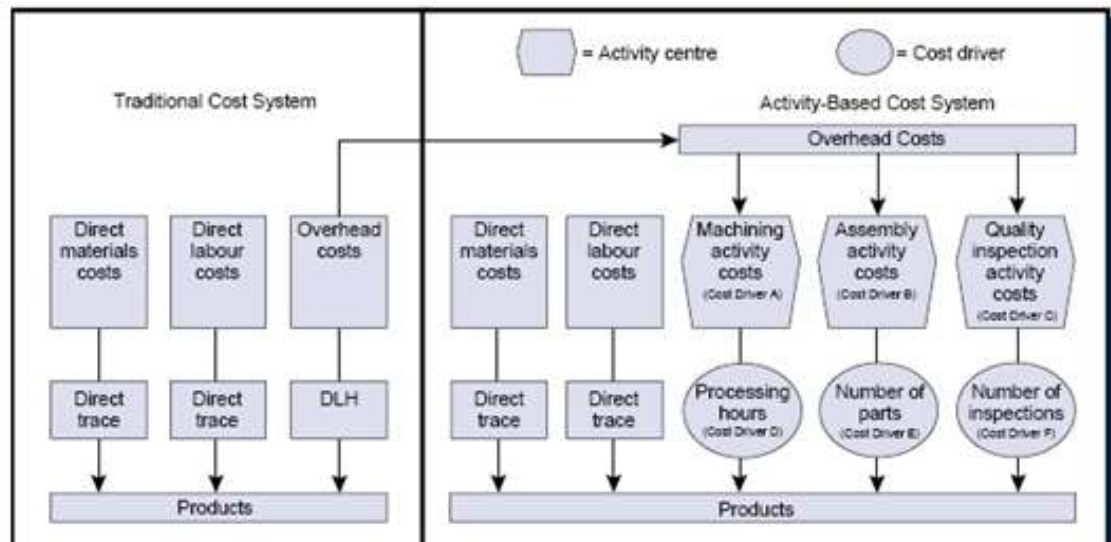
COST DRIVER

Production set-up	Number of production runs
Production control	Number of production process changes
Engineering	Number of engineering change orders
Maintenance	Number of machine hours
Power	Number of kilowatt hours

Difference between Traditional Cost System and Activity Based costing system

Traditional Activity Based Costing

1 Uses Unit Based Costing	Recognizes activities are the causes of costs
2 Geared to manufacturing	Concepts can be implemented in environments
3 Useful in a one product	Valuable in a multi-product



environment

4 External reporting focus
making focus

Internal management decision

5 Potential for poor decisions due to product cross-subsidization
Potential to cut costs by identifying the "true" costs of the product and increase profitability
System of traditional and ABC

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In Traditional cost models the resources are applied to products in two ways. That is known as direct costs and indirect cost. The direct cost is the cost which is attributed directly to the product e.g., material and direct labor whereas the indirect cost like sales, marketing and administrative costs are not included in product costs.

Activity Based Costing (ABC) does not change the way material and direct labor are attributed to manufactured products. The primary task of activity based costing is to break out indirect activities into meaningful pools which can then be assigned to processes in a manner which better reflects the way costs are actually incurred. The system must recognize that resources are consumed by processes or products in different proportions for each activity.

All costs are existed in resources like material, labor, space, equipment and services. Resources are consumed by activities which have no inherent cost. The cost associated with activities represents the amount of resource they consume per unit of activity. Resources and activities are then applied to cost objects, that is, the purpose for which the resource is consumed and the activity is performed.

The resource and activity is measured in terms of units which defines the amount of the resource consumed or activity required by a unit of demand for it. Resources can be consumed by resources (e.g. office space resource is consumed by an employee resource), by activities (e.g. telephone resource is consumed by a customer service call activity) or by cost objects (e.g. material resource is consumed by a product cost object).

Activities can be performed in support of another activity (e.g. invoice printing activity

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supports the billing activity) or in response to a cost object (e.g. purchase orders are issued to support the material acquisition process). A cost object can be a process or product and either an interim cost object or an end user (customer) cost object. For example, hiring personnel may be a cost object of Human Resources Department utilizing space, utility, telephone, supply and labor resources and performing advertising, calling, interviewing and orientation activities. That cost object may be a resource used by other departments to secure labor resource for their department.

A network of resources, activities and cost objects are to be constructed in the operational flow of the process. Each resource and activity has a unit of measure which converts them at a unit of demand rate. First, we need to understand the business process and it is to be identified and develop a cost model. The cost model is essential and it must be useful and effective in determining the process. The costs are attached to determine the cost of the defined process.

Activity-Based-Costing is necessary for the following reasons.

- To Understand True profitability of the customers, products, or services
- To Quantify the cost of non-value added activities such as errors and reworks,
- To Identify opportunities to reduce costs and/or increase efficiency,
- To Obtain actionable information to negotiate price increases for unprofitable clients,
- To Understand why profitability may be mediocre despite good strategic fundamentals,
- To Stratify overhead costs so they can be managed more effectively

ABC Model

The objective of an ABC implementation is to relate all of the costs of doing business to products, services, or customers. Developing the initial model consists of the following five steps:

1. Identification of the Resources (expenditures) of an organization
2. Determination of Activities (work performed) that are supported by Resources

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3. Description of the Cost Objects (products, services, customers)
4. Development of Resource Drivers to link Resources to Activities
5. To Develop the Cost Drivers to link Activities to Cost Objects

1: Identification of Resources

Resources represent the expenditures of an organization.

Example: production labour, sales and marketing labor, occupancy and utilities, equipment, and supplies. These are the same costs that are represented in a traditional accounting view; unlike traditional accounting, ABC links these costs to products, customers, or services.

2: Determination of Activities

Activities represent the work performed in an organization.

Example: ABC Activities for the sales department in a typical organization might include: Making sales calls to existing customers, Making sales calls to potential customers, Making customer service calls, Training product representatives, Evaluating products and improving product knowledge, Distributing samples, Attending trade shows and other events.

In traditional accounting, the cost of the sales department is breaking into salaries, benefits, allocated rent, supplies, and so on.

Unlike traditional accounting, which reports what the costs are (i.e. salaries, benefits, rent); ABC accounts for these costs based on what activities caused them to occur. By determining the actual activities that occur in various departments, such as accounting, customer service, and sales, it is then possible to more accurately relate these costs to customers, products, and services.

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3: Description of the Cost Objects

ABC provides profitability by one or more cost object, usually represented by products, customers, and/or services. Cost Object profitability is utilized to identify money losing customers, to validate separate divisions or business units, or to measure the performance of individual projects, jobs, or contracts. Defining the outputs to be viewed is an important step in a successful ABC implementation.

4: Determination of Resource Drivers

Resource Drivers provide the link between the expenditures of an organization and the Activities performed within the organization.

For example, the total salary of a customer service representative would likely be allocated to the Activities performed based on the amount of time spent performing the Activity. If 50% of her time is spent performing the activity, taking orders for existing customers, 50% of her salary (including all costs such as benefits, taxes, and insurance) would be allocated to this Activity.

5: Determination of Cost Drivers

Determination of Cost Drivers completes the last stage of the model. Cost Drivers trace, or link, the cost of performing certain Activities to Cost Objects.

For example, taking orders for existing customers may be linked to specific customers based on the number of orders taken, if each order takes approximately the same amount of time. If order taking time varies based on the customer, this cost may be linked based on another driver or multiple drivers.

Today, companies are using ABC to make better-informed decisions about pricing, what type of customers to pursue, and what products or services to offer. Activity-Based Costing determines the TRUE COST and PROFITABILITY of customers, products, and/or services. While traditional accounting may provide the business with an accurate sense of

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the direct costs of the products or services, indirect costs are often less accurately applied. Overhead, such as customer support or marketing costs tend to be allocated based on arbitrary factors.

MANAGEMENT CONTROL SYSTEM

Management control is a must in any organization that practices decentralization. One view argues that management control systems must fit the firm's strategy. This implies that the strategy is first developed through a formal and rational process, and this strategy then dictates the design of the firm's management systems. An alternative perspective is that strategies emerge through experimentation, which is influenced by the firm's management systems. In this view, management control systems can affect the development of strategies.

When firms operate in industry contexts where environmental changes are predictable, they can use a formal and rational process to develop the strategy first and then design management control systems to execute that strategy. However, in a rapidly changing environment, it is difficult for a firm to formulate the strategy first and then design management systems to execute the chosen strategy. Perhaps, in such contexts, strategies emerge through experimentation and ad hoc processes that are significantly influenced by the firm's management control systems.

The importance of the subject matter is captured in the widely accepted truism that more than 90 percent of businesses including non organizations is founded on the rocks of implementation; either the strategies never come into being or get distorted, or the implementation is much more costly and time-consuming than anticipated. However, laudable strategic intentions may be, if they do not become reality, they usually are not worth the paper on which they are written. Conversely, high-performing companies excel at execution.

Consider the collapse of companies such as Enron, WorldCom, Global Crossing and Tyco. Part of the reason for their demise was the lapse in controls. CEO and top management compensation in these companies

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was so heavily tied to stock options that executives were motivated to manipulate financials to buoy the short-term stock price.

Consider world-class companies such as Dell Computer, Walmart, Cisco Systems, New York Times, Emerson Electric, Lincoln Electric, Worthington industries, 3M Corporation, Nucor Corporation, Analog Devices and so on. Their long-term success is not just because they have developed good strategies; more importantly, they have designed systems and processes that energize their employees to execute those strategies; more importantly, they have designed systems and processes that energize their employees to execute those strategies effectively.

The traditional perception of control systems is similar to that of the autocrat through his policemen controlling an unruly mob. But in the twenty-first century the unmistakable forward trend towards empowerment should not go unnoticed. Systems, which are in perfect control without an autocrat and policemen controlling them, would show the profound difference between the concept of controlling persons and that of systems being under control and being able to achieve their goals and objectives with ease. They deserve to be emulated.

Definition of Management Control Systems

A MCS is a set of interrelated communication structures that facilitates the processing of information for the purpose of assisting managers in coordinating the parts and attaining the purpose of an organization on a continuous basis.

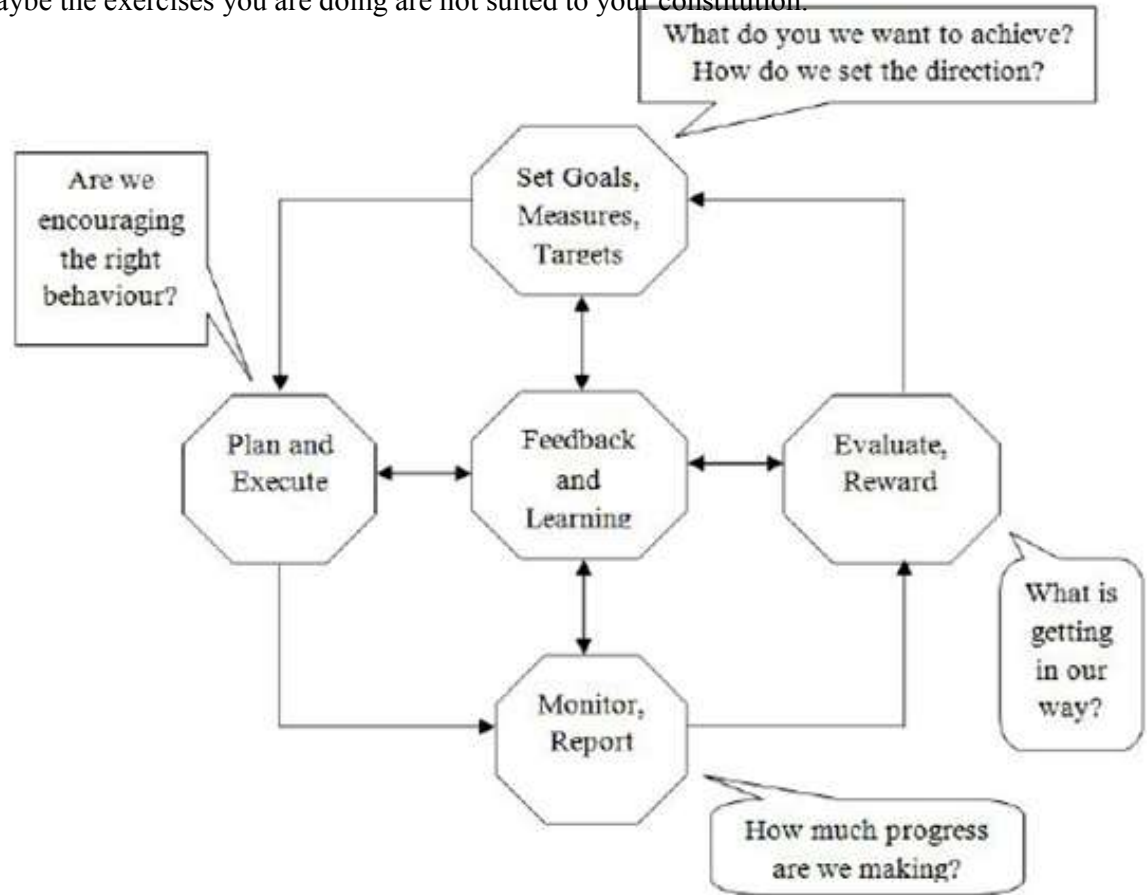
A MCS is a logical integration of techniques, to gather and use information to make planning and control decisions, to motivate employee behaviour, and to evaluate performance.

Purpose and Importance

Imagine that you have the tendency to put on weight. It is in your genes and if you are not careful you might go the same way as several people in your family went earlier. So what do you do? You cut down on your food intake. It might help or may not. You start exercising, but you

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are alarmed to discover that you are building up a lot of needless muscle. Maybe the exercises you are doing are not suited to your constitution.



The Management Control System

Then you change your method of exercising and you find that it works. You start shedding weight. This is weight control. It gives us control over our body and its functioning. If such control is not exercised, we may not be able to do whatever we set out to do so. In a

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similar way, organizations need to be in control of them. An organization lacking in controls is bad for its employees and hence, bad for itself in the long run.

The ***purpose*** of all management and control systems is to achieve the goals and objectives of an organization with ease and at least cost. The ultimate purpose of any system is that it should be ‘in control’ instead of controlling people. It also aims at assisting management in the ***coordination*** of the parts of an organization and the ***steering*** of those parts toward the achievement of its overall purposes, goals and objectives.

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The purposes of a management control system are:

- To clearly communicate the organisation's goals;
- To ensure that managers and employees understand the specific actions required of them to achieve organizational goals;
- To communicate results of actions across the organisation; and
- To ensure that managers can adjust to changes in the environment.

A control system is designed to bring *unity out of the diverse activities* of an organization as it seeks to fulfil its overall purpose. In the above following diagram shows the components of a management control system.

Basic Concepts

1. Control

Press the accelerator, and your car goes faster. Rotate the steering wheel, and it changes direction. Press the brake pedal, and the car slows or stops. With these devices, you control speed and direction; if any of them is inoperative, the car does not do what you want it to. In other words, it is out of control.

An organization must also be controlled, i.e., devices must be in place to ensure that its strategic intentions are achieved. But controlling an organization is much more complicated than controlling a car.

Elements of a Control System

Every control system has at least four elements:

1. *A detector or sensor* - a device that measures what is actually happening in the process being controlled.
2. *An assessor* - a device that determines the

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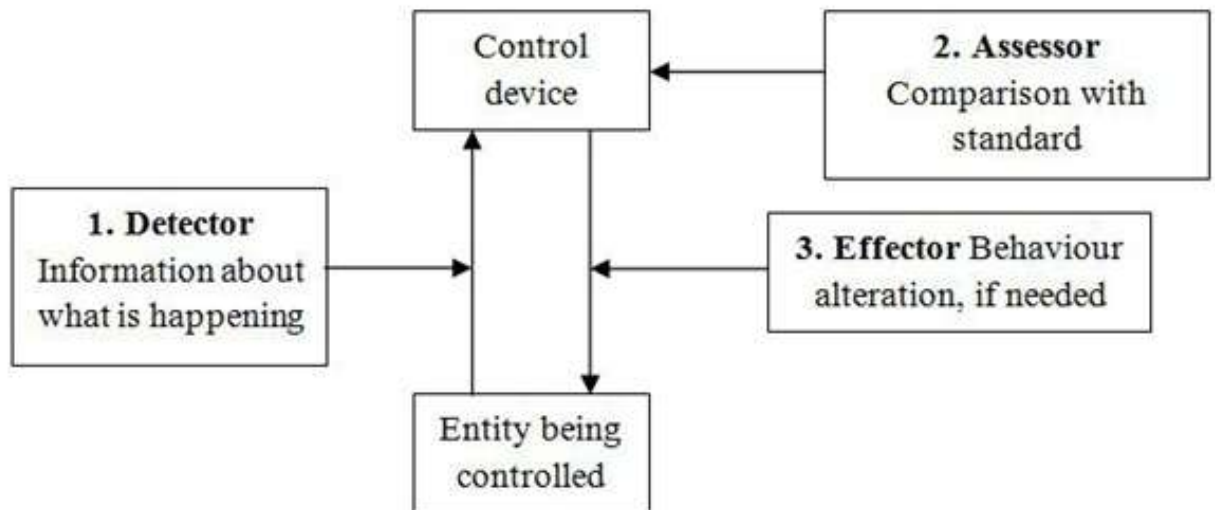
significance of what
is actually happening by comparing it with some
standard or
expectation of what should happen.

3. *An effector* - a device (often called 'feedback') that alters
behaviour
if the assessor indicates the need to do so.

4. *A communications network* - devices that transmit
information
between the detector and the assessor and between the
assessor and
the effector.

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These four basic elements of any control system are given in the following diagram.



Elements of the Control Process

The functioning of these four basic elements is described in three examples of increasing complexity; the *thermostat*, which regulates room temperature; the biological process that regulates *body temperature*; and the *driver* of an automobile, who regulates the direction and speed of the vehicle.

Thermostat The components of the thermostat are (i) a thermometer (the detector), which measures the current temperature of a room; (ii) an assessor, which compares the current temperature with the accepted

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standard for what the temperature should be; (iii) an effector, which prompts a furnace to emit heat (if the actual temperature is lower than the standard) or activates an air conditioner (if the actual temperature is higher than the standard) and which also shuts off these appliances when the temperature reaches the standard level; and (iv) a communications network, which transmits information from the thermometer to the assessor and from the assessor to the heating or cooling element.

Body Temperature Most mammals are born with a built-in standard of desirable body temperature; in humans that standard is 98.6°F. The elements of the control mechanism by which the body strives to maintain that standard are (i) the sensory nerves (detectors) scattered throughout

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the body; (ii) the hypothalamus centre in the brain (assessor), which compares information received from detectors with the 98.6°F standard; (iii) the muscles and organs (effectors) that reduce the temperature when it exceeds the standard (via panting and sweating, and opening the skin pores) and raise the temperature when it falls below the standard (via shivering and closing the skin pores); and (iv) the overall communications systems of nerves.

This biological control system is homeostatic - that is, self-regulating. If the system is functioning properly, it automatically corrects for deviations from the standard without requiring conscious effort.

The body temperature control system is more complex than the thermostat, with body sensors scattered throughout the body and hypothalamus directing actions that involve a variety of muscles and organs. It is also more mysterious; scientists know what the hypothalamus does but not how it does it.

Automobile driver Assume you are driving on a highway where the legal (i.e., standard) speed is 65 mph. your control system acts as follows: (i) Your eyes (sensors) measure actual speed by observing the speedometer; (ii) your brain (assessor) compares actual speed with desired speed, and, upon detecting a deviation from the standard, (iii) directs your foot (effector) to ease up or press down on the accelerator; and as in body temperature regulation, your nerves form the communication

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system that transmits information from eyes to brain and brain to foot.

But just as body temperature regulation is more complicated than the thermostat, so the regulation of a car is more complicated than the regulation of body temperature. This is because there can be no certainty as to what action the brain will direct after receiving and evaluating information from the detector.

For example, once they determine that the car's actual speed exceeds 65 mph, some drivers, wanting to stay within the legal limit, will ease up on the accelerator, while others, for any number of reasons, will not. In this system, control is not automatic; one would have to know something about the personality and circumstances of the driver to predict what the actual speed of the automobile would be at the end point of the process.

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2. Management

Management in business and human organization activity is simply the act of getting people together to accomplish desired goals. Management comprises planning, organizing, staffing, leading or directing, and controlling an organization (a group of one or more people or entities) or effort for the purpose of accomplishing a goal. Resourcing encompasses the deployment and manipulation of human resources, financial resources, technological resources, and natural resources.

Management can also refer to the person or people who perform the act(s) of management.

An organization consists of a group of people who work together to achieve certain common goals (in a business organization a major goal is to earn a satisfactory profit). Organizations are led by a hierarchy of managers, with the chief executive officer (CEO) at the top, and the managers of business units, departments, functions and other subunits ranked below him or her in the organizational chart. The complexity of the organization determines the number of layers in the hierarchy. All managers other than the CEO are both superiors and subordinates; they supervise the people in their own units, and they are supervised by the managers to whom they report.

The CEO or a team of senior managers decides on the overall strategies that will enable the organization to meet its goals. Subject to the approval of the CEO, the various business unit managers formulate additional strategies that will enable their respective units to

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further these goals. The management control process is the process by which managers at all levels ensure that the people they supervise implement their intended strategies.

Management Control Systems versus Simpler Control Processes

- Unlike in the thermostat or body temperature systems, *the standard is not preset*. Rather, it is a result of a conscious planning process. In this process, management decides what the organization should be doing and part of the control process is a comparison of actual accomplishments with these plans. Thus, the control process in an organization involves planning. Management control, however, involves both planning and control.

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- Like controlling an automobile, *management control is not automatic.*

Some detectors in an organization may be mechanical, but the manager often detects important information with her own eyes, ears and other senses. Although she may have routine ways of comparing certain reports of what is happening with standards of what should be happening, the manager must personally perform the assessor function, deciding for herself whether the difference between actual and standard performance is significant enough to warrant action, and if so, what action to take.

- Unlike controlling an automobile, a function performed by a single individual, *management control requires coordination among individuals.* An organization consists of many separate parts, and management control must ensure that each part works in harmony with the others, a need that exists only minimally in the case of the various organs that control body temperature and not all in the case of the thermostat.

- The connection for perceiving the need for action to determine the

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action required to obtain the desired result may not be clear.

- ***Much management control is self control;*** i.e., control is maintained not by an external regulating device like the thermostat, but by managers who are using their own judgement rather than following instructions from a superior.

3. Systems

System is a set of interacting or interdependent entities, real or abstract, forming an integrated whole.

The concept of an “integrated whole” can also be stated in terms of a system embodying a set of relationships which are differentiated from relationships of the set to other elements, and from relationships between an element of the set and elements not a part of the relational regime.

The scientific research field which is engaged in the study of the general properties of systems includes systems theory, systems science and systemic. They investigate the abstract properties of the matter and

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organization, searching concepts and principles which are independent of the specific domain, substance, type, or temporal scales of existence.

The term system may also refer to a set of rules that governs behavior or structure.

A system is a prescribed and usually repetitious way of carrying out an activity or a set of activities. Systems are characterized by a more or less rhythmic, coordinated, and recurring series of steps intended to accomplish a specified purpose. The thermostat and the body temperature control processes are examples of systems. Management control systems are far more complex and judgemental.

Most systems share the same common characteristics. These common characteristics include the following:

- Systems are abstractions of reality.
- Systems have structure which is defined by its parts and their composition.
- Systems have behaviour, which involves inputs, processing and outputs of material, information or energy.
- The various parts of a system have functional as well as structural relationships between each other.

Many management actions are unsystematic. Managers regularly encounter situations for which the rules are not well defined and thus must use their best judgement in deciding what actions to take. The effectiveness of their actions is determined by their skill in dealing with people, not by a rule

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specific to the system.

Boundaries of Management Control

Management control is distinguished from two other systems or activities that also require both planning and control: strategy formulation and task control. Management control fits between strategy formulation and task control in several respects. Strategy formulation is the least systematic

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of the three, task control is the most systematic, and management control lies in between. Strategy formulation focuses on the long run, task control focuses on short run activities, and management control is in between. Strategy formulation uses rough approximations of the future, task control uses current accurate data, and management control is in between.

Activity	Nature of End Product
Strategy Formulation	Goals, strategies, and policies
Management control	Implementation of strategies
Task control	Efficient and effective performance of individual tasks

General Relationships among Planning and Control Functions

Each activity involves both planning and control, but the emphasis varies with the type of activity. The planning process is much more important in strategy formulation, the control process is much more important in task control, and planning and control are of approximately equal importance in management control.

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1. Management Control			

Management control is the process by which managers influence other members of the organization to implement the organization's strategies.

i. Management Control Activities

Management control involves a variety of activities including

- Planning what the organization should do
- Coordinating the activities of several parts of the organization
- Communicating information

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- Evaluating information
- Deciding what, if any, action should be taken
- Influencing people to change their behaviour

ii. Conforming to a budget is not necessarily good, and departure from a budget is not necessarily bad.

Budgets or plans are based on circumstances believed to exist at the time they were formulated. If these circumstances have changed at the time of implementation, the actions dictated by the plan may no longer be appropriate. If a manager discovers a better approach - one more likely than the predetermined plan to achieve the organization's goals - the management control systems should not obstruct its implementation.

iii. Goal Congruence

Organizational goals explain how an organization intends to go about achieving its mission. For example, a car manufacturer might identify its mission as increasing market share and making a profit. Establishing goals of introducing a new model of car each year and providing the highest-quality spare parts to customers will enable it to achieve that

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mission.

Goal congruence means the goals of an organization's individual members should be consistent with the goals of the organization itself. The management control system should be designed and operated keeping in mind the principle of goal congruence.

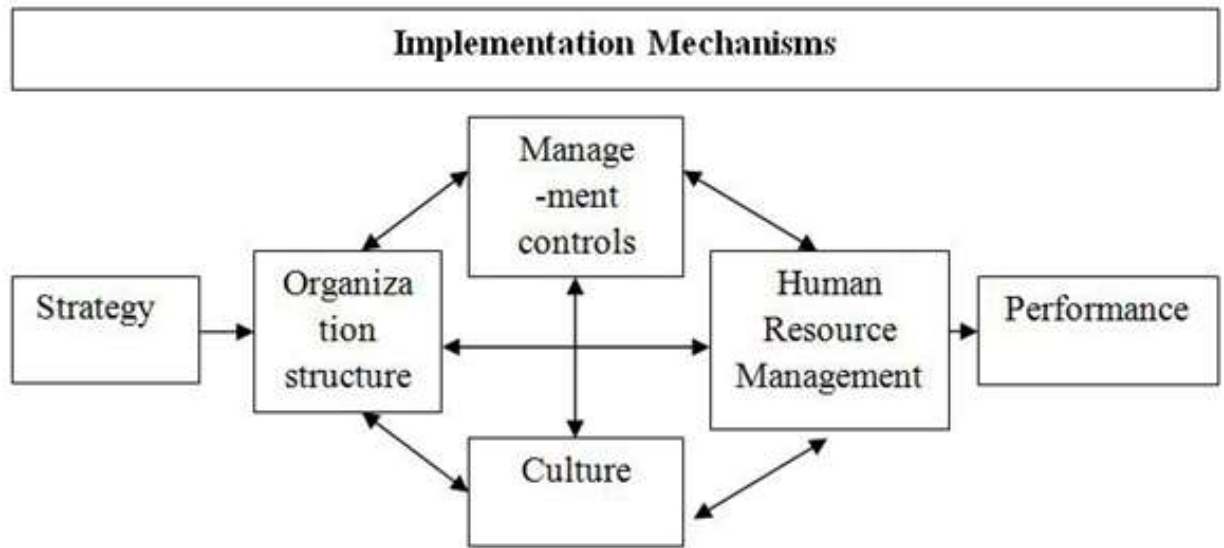
iv. Tool for Implementing Strategy

Management control systems help managers move an organization toward its strategic objectives. Therefore, management control focuses primarily on strategy execution.

Apart from management controls, strategies are also implemented through the organisation's structure, its management of human resources, and its particular culture. This is indicated in the following diagram.

Organizational structure: An organizational structure is a mostly hierarchical concept of subordination of entities that collaborate and contribute to serve one common aim.

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Framework for Strategy Implementation

Organizational structure allows the expressed allocation of responsibilities for different functions and processes to different entities. Ordinary description of such entities is as branch, site, department, work groups and single people. Contracting of individuals in an organizational structure normally is under timely limited work contracts or work orders or under timely unlimited *employment contracts or program orders*.

It specifies the roles, reporting relationships, and division of responsibilities that shape decision-making within an organization.

Human Resource Management (HRM): Human Resource

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Management is the strategic and coherent approach to the management of an organization's most valued assets - the people working there who individually and collectively contribute to the achievement of the objectives of the business. In simple sense, Human Resource Management means employing people, developing their resources, utilizing, maintaining and compensating their services in tune with the job and organizational requirement.

HRM is the selection, training, evaluation, promotion, and termination of employees so as to develop the knowledge and skills required to execute organisational strategy.

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Organizational Culture

Every organization has an unwritten culture that defines standards of acceptable and unacceptable behavior for employees. After a few months, most employees understand their organization's culture. They know things like how to dress for work, whether rules are rigidly enforced, what kinds of questionable behaviors are sure to get them into trouble and which are likely to be overlooked, the importance of honesty, integrity and the like. While many organizations have sub cultures - often created around the work groups - with an additional and modified set of standards, they still have dominant culture that conveys to all employees those values the organization holds dearest. Members of work groups have to accept the standards implied in the organization's dominant culture if they are to remain in good standing.

Organizational climate

Perhaps one of the most important and significant characteristics of a great workplace is its organizational climate. *Organizational climate*, while defined differently by many researchers and scholars, generally

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refers to the degree to which an organization focuses on and emphasizes:

- Innovation
- Flexibility
- Appreciation and recognition
- Concern for employee well-being
- Learning and development
- Citizenship and ethics
- Quality performance
- Involvement and empowerment ➤ Leadership

Organizational climate, manifested in a variety of human resource practices, is an important predictor of organizational success. Numerous studies have found positive relationships between positive organizational climates and various measures of organizational success, most notably for metrics such as sales, staff retention, productivity, customer satisfaction, and profitability

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v. Financial and Non-financial Emphasis

Management control systems encompass both financial and nonfinancial performance measures. The financial measures are focused on the monetary “bottom line” - net income, return on equity, etc. But all organizations have nonfinancial objectives - product quality, market share, customer satisfaction, on-time delivery, and employee morale.

vi. Aid in Developing New Strategies

In industries that are subject to rapid environmental changes, management control systems can also provide the basis for considering new strategies. This function, referred to as interactive control, draws management’s attention to both positive and negative developments - that indicate the need for new strategic initiatives. Interactive controls are an integral part of the management control system. This is illustrated below in diagram:

Today’s controls

Tomorrow’s strategy

Interactive Controls

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2. Strategy Planning & Formulation

Strategic planning is an organization's process of defining its strategy, or direction, and making decisions on allocating its resources to pursue this strategy, including its capital and people. Various business analysis techniques can be used in strategic planning, including SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) and PEST analysis (Political, Economic, Social, and Technological analysis) or STEER analysis involving Socio-cultural, Technological, Economic, Ecological, and Regulatory factors and EPISTEL (Environment, Political, Informatic, Social, Technological, Economic and Legal)

Strategic planning is the formal consideration of an organization's future course. All strategic planning deals with at least one of three key questions:

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1. “What do we do?”
2. “For whom do we do it?”
3. “How do we excel?”

In many organizations, this is viewed as a process for determining where an organization is going over the next year or more -typically 3 to 5 years, although some extend their vision to 20 years.

In order to determine where it is going, the organization needs to know exactly where it stands, then determine where it wants to go and how it will get there. The resulting document is called the “strategic plan”.

It is also true that strategic planning may be a tool for effectively plotting the direction of a company; however, strategic planning itself cannot foretell exactly how the market will evolve and what issues will surface in the coming days in order to plan your organizational strategy. Therefore, strategic innovation and tinkering with the ‘strategic plan’ have to be a cornerstone strategy for an organization to survive the turbulent business climate.

Strategy formulation is the process of deciding on the goals of the organization and the strategies for attaining these goals.

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Goals describe the broad overall aims of an organization and *objectives* describe specific steps to accomplish the goals within a given time frame.

Goals are timeless; they exist until they are changed, and they are changed only rarely. For many businesses, earning a satisfactory return on investment is an important goal; for others, attaining a large market share is equally important. Non-profit also have goals to provide maximum services possible with available funding. In the strategy formulation process, the goals of the organization are usually taken as given, although on occasion strategic thinking can focus on the goals themselves. Strategies are big plans, important plans. They state in a general way the direction in which senior management wants the organization to move. A decision by a automobile manufacturer to produce and sell an electric automobile would be a strategic decision.

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The need for formulating strategies usually arises in response to a perceived threat (e.g., a shift in customer tastes, or new government regulations, or market inroads by competitors) or opportunity (e.g., technological innovations, new perceptions of customer behaviour, or the development of new applications for existing products).

A new CEO usually perceives both threats and opportunities differently from how his predecessor did. So changes in strategies occur when a new CEO takes over.

Strategies to address a threat or opportunity can arise from anywhere in an organization and at any time. New ideas do not emanate solely from the R&D team or the head quarters staff. Anyone might come up with a bright idea, which after analysis and discussion can form the basis for a new strategy.

Complete responsibility for strategy formulation should never be assigned to a particular person or organizational unit.

3. Task Control

Task control is the process of ensuring that specified tasks are carried out effectively and efficiently. It is transaction-oriented i.e., it involves the performance of individual tasks according to rules established in the management control process. Task control often consists of seeing that these rules are followed, a function that in some cases does not even require the presence of human beings.

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Numerically controlled machine tools, process control computers, and robots are *mechanical task control devices*. Their function involves humans only when the latter proves less expensive or more reliable; this is likely to happen only if unusual events occur so frequently that programming a computer with rules for dealing with these events is not worthwhile.

Many task control *activities are scientific*; i.e., the optimal decision or the appropriate action for bringing an out-of-control condition back to the desired state is predictable within acceptable limits.

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For instance, the rules for economic order quantity determine the amount and timing of purchase orders. Task control is the focus of many management science and operations research techniques.

Most of the information in an organization is task control information: the number of items ordered by customers, the pounds of material and units of components used in the manufacture of products, the number of hours worked by employees, and the amount of cash disbursed. Many of an organization's central activities - including procurement, scheduling, order entry, logistics, quality control, and cash management - are task control systems.

The Four Paradigms of Control

The conceptual framework, around which the theme of controls is built, has four aspects to it, which are the four paradigms of control. This needs an understanding of the environment (both internal and external) in which an organization operates and its impact on the organization's control structure.

The four paradigms are

- Adaptability,
- Integration across organization,
- Optimal mix of control and coordination, and
- Reinforcing cooperative instincts.

The First Paradigm

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A control system is one that enables organizations to *adapt themselves to their environment*, know what they want and achieve it with optimal effort.

The prime purpose being effective adaptation to the environment, the acid test for their success is their ability to discover for themselves, the best strategies and instruments of control to achieve this task of adaptation. Therefore, the criteria should never be only to see that the lines of command are strict and rigid and that the central authority is in a position to enforce its command adequately.

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Example

The success of Indian IT and pharmaceutical firms is mainly due to their understanding of control systems. On the other hand, the great failure of the US aviation industry was due to its inability to adapt itself to the fast-changing consumer demands for this service. The expectations of the average air traveller rapidly changed. They were no longer hooked on to luxurious comfort and superb food. They were looking for cheap fares, easy process of booking on the internet and, of course, prompt and reliable service.

The Second Paradigm

Corporate Governance (Strategic Control) At board Level

Management Control at Senior Level

Process (Operational Control) at

Supervisory Level

Task or Transaction Control at the Grass-

Root Level

Span of Control

The integration of all activities of an organization is the second paradigm which is described in the diagram. The behaviour of top level is described as corporate governance, senior levels as management controls, supervisory levels as process or operational controls and grass root level as task controls.

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All levels are interdependent of each other and it is necessary that at all levels satisfactory controls are in place.

Example

'N', a multinational in the detergent industry, had positioned its product as a superior one with prices much higher than its competitors. Its dealers and sales force realized that this was shutting out many markets. This was conveyed to their board. They therefore decided that they should drastically cut down their prices; they cut them down almost 50%.this required them to drastically cut costs and they undertook a cost ascertainment exercise to pinpoint potential savings.

Among other things, they found that the size of the working capital should be cut down. They had targets for these cuts in costs and the

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organization watched the newly accepted norms of cost performance. Thus, the consumption rate of material, wastage, direct labour productivity and machine productivity had to be watched both in aggregate numbers and also as broken down into individual centres of responsibility. They also set up a quality control system to maintain the quality, which was in the danger of getting eroded in the newly found enthusiasm for cutting costs. This was all management control. The processes were streamlined. This was process control. The productivity of every individual was watched as also were the adherence to quality using statistical quality control techniques. This was task control. Thus the entire hierarchy from the top to the bottom was enabled to work together in congruence.

So the integration of the systems at the board level, the senior levels, operational levels and grass root levels have been emphasized in this paradigm.

The Third Paradigm

It deals with ***coordinating control systems*** with self-control and designing and implementing systems for controlling the not-so-sincere people. There is a traditional and modern approach to it.

The Single and Dual Approach

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Single focus is on the manner in which leaders could control the not-so-sincere people and systems. Whereas a dual focus is emerging in which it incorporates the need to encourage and build self-control in organizations. Just because no one is 'in control' does not mean that there is 'no control'. In fact, all healthy organizations have processes of control. However, they are distributed processes, not concentrated in any one authoritarian decision maker. We can imagine what would happen if the immune system had to wait for before releasing anti-bodies to fight an infection.

The above diagram shows two alternative paths for control, the single focus and the dual or multiple focuses. The image of the autocrat and policeman in the earlier focus and the emerging trends of empowerment in the altered paradigm of control systems have been invoked here.

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The two focus can be described in the following diagram

Single Paradigm	Focus	Revised Paradigm
Elitist control	Strategist in	Participative Operating Personnel in self-control
Strategic Plan		Strategic shifts requested
Strategic Implementation		Strategic control groups in coordination
Management		Agreed Plan to aid coordination

The New Paradigm of Dual Focus in Control Systems

According to the ideas of Harvard's Robert Simons, one may say that the single focus paradigm is supported by diagnostic systems, which monitor performance against targets and boundary systems of control which punish prohibited behaviour, and establish the revised paradigm supported by belief systems which are the universally accepted ethics of an organization and interactive systems of control which keep the grass roots and other levels constantly in touch with each other, usually informally. Both the paradigms co-exist in organizations.

Control	Controls optimally	Coordinate optimally
		Balanced coordination optimally
Further control		Suppress Coordination
Result		disaster

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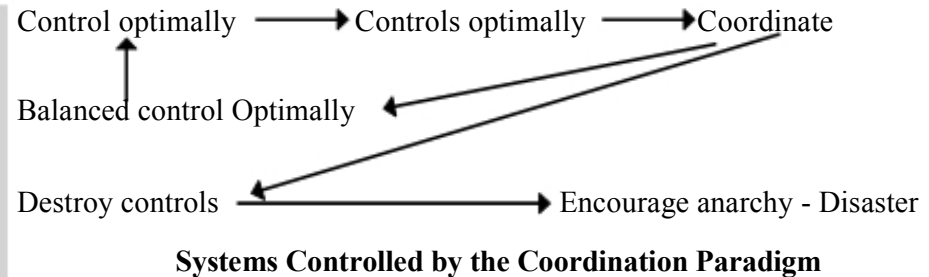
Optimal

path

Disaster path

Systems Controlled by the Control Paradigm

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The Fourth Paradigm

Simons makes very heroic assumptions about human beings that they want to contribute, achieve, innovate and work competently even if they do not have specific external inducements to be so. Systems designers for controls need, however, make sure that there are no organizational blocks to dissuade them to the contrary.

Human beings are quite capable of generating and implementing adaptive control strategies all by themselves, with mutual consultation without an overweening driving force from the top to make them fall in line and work for the organization. Vernon Smith, the Noble Laureate in Economics in the year 2002, calls it 'the ecological rationality arising from the social mind'.

The diagram needs an explanation.

1. The prime mover is the Decision Maker. It is implicitly presumed
that the decision maker is on the spot at the
interface with the
environment using its sensor.
2. Decision Makers have their goals.
3. The sensor gets the feedback from the environment.

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4. It forms a perception.

5. It checks the facts or factual premises.

6. It compares factual premises with the goals using the comparator

(an engineering term for devices to compare actual with expected).

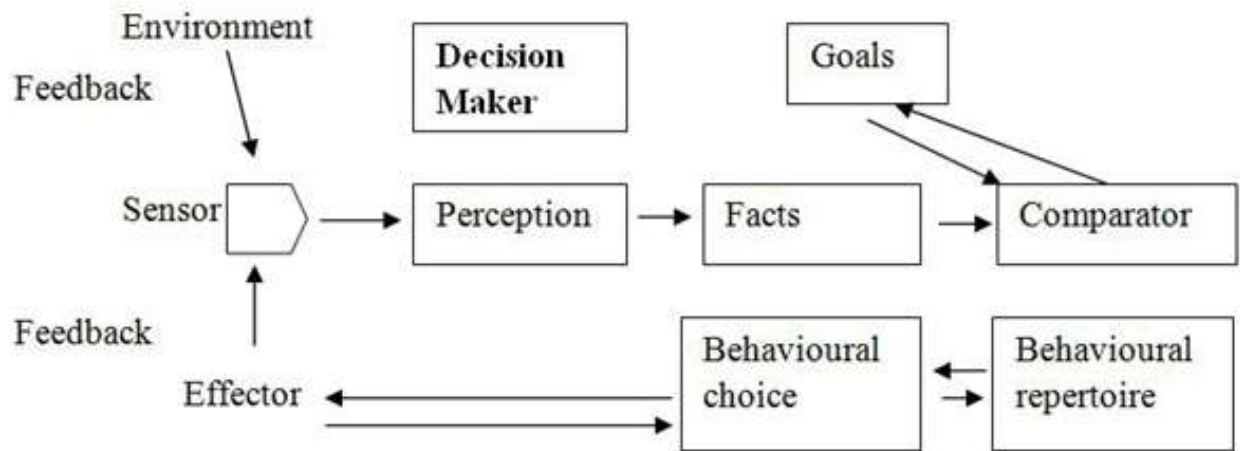
7. Decision maker may modify the goals through the effector, its agent.

8. It may also choose to modify behaviour.

9. It chooses one of the feasible behavioural alternatives from its repertoire.

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10. It effects the change through the effector which is its agent.
11. The effector checks back with the sensor.
12. The feedback loop goes on as the system evolves further and further.



The Cybernetic Paradigm in Control Systems

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Definition of Responsibility Accounting

“Responsibility Accounting collects and reports planned and actual accounting information about the inputs and outputs of responsibility centers”.

It is based on information pertaining to inputs and outputs. The resources utilized in an organization are physical in nature like quantities of materials consumed, hours of labour, etc., which are called inputs. They are converted into a common denominator and expressed in monetary terms called “costs”, for the purpose of managerial control. In a similar way, outputs are based on cost and revenue data.

Responsibility Accounting must be designed to suit the existing structure of the organization. Responsibility should be coupled with authority. An organization structure with clear assignment of authorities and responsibilities should exist for the successful functioning of the responsibility accounting system. The performance of each manager is evaluated in terms of such factors.

Responsibility Centres

The main focus of responsibility accounting lies on the responsibility centres. A responsibility centre is a sub unit of

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an organization under the control of a manager who is held responsible for the activities of that centre. The responsibility centres are classified as follows:-

- 1) Cost Centres,
- 2) Profit Centres and
- 3) Investment centres.

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Cost Centres

When the manager is held accountable only for costs incurred in a responsibility centre, it is called a cost centre. It is the inputs and not outputs that are measured in terms of money. A cost centre records only costs incurred by the centre/unit/division, but the revenues earned (output) are excluded from its purview. It means that a cost centre is a segment whose performance is measured in terms of cost without taking into consideration its attainments in terms of “output”. The costs are the data for planning and control of cost centers. The performance of the managers is evaluated by comparing the costs incurred with the budgeted costs. The management focuses on the cost variances for ensuring proper control.

A cost centre does not serve the purpose of measuring the performance of the responsibility centre, since it ignores the output (revenues) measured in terms of money. For example, common feature of production department is that there are usually multiple product units. There must be some common basis to aggregate the dissimilar products

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to arrive at the overall output of the responsibility centre. If this is not done, the efficiency and effectiveness of the responsibility centre cannot be measure.

Profit Centres

When the manager is held responsible for both Costs (inputs) and Revenues (output) it is called a profit centre. In a profit centre, both inputs and outputs are measured in terms of money. The difference between revenues and costs represents profit. The term “revenue” is used in a different sense altogether.

According to generally accepted principles of accounting, revenues are recognized only when sales are made to external customers. For evaluating the performance of a profit centre, the revenue represents a monetary measure of output arising from a profit centre during a given period, irrespective of whether the revenue is realized or not.

The relevant profit to facilitate the evaluation of performance of a profit centre is the pre-tax profit. The profit of all the departments

so calculated will not necessarily be equivalent to the profit of the entire organization. The variance will arise because costs which are not attributable to any single department are excluded from the computation of the department's profits and the same are adjusted while determining the profits of the whole organization.

Profit provides more effective appraisal of the manager's performance. The manager of the profit centre is highly motivated in his decision-making relating to inputs and outputs so that profits can be maximized. The profit centre approach cannot be uniformly applied to all responsibility centres. The following are the criteria to be considered for making a responsibility centre into a profit centre.

A profit centre must maintain additional record keeping to measure inputs and outputs in monetary terms. When a responsibility centre renders only services to other departments, e.g., internal audit, it cannot be made a profit centre.

A profit centre will gain more meaning and significance only when the divisional managers of responsibility centers have empowered adequately in their decision making relating to quality and quantity of outputs and also their relation to costs.

If the output of a division is fairly

homogeneous (e.g., cement), a profit centre will not prove to be more beneficial than a cost centre.

Due to intense competition prevailing among different profit centers, there will be continuous friction among the centers arresting the growth and expansion of the whole organization. A profit centre will generate too much of interest in the short-run profit which may be detrimental to the long-term results.

Investment Centers

When the manager is held responsible for costs and revenues as well as for the investment in assets, it is called an Investment Centre. In an investment centre, the performance is measured not by profits alone, but is involved with investments effected. The manager of an investment centre is always interested to earn a satisfactory return. The return on investment

is usually referred to as ROI that serves as a criterion for the performance evaluation of the manager of an investment centre. Investment centers may be considered as separate entities where the manager is entrusted with the overall responsibility of inputs, outputs and investment.

Part A (ONE Mark)

Multiple Choice Questions

Online Examination

Part B (2 Marks)

1. What is meant by responsibility centre?
2. Define ABC
3. Define reasonability accounting
4. Define reasonability centre
5. List out the different types of reasonability centre
6. Define management control system
7. What is meant by cost centre?
8. What is meant by profit centre?
9. What is meant by investment centre?
10. What is meant by resource centre?

PART C (8 Marks)

1. Explain the steps in management control system?
2. Describe the role of responsibility accounting in an organization?
3. Describe the importance of responsibility center with suitable illustration?
4. “Activity Based Costing is a best tool for controlling and reducing the cost” Comment
5. Describe the performance of responsibility centers with suitable example?
6. “Activity Based Costing identifies the activities that a firm performs” Comment
7. Explain the different types of responsibility centre with suitable illustration?

PART D (11 Marks)

1. “ABC system recognizes the relationship between costs, activities and products and it

assigns indirect costs to products” Describe this statement with suitable illustration?

2. . “Management Control system are the formal and informal structures applied in a business

to compare the goods and strategy of the organization against the actual outcome”

Elaborate

3. “Activity Based Costing is an accounting method that identifies the activities that a firm

performs” Comment

KARPAGAM ACADEMY OF HIGHER EDUCATION**DEPARTMENT OF MANAGEMENT****STRATEGIC COST MANAGEMENT (17MBAPF301B)****UNIT – III (20*1=20) MARKS Multiple choice Questions**

S. N O	Question	Option - I	Option - II	Option - III	Option - IV	Option - V	Option - VI	Answer
1	ABC -	Activity better costing	Activity based costing	Activity based control	Already better control			Activity based costing
2	ABC is a modern term used to for finding out -----	Cost	Profit	Loss	Revenue			Cost
3	----- focus is on activities as the fundamental cost objectives	Target cost	Transfer cost	ABC	Job cost			ABC
4	----- was activities as the basis for calculating the costs of goods and service	Target cost	Transfer cost	ABC	Job cost			ABC
5	----- attempts to absorb indirect over heads into product costs on a more realistic basis	Target cost	Transfer cost	ABC	Job cost			ABC
6	In a ----- system, direct costs are allocated to various products on the basis of use and indirect costs are allowed through cost centres	Traditional costing	ABC	Target costing	Transfer price			ABC
7	AMT -	Advanced manufacturing technology	Alternate manufacturing technology	Alternate modern technology	Advanced moderated technology			Advanced manufacturing technology
8	There are ----- components in ABC	4	5	3	2			4

9	The traditional system of classifying overheads into ----- ----- ways	4	5	3	2			2
10	The traditional system of identifying overheads into ----- ----- and ----- -----	Fixed and semi variable cost	Variable cost and semi variable cost	Fixed and Variable cost	Semi variable and fixed cost			Fixed and Variable cost
11	The first step in implementing ABC is -----	Identifying of functional areas	Identify the relevant activities	Collect accurate data on labour, materials and overhead costs	Allocate the common expenditure to various activities			Identifying of functional areas
12	The Second step in implementing ABC is -----	Identifying of functional areas	Identify the relevant activities	Collect accurate data on labour, materials and overhead costs	Allocate the common expenditure to various activities			Identify the relevant activities
13	The Third step in implementing ABC is -----	Identifying of functional areas	Identify the relevant activities	Collect accurate data on labour, materials and overhead costs	Allocate the common expenditure to various activities			Collect accurate data on labour, materials and overhead costs
14	The Fourth step in implementing ABC is -----	Identifying of functional areas	Identify the relevant activities	Collect accurate data on labour, materials and overhead costs	Allocate the common expenditure to various activities			Allocate the common expenditure to various activities
15	The Fifth step in implementing ABC is -----	Identifying of functional areas	Identify the relevant activities	Identify the most suitable cost drivers	Allocate the common expenditure to various activities			Identify the most suitable cost drivers

16	The Sixth step in implementing ABC is -----	Identifying of functional areas	Identify the relevant activities	Identify the most suitable cost drivers	Establish the demand made by particular products on activities			Establish the demand made by particular products on activities
17	The Seventh step in implementing ABC is -----	Identifying of functional areas	Identify the relevant activities	Identify the most suitable cost drivers	Absorb overhead expenses on the basis of cost drivers			Absorb overhead expenses on the basis of cost drivers
18	----- helps the organization in determination of cost	Activity based costing	Transfer price	Quality cost	Life cycle cost			Activity based costing
19	----- helps in improving the performance	Activity based costing	Transfer price	Quality cost	Life cycle cost			Activity based costing
20	----- helps in strategic decision	Activity based costing	Transfer price	Quality cost	Life cycle cost			Activity based costing
21	----- guides for make/buy decision	Activity based costing	Transfer price	Quality cost	Life cycle cost			Activity based costing
22	----- guides for rationalizing product mix	Activity based costing	Transfer price	Quality cost	Life cycle cost			Activity based costing
23	-----helps in formulating budget	Activity based costing	Transfer price	Quality cost	Life cycle cost			Activity based costing
24	-----helpful in target costing	Activity based costing	Transfer price	Quality cost	Life cycle cost			Activity based costing
25	----- system allows allocation of expense on the basis of activity and cost drivers	Activity based costing	Transfer price	Quality cost	Life cycle cost			Activity based costing
26	Management will take decision to manufacture/go for sub-contract will be -----	make/buy decision	Accept/reject decision	Capital rationalizing	Target costing			make/buy decision
27	----- will help in establishing a relationship	Target cost	ABC	Transfer price	Job costing			ABC

	between activities and indirect cost							
28	----- will help in identifying and eliminating the non value adding activities	Target cost	ABC	Transfer price	Job costing			ABC
29	In ----- , the relationship between activities and indirect cost will help in formulating proper budgets	Target cost	ABC	Transfer price	Job costing			ABC
30	----- is the first step in control process	Establishing standards	Appraising performance	Actual is compared with standards	Taking corrective action			Establishing standards
31	----- is the second step in control process	Establishing standards	Appraising performance	Actual is compared with standards	Taking corrective action			Appraising performance
32	----- is the third step in control process	Establishing standards	Appraising performance	Actual is compared with standards	Taking corrective action			Actual is compared with standards
33	----- is the fourth step in control process	Establishing standards	Appraising performance	Actual is compared with standards	Taking corrective action			Taking corrective action
34	----- can be defined as a systematic effort by management, to compare performance to predetermined standards	ABC	Transfer price	Target cost	Management control			Management control
35	----- is a process carried on within the framework elaborated by strategic planning	ABC	Transfer price	Target cost	Management control			Management control
36	----- is an extension of the corporate planning process	ABC	Transfer price	Target cost	Management control			Management control
37	Management control system has -	10	5	4	3			10

	----- principles							
38	----- is one of the principle of management control	Principl es of assuranc e of objectiv e	Principles of equality	Principles of liberty	Principles of justice			Principles of assurance of objective
39	----- is one of the principles of management control	Principl es of efficcenc y of control	Principles of equality	Principles of liberty	Principles of justice			Principles of efficiency of control
40	----- is one of the principles of management control	Principl es of control responsi bilities	Principles of equality	Principles of liberty	Principles of justice			Principles of control responsibili ties
41	----- is one of the principles of management control	Principl es of future controls	Principles of equality	Principles of liberty	Principles of justice			Principles of future controls
42	----- is one of the principles of management control	Principl es of direct control	Principles of equality	Principles of liberty	Principles of justice			Principles of direct control
43	----- is one of the principles of management control	Principl es of reflectio n of plans	Principles of equality	Principles of liberty	Principles of justice			Principles of reflection of plans
44	----- is one of the principles of management control	Principl es of organiza tional suitabilit y	Principles of equality	Principles of liberty	Principles of justice			Principles of organiza tional suitability
45	----- is one of the principles of management control	Principl es of individu ality of controls	Principles of equality	Principles of liberty	Principles of justice			Principles of individualit y of controls
46	----- is one of the principles of management control	Principl es of strategic point control	Principles of equality	Principles of liberty	Principles of justice			Principles of strategic point control
47	----- is one of the principles of management	The exceptio n	Principles of equality	Principles of liberty	Principles of justice			The exception principle

	control	principle						
48	----- is one of the principles of management control	Principles of flexibility of control	Principles of equality	Principles of liberty	Principles of justice			Principles of flexibility of control
49	----- is one of the principles of management control	Principles of action	Principles of equality	Principles of liberty	Principles of justice			Principles of action
50	----- is one of the principles of management control	Principles of review	Principles of equality	Principles of liberty	Principles of justice			Principles of review
51	----- involves a company's internal accounting and budgets	ABC	Job costing	Responsibility accounting	Cost accounting			Responsibility accounting
52	----- objective is to assist in the planning and control of a company's responsibility centres	ABC	Job costing	Responsibility accounting	Cost accounting			Responsibility accounting
53	----- usually involves the preparation of annual and monthly budget for each responsibility centre	ABC	Job costing	Responsibility accounting	Cost accounting			Responsibility accounting
54	The company's actual transactions are classified by ----	Responsibility centre	Responsibility accounting	ABC	Transfer price			Responsibility centre
55	----- allows the company and managers of a responsibility center to receive monthly feedback on the manager's performance	ABC	Job costing	Responsibility accounting	Cost accounting			Responsibility accounting
56	----- system is based upon information relating to inputs and outputs	ABC	Job costing	Responsibility accounting	Cost accounting			Responsibility accounting

57	----- is based on cost and revenue information	ABC	Job costing	Responsibility accounting	Cost accounting			Responsibility accounting
58	Effective ----- requires both planning and actual financial information	ABC	Job costing	Responsibility accounting	Cost accounting			Responsibility accounting
59	A----- is an organizational sub-unit such as department or division, whose manager is held accountable for the cost incurred in that division	Cost centre	Profit centre	Revenue centre	Investment centre			Cost centre
60	A ----- is held accountable for the revenue attributes to the sub-unit	Cost centre	Revenue centre	Profit centre	Investment centre			Revenue centre

UNIT-IV- Regression Analysis

SYLLABUS

Linear Programming and Regression Analysis - Implications of Linear Programming for Cost Accountants - Guidelines for Regression Analysis - Applications of Regression Analysis in Cost Functions.

REGRESSION ANALYSIS

What is regression? Regression is a statistical technique to determine the linear relationship between two or more variables. Regression is primarily used for prediction and causal inference. In its simplest (bivariate) form, regression shows the relationship between one independent variable (X) and a dependent variable (Y), as in the formula below:

The magnitude and direction of that relation are given by the slope parameter (1), and the status of the dependent variable when the independent variable is absent is given by the intercept parameter (0). An error term (u) captures the amount of variation not predicted by the slope and intercept terms. The regression coefficient (R^2) shows how well the values fit the data. Regression thus shows us how variation in one variable co-occurs with variation in another.

What regression cannot show is causation; causation is only demonstrated analytically, through substantive theory. For example, a regression with shoe size as an independent variable and foot size as a dependent variable would show a very high regression coefficient and highly significant parameter estimates, but we should not conclude that higher shoe size causes higher foot size. All that the mathematics can tell us is whether or not they are correlated, and if so, by how much.

It is important to recognize that regression analysis is fundamentally different from ascertaining the correlations among different variables. Correlation determines the strength of the relationship between variables, while regression attempts to describe that relationship between these variables in more detail. B. The linear regression model (LRM) The simple (or bivariate) LRM model is designed to study the relationship between a pair of variables that appear in a data set. The multiple LRM is designed to study the relationship between one variable and several of other variables. In both cases, the sample is considered a random sample from some population. The two variables, X and Y, are two measured outcomes for each observation in the data set.

In the pairs of observations, if there is a cause and effect relationship between the variables X and Y, then the average relationship between these two variables is called regression, which means “stepping back” or “return to the average”. The linear relationship giving the best mean value of a variable corresponding to the other variable is called a regression line or line of the best fit. The regression of X on Y is different from the regression of Y on X. Thus, there are two equations of regression and the two regression lines are given as follows:

Regression of Y on X:
$$Y - \bar{Y} = b_{yx}(X - \bar{X})$$

Regression of X on Y:
$$X - \bar{X} = b_{xy}(Y - \bar{Y})$$

Where \bar{X} , \bar{Y} are the means of X, Y respectively.

Result:

Let σ_x , σ_y denote the standard deviations of x, y respectively. We have the following result.

The coefficient of correlation r between X and Y is the square root of the product of the b values in the two regression equations.

Assumptions of the linear regression model

1. The proposed linear model is the correct model. Violations: Omitted variables, nonlinear effects of X on Y (e.g., area of circle = $\pi \times \text{radius}^2$)

2. The mean of the error term (i.e. the unobservable variable) does not depend on the observed X variables.

3. The error terms are uncorrelated with each other and exhibit constant variance that does not depend on the observed X variables. Violations: Variance increases as X or Y increases. Errors are positive or negative in bunches – called heteroskedasticity.

4. No independent variable exactly predicts another. Violations: Including monthly precipitation for 12 months, and annual precipitation in the same model.

5. Independent variables are either random or fixed in repeated sampling. If the five assumptions listed above are met, then the Gauss-Markov Theorem states that the Ordinary Least Squares regression estimator of the coefficients of the model is the Best Linear Unbiased Estimator of the effect of X on Y. Essentially this means that it is the most accurate estimate of the effect of X on Y.

Why do we use Regression Analysis?

As mentioned above, regression analysis estimates the relationship between two or more variables. Let's understand this with an easy example:

Let's say, you want to estimate growth in sales of a company based on current economic conditions. You have the recent company data which indicates that the growth in sales is around two and a half times the growth in the economy. Using this insight, we can predict future sales of the company based on current & past information.

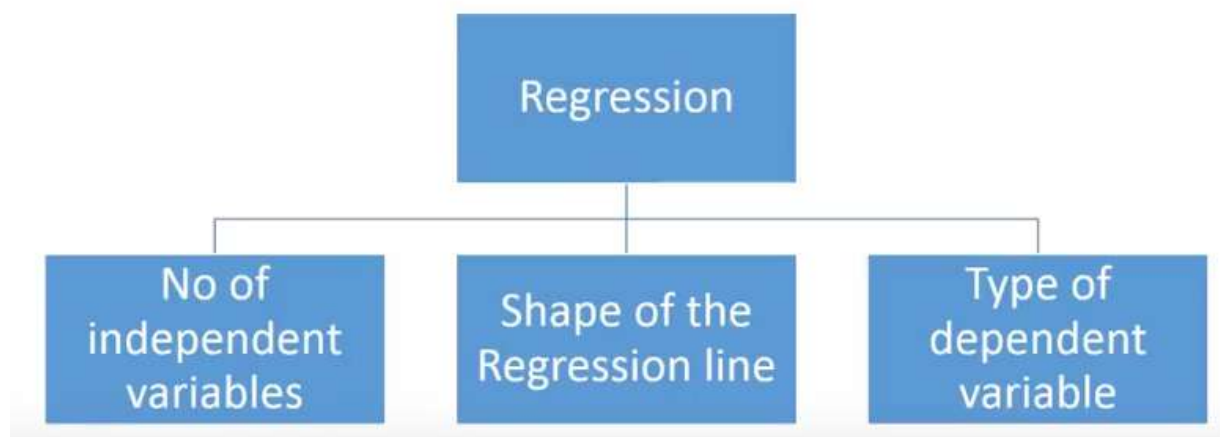
There are multiple benefits of using regression analysis. They are as follows:

1. It indicates the **significant relationships** between dependent variable and independent variable.
2. It indicates the **strength of impact** of multiple independent variables on a dependent variable.

Regression analysis also allows us to compare the effects of variables measured on different scales, such as the effect of price changes and the number of promotional activities. These benefits help market researchers / data analysts / data scientists to eliminate and evaluate the best set of variables to be used for building predictive models.

How many types of regression techniques do we have?

There are various kinds of regression techniques available to make predictions. These techniques are mostly driven by three metrics (number of independent variables, type of dependent variables and shape of regression line). We'll discuss them in detail in the following sections.



For the creative ones, you can even cook up new regressions, if you feel the need to use a combination of the parameters above, which people haven't used before. But before you start that, let us understand the most commonly used regressions:

Guidelines For Regression Analysis

(1) Get descriptive statistics of all variables, including mean, std, dev., min, max and a histogram. Get a "feeling" of the data first.

(2) Run scatter plots of all pairs of variables. The dependent variable y should be on the y -axis. Get a preliminary feel of what functional form the response variable y is related to the independent variables.

(3) Get a correlation matrix, check to see if some independent variables are highly correlated, and decide whether there's multicollinearity in the data

(4) Run a first order model and get the residual plot and histogram of the residuals.

(5) Run a second order model and repeat the same as (4).

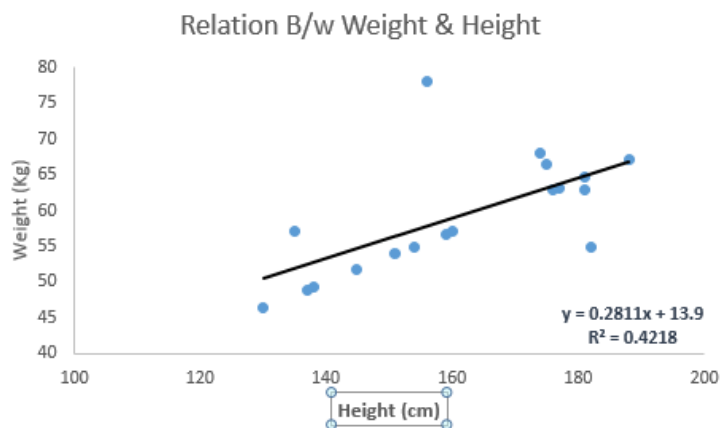
The following are general procedures for regression analysis with less than 10 variables. When there are more than 10 variables, we need to perform step wise selection to determine the most important variables.

Linear Regression

It is one of the most widely known modeling technique. Linear regression is usually among the first few topics which people pick while learning predictive modeling. In this technique, the dependent variable is continuous, independent variable(s) can be continuous or discrete, and nature of regression line is linear.

Linear Regression establishes a relationship between **dependent variable (Y)** and one or more **independent variables (X)** using a **best fit straight line** (also known as regression line).

It is represented by an equation $Y = a + b \cdot X + e$, where a is intercept, b is slope of the line and e is error term. This equation can be used to predict the value of target variable based on given predictor variable(s).

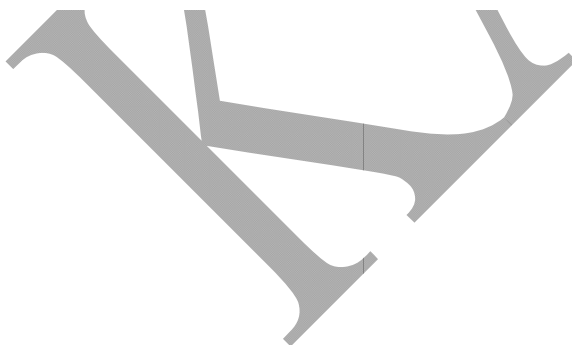


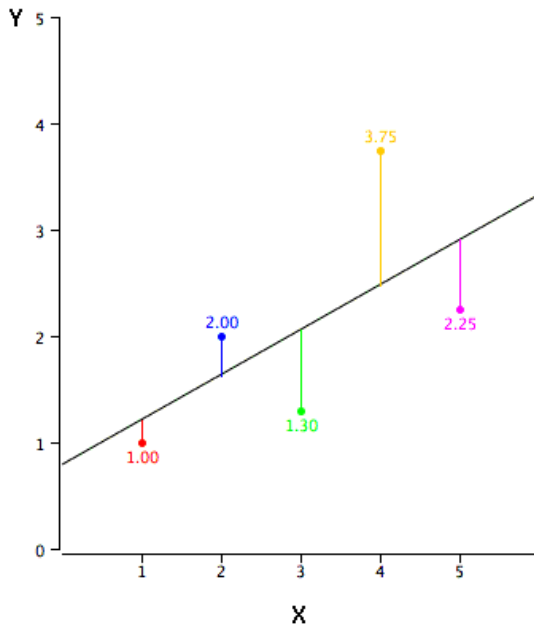
The difference between simple linear regression and multiple linear regression is that, multiple linear regression has (>1) independent variables, whereas simple linear regression has only 1 independent variable. Now, the question is “How do we obtain best fit line?”.

How to obtain best fit line (Value of a and b)?

This task can be easily accomplished by Least Square Method. It is the most common method used for fitting a regression line. It calculates the best-fit line for the observed data by minimizing the sum of the squares of the vertical deviations from each data point to the line. Because the deviations are first squared, when added, there is no cancelling out between positive and negative values.

$$\min_w ||Xw - y||_2^2$$





We can evaluate the model performance using the metric **R-square**. To know more details about these metrics, you can read: Model Performance metrics [Part 1](#), [Part 2](#).

Important Points:

- There must be **linear relationship** between independent and dependent variables
- Multiple regression suffers from **multicollinearity, autocorrelation, heteroskedasticity**.
- Linear Regression is very sensitive to **Outliers**. It can terribly affect the regression line and eventually the forecasted values.
- Multicollinearity can increase the variance of the coefficient estimates and make the estimates very sensitive to minor changes in the model. The result is that the coefficient estimates are unstable
- In case of multiple independent variables, we can go with **forward selection, backward elimination** and **step wise approach** for selection of most significant independent variables.

2. Logistic Regression

Logistic regression is used to find the probability of event=Success and event=Failure. We should use logistic regression when the dependent variable is binary (0/ 1, True/ False, Yes/ No) in nature. Here the value of Y ranges from 0 to 1 and it can be represented by following equation.

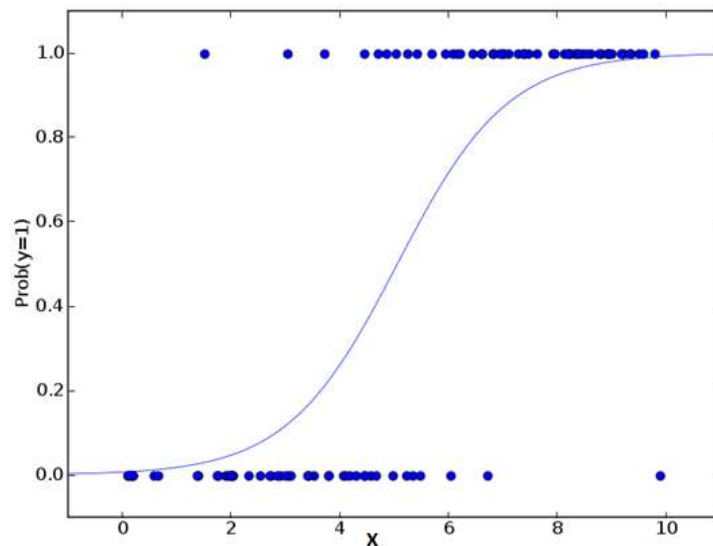
odds = $p / (1-p)$ = probability of event occurrence / probability of not event occurrence

$$\ln(\text{odds}) = \ln(p/(1-p))$$

$$\text{logit}(p) = \ln(p/(1-p)) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k$$

Above, p is the probability of presence of the characteristic of interest. A question that you should ask here is “why have we used log in the equation?”.

Since we are working here with a binomial distribution (dependent variable), we need to choose a link function which is best suited for this distribution. And, it is **logit** function. In the equation above, the parameters are chosen to maximize the likelihood of observing the sample values rather than minimizing the sum of squared errors (like in ordinary regression).



Important Points:

- It is widely used for **classification problems**
- Logistic regression doesn't require linear relationship between dependent and independent variables. It can handle various types of relationships because it applies a non-linear log transformation to the predicted odds ratio
- To avoid over fitting and under fitting, we should include all significant variables. A good approach to ensure this practice is to use a step wise method to estimate the logistic regression

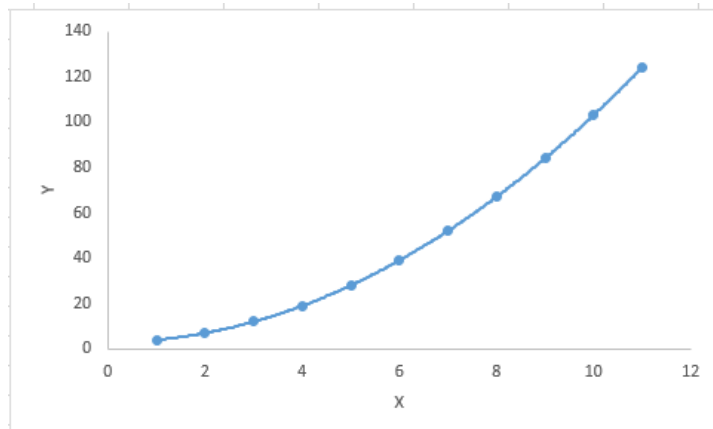
- It requires **large sample sizes** because maximum likelihood estimates are less powerful at low sample sizes than ordinary least square
- The independent variables should not be correlated with each other i.e. **no multi collinearity**. However, we have the options to include interaction effects of categorical variables in the analysis and in the model.
- If the values of dependent variable is ordinal, then it is called as **Ordinal logistic regression**
- If dependent variable is multi class then it is known as **Multinomial Logistic regression**.

3. Polynomial Regression

A regression equation is a polynomial regression equation if the power of independent variable is more than 1. The equation below represents a polynomial equation:

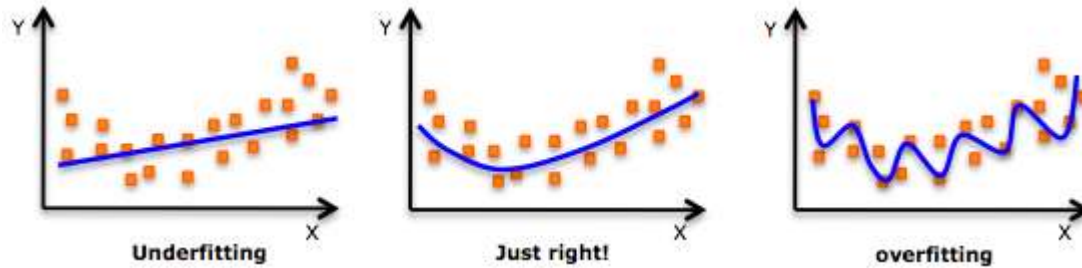
$$y=a+b*x^2$$

In this regression technique, the best fit line is not a straight line. It is rather a curve that fits into the data points.



Important Points:

- While there might be a temptation to fit a higher degree polynomial to get lower error, this can result in over-fitting. Always plot the relationships to see the fit and focus on making sure that the curve fits the nature of the problem. Here is an example of how plotting can help:



- Especially look out for curve towards the ends and see whether those shapes and trends make sense. Higher polynomials can end up producing wierd results on extrapolation.

4. Stepwise Regression

This form of regression is used when we deal with multiple independent variables. In this technique, the selection of independent variables is done with the help of an automatic process, which involves *no* human intervention.

This feat is achieved by observing statistical values like R-square, t-stats and AIC metric to discern significant variables. Stepwise regression basically fits the regression model by adding/dropping co-variates one at a time based on a specified criterion. Some of the most commonly used Stepwise regression methods are listed below:

- Standard stepwise regression does two things. It adds and removes predictors as needed for each step.
- Forward selection starts with most significant predictor in the model and adds variable for each step.
- Backward elimination starts with all predictors in the model and removes the least significant variable for each step.

The aim of this modeling technique is to maximize the prediction power with minimum number of predictor variables. It is one of the method to handle higher dimensionality of data set.

5. Ridge Regression

Ridge Regression is a technique used when the data suffers from multicollinearity (independent variables are highly correlated). In multicollinearity, even though the least squares estimates (OLS)

are unbiased, their variances are large which deviates the observed value far from the true value. By adding a degree of bias to the regression estimates, ridge regression reduces the standard errors.

Above, we saw the equation for linear regression. Remember? It can be represented as:

$$y = a + b \cdot x$$

This equation also has an error term. The complete equation becomes:

$y = a + b \cdot x + e$ (error term), [error term is the value needed to correct for a prediction error between the observed and predicted value]

$\Rightarrow y = a + y = a + b_1x_1 + b_2x_2 + \dots + e$, for multiple independent variables.

In a linear equation, prediction errors can be decomposed into two sub components. First is due to the **biased** and second is due to the **variance**. Prediction error can occur due to any one of these two or both components. Here, we'll discuss about the error caused due to variance.

Ridge regression solves the multicollinearity problem through shrinkage parameter λ (lambda). Look at the equation below.

$$= \underset{\beta \in \mathbb{R}^p}{\operatorname{argmin}} \underbrace{\|y - X\beta\|_2^2}_{\text{Loss}} + \lambda \underbrace{\|\beta\|_2^2}_{\text{Penalty}}$$

In this equation, we have two components. First one is least square term and other one is lambda of the summation of β^2 (beta-square) where β is the coefficient. This is added to least square term in order to shrink the parameter to have a very low variance.

Important Points:

- The assumptions of this regression is same as least squared regression except normality is not to be assumed
- It shrinks the value of coefficients but doesn't reaches zero, which suggests no feature selection feature

- This is a regularization method and uses l2 regularization.

6. Lasso Regression

Similar to Ridge Regression, Lasso (Least Absolute Shrinkage and Selection Operator) also penalizes the absolute size of the regression coefficients. In addition, it is capable of reducing the variability and improving the accuracy of linear regression models. Look at the equation

$$= \underset{\beta \in \mathbb{R}^p}{\operatorname{argmin}} \underbrace{\|y - X\beta\|_2^2}_{\text{Loss}} + \lambda \underbrace{\|\beta\|_1}_{\text{Penalty}}$$

below:

Lasso regression differs from ridge regression in a way that it uses absolute values in the penalty function, instead of squares. This leads to penalizing (or equivalently constraining the sum of the absolute values of the estimates) values which causes some of the parameter estimates to turn out exactly zero. Larger the penalty applied, further the estimates get shrunk towards absolute zero. This results to variable selection out of given n variables.

Important Points:

- The assumptions of this regression is same as least squared regression except normality is not to be assumed
- It shrinks coefficients to zero (exactly zero), which certainly helps in feature selection
- This is a regularization method and uses l1 regularization
- If group of predictors are highly correlated, lasso picks only one of them and shrinks the others to zero

7. ElasticNet Regression

ElasticNet is hybrid of Lasso and Ridge Regression techniques. It is trained with L1 and L2 prior as regularizer. Elastic-net is useful when there are multiple features which are correlated. Lasso is likely to pick one of these at random, while elastic-net is likely to pick both.

$$\hat{\beta} = \underset{\beta}{\operatorname{argmin}} (\|y - X\beta\|_2^2 + \lambda_2 \|\beta\|_2^2 + \lambda_1 \|\beta\|_1).$$

A practical advantage of trading-off between Lasso and Ridge is that, it allows Elastic-Net to inherit some of Ridge's stability under rotation.

Important Points:

- It encourages group effect in case of highly correlated variables
- There are no limitations on the number of selected variables
- It can suffer with double shrinkage

Beyond these 7 most commonly used regression techniques, you can also look at other models like Bayesian, Ecological and Robust regression.

How to select the right regression model?

Life is usually simple, when you know only one or two techniques. One of the training institutes I know of tells their students – if the outcome is continuous – apply linear regression. If it is binary – use logistic regression! However, higher the number of options available at our disposal, more difficult it becomes to choose the right one. A similar case happens with regression models.

Within multiple types of regression models, it is important to choose the best suited technique based on type of independent and dependent variables, dimensionality in the data and other essential characteristics of the data. Below are the key factors that you should practice to select the right regression model:

1. Data exploration is an inevitable part of building predictive model. It should be your first step before selecting the right model like identify the relationship and impact of variables
2. To compare the goodness of fit for different models, we can analyse different metrics like statistical significance of parameters, R-square, Adjusted r-square, AIC, BIC and error term. Another one is the Mallow's Cp criterion. This essentially checks for possible bias in your model, by comparing the model with all possible submodels (or a careful selection of them).
3. Cross-validation is the best way to evaluate models used for prediction. Here you divide your data set into two groups (train and validate). A simple mean squared difference between the observed and predicted values gives you a measure for the prediction accuracy.
4. If your data set has multiple confounding variables, you should not choose automatic model selection method because you do not want to put these in a model at the same time.
5. It'll also depend on your objective. It can occur that a less powerful model is easy to implement as compared to a highly statistically significant model.
6. Regression regularization methods (Lasso, Ridge and ElasticNet) work well in case of high dimensionality and multicollinearity among the variables

PRINCIPLE OF LEAST SQUARES

Let x , y be two variables under consideration. Out of them, let x be an independent variable and let y be a dependent variable, depending on x . We desire to build a functional relationship between them. For this purpose, the first and foremost requirement is that x , y have a high degree of correlation. If the correlation coefficient between x and y is moderate or less, we shall not go ahead with the task of fitting a functional relationship between them.

Suppose there is a high degree of correlation (positive or negative) between x and y . Suppose it is required to build a linear relationship between them i.e., we want a regression of y on x .

Geometrically speaking, if we plot the corresponding values of x and y in a 2-dimensional plane and join such points, we shall obtain a straight line. However, hardly we can expect all the pairs (x, y) to lie on a straight line. We can consider several straight lines which are, to some extent, near all the points (x, y) . Consider one line. An observation (x_1, y_1) may be either above the line of consideration or below the line. Project this point on the x -axis. It will meet the straight line at the point (x_1, y_{1e}) . Here the theoretical value (or the expected value) of the variable is y_{1e} while the observed value is y_1 . When there is a difference between the expected and observed values, there appears an error. This error is $E_1 = y_1 - y_{1e}$. This is positive if (x_1, y_1) is a point above the line and negative if (x_1, y_1) is a point below the line. For the n pairs of observations, we have the following n quantities of error:

$$E_1 = y_1 - y_{1e} ,$$

$$E_2 = y_2 - y_{2e} ,$$

$$E_n = y_n - \hat{y}_n$$

Some of these quantities are positive while the remaining ones are negative. However, the squares of all these quantities are positive.

Normal equations

Suppose we have to fit a straight line to the n pairs of observations $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$. Suppose the equation of straight line finally comes as

$$Y = a + bX \quad (1)$$

Where

a, b are constants to be determined. Mathematically speaking, when we require finding the equation of a straight line, two distinct points on the straight line are sufficient. However, a different approach is followed here. We want to include all the observations in our attempt to build a straight line. Then all the n observed points (x, y) are required to satisfy the relation

(1). Consider the summation of all such terms. We get

$$\sum y = \sum (a + b x) = \sum (a \cdot 1 + b x) = (\sum a \cdot 1) + (\sum b x) = a (\sum 1) + b (\sum x).$$

i.e.

$$\sum y = an + b (\sum x) \quad (2)$$

To find two quantities a and b , we require two equations. We have obtained one equation i.e., (2). We need one more equation. For this purpose, multiply both sides of (1) by

x . We obtain

$$xy = ax + bx^2$$

Consider the summation of all such terms. We get

$$\sum xy = \sum (ax + bx^2) = (\sum ax) + (\sum bx^2)$$

i.e.,

$$\sum xy = a(\sum x) + b(\sum x^2) \dots\dots\dots (3)$$

Equations (2) and (3) are referred to as the normal equations associated with the regression of y on x. Solving these two equations, we obtain

For calculating the coefficient of correlation,

we require $\sum X, \sum Y, \sum XY, \sum X^2, \sum Y^2$.

Next, if we consider the regression line of x on y, we get the equation $X = a + b y$. The expressions for the coefficients can be got by interchanging the roles of X and Y in the previous discussion.

Applications of linear programming for solving business problems:

1. Production Management:

LP is applied for determining the optimal allocation of such resources as materials, machines, manpower, etc. by a firm. It is used to determine the optimal product- mix of the firm to maximize its revenue. It is also used for product smoothing and assembly line balancing.

2. Personnel Management:

LP technique enables the personnel manager to solve problems relating to recruitment, selection, training, and deployment of manpower to different departments of the firm. It is also used to determine the minimum number of employees required in various shifts to meet production schedule within a time schedule.

3. Inventory Management:

A firm is faced with the problem of inventory management of raw materials and finished products. The objective function in inventory management is to minimise inventory cost and the constraints are space and demand for the product. LP technique is used to solve this problem.

4. Marketing Management:

LP technique enables the marketing manager in analysing the audience coverage of advertising based on the available media, given the advertising budget as the constraint. It also helps the sales executive of a firm in finding the shortest route for his tour. With its use, the marketing manager determines the optimal distribution schedule for transporting the product from different warehouses to various market locations in such a manner that the total transport cost is the minimum.

5. Financial Management:**ADVERTISEMENTS:**

The financial manager of a firm, mutual fund, insurance company, bank, etc. uses the LP technique for the selection of investment portfolio of shares, bonds, etc. so as to maximise return on investment.

6. Blending Problem:

LP technique is also applicable to blending problem when a final product is produced by mixing a variety of raw materials. The blending problems arise in animal feed, diet problems, petroleum products, chemical products, etc. In all such cases, with raw materials and other inputs as constraints, the objective function is to minimise the cost of final product.

Examples of Practical Applications of Regression Analysis

The discussion thus far is intended to provide non-practitioners a brief introduction to regression analysis. We now introduce some practical applications of regression analysis in the litigation context.

Specifically, we provide an overview of (A) the role of regression analysis in estimating price elasticity of demand in antitrust and intellectual property matters,

(B) use of regression -9- analysis to conduct event studies designed to estimate the impact of specific events on the value of a firm,

(C) the application of regression analysis to cost estimation in damages studies, and

(D) applications of regression analysis in labor and employment disputes. A. Price Elasticity of Demand Demand refers to the quantity of a good or service consumers purchase at prevailing prices. Increases in the prevailing price of a good tend to result in reduced sales volume because some consumers will choose alternative products or refrain altogether from making a purchase as price increases. Conversely, decreases in the prevailing price tend to result in sales volume increases.

The term price elasticity of demand refers to the extent to which sales volume is affected by price changes. Own-price elasticity of demand measures the responsiveness of the quantity of a good demanded to changes in its price. Demand is said to be elastic if quantity demanded is highly sensitive to changes in price, and inelastic if price changes have little impact on quantity demanded. Cross-price elasticity of demand measures the responsiveness of quantity demanded for one good to changes in the price of another good. Own-price elasticity of demand is negative since price increases lead to decreases in quantity demanded.

This elasticity commonly is reported in terms of absolute value, however, and the negative sign can be assumed. Cross-price elasticity of demand can be positive or negative depending upon whether the goods are substitutes (positive cross-price elasticity) or compliments (negative cross-price elasticity). Together, own- and cross-price elasticity summarize anticipated substitution patterns among consumers faced with changes in price. The concept of price elasticity of demand has been widely used in litigation, notably in assessing potential anticompetitive effects of mergers. Own- and cross-price elasticity are routinely used to define relevant antitrust markets, assess market power,

and -10- simulate price increases resulting from mergers before they are consummated. Use of price elasticity of demand also has emerged in patent infringement litigation, particularly in cases where price erosion is alleged to have occurred. An assessment of price erosion involves estimating the price that would have prevailed but for the infringement and then determining the amount of sales the patent owner would have made at that price. Although a patent owner may have been able to charge a higher price in the absence of the infringement, its sales might have been lower depending upon the price elasticity of demand. Measures of price elasticity of demand commonly are derived by estimating one or more demand curves using regression analysis. Economic theory suggests the quantity of a good demanded depends upon its price, the price of substitutes and complements, and income, among other possible factors. In practice, data limitations may dictate which variables are included in a regression analysis, but the potential for omitted variable bias also should be considered when specifying models.

Suppose we have monthly data on the quantity of goods sold (and) and corresponding price data (and) for two substitute goods. We also have monthly income data (I) for consumers that purchase the goods. We can estimate the following linear demand equations using regression analysis. We use a linear demand model in this example for simplicity. Economic theory does not dictate an exact functional relationship between quantity demanded and the variables that impact demand. The properties of a specific functional form may lead the researcher to believe it superior for a given situation, but the choice is often somewhat arbitrary. If sufficient data are available, a variety of functional forms might be estimated to assess the sensitivity of the results to the choice of functional form. This -11- practice may lend credibility to the results if they are shown to be insensitive to the choice of functional form. Results that are extremely sensitive to functional form may prove difficult to defend. Price elasticity for both goods can readily be estimated using the estimated coefficients from the linear demand model. Own-price elasticity is equal to the “first partial derivative” of the

demand equation with respect to price times price divided by quantity. In other words, own-price elasticity of demand is equal to the coefficient for the price variable multiplied by price which is divided by quantity. Cross-price elasticity of demand is calculated as the coefficient for the price of the other good multiplied by the price of the other good divided by quantity. Price elasticity estimates can prove useful in the litigation context, particularly in cases where the interplay between price and quantity is an issue. In antitrust litigation, for example, elasticity and cross-price elasticity are often used to delineate relevant markets. Firms are likely to be grouped in the same market if the products they produce can be used interchangeably and where the products exhibit a high cross-price elasticity of demand. In cases where price allegedly would have been higher (or lower) in the absence of some conduct, elasticity estimates can be used to show the impact of that but-for price on quantity demanded. -12- B. Event Study Analysis Event studies measure the impact of specific events on the value of firms.

There are many useful applications for event studies in litigation settings. For example, event studies are commonly used to estimate the impact of adverse information on movements in share prices in matters of alleged securities fraud. They also can provide insight into damages resulting from events such as product recalls, the loss of patent protection, credit facility constraints, and fraud. The basic premise underlying an event study analysis is that given rational market participants, security prices will quickly adjust to reflect the announcement of an event. Roughly speaking, security price changes are attributable to company-specific information (such as the announcement of a new product) and industry or market-wide information (such as new regulation or changes in interest rates). Event study analysis provides a framework for isolating the impact of company-specific events on security prices. The total impact of an event can then be estimated by summing the company-specific impact across all of shares affected. The first step in undertaking an event study

analysis involves the identification of the event or events of interest. In the litigation context, the events of interest often are dictated by allegations in the complaint.

Suppose, for example, that a publicly traded earlystage pharmaceutical company alleges that clinical trials for a potential new therapeutic drug were unsuccessful as a result of a failure on the part of its development partner to design a proper test protocol. In this example, the event of interest is the public announcement that the clinical trials were unsuccessful. After the event of interest has been identified, it is necessary to determine the period of time over which the impact will be measured. This is called the event window.

In practice, the event window typically is defined to include at least the day on which the event was announced and the following business day. Depending upon the circumstances, the event window may commence before the event is announced (e.g., if there is reason to believe that news of the event leaked before the official -13- announcement) and end days after the event is announced (e.g., if there is reason to believe that some market participants did not immediately learn of the event at the time it was announced).

The event window ideally will be long enough to include any ongoing adjustment to news of the event in the market, but not so long as to capture effects of unrelated subsequent events. A primary objective of event study analysis is to isolate the impact of the event in question from market-wide and industry-wide information that also impacts securities prices. The following model is often used in this context: where the security return on day t for the company of interest; the market index return on day t ; the intercept coefficient; the market index coefficient; and a disturbance term reflecting other factors that influence the security return for the company of interest.

Historical stock price data for the company in question are collected and daily returns are calculated. Market index data also are collected. This market index may be a widely available index such as the Standard and Poor's 500 or a custom index that includes peers of the company of interest. Returning to our earlystage pharmaceutical company example, a useful market index might be constructed to include other publicly traded early-stage companies involved in clinical trials for potential new therapeutics. -14- Regression analysis is employed to obtain estimates for and . The results of the regression analysis are then used to calculate the predicted security return, for each day in the event window.

The predicted security return is essentially an estimate -15- C. Cost Estimation in Damages Studies In many cases, lost profits damages are calculated as the difference between profits that would have been generated but for some alleged conduct, such as a breach of contract, and actual profits generated given the conduct. Estimating but-for profits requires an understanding of the costs involved, and in particular those costs that were not incurred given the alleged conduct but would have been incurred in the absence of the alleged conduct. These costs are sometimes referred to as avoided costs.

The estimation of avoided costs often requires an understanding of the distinction between those cost elements that are fixed and those that are variable. Fixed costs do not vary with levels of output. Costs that frequently are fixed over moderate changes in output include rent, insurance premiums, business license fees, and salaries for permanent full time employees. Variable costs are those that vary directly with the level of output. Depending upon the nature of the business, variable costs may include cost of goods sold, shipping charges, royalties, and sales commissions, among others. Certain costs cannot be classified as strictly fixed or variable. These semi-variable costs include a mixture of fixed and variable components. Common examples of semi-variable costs include

production labor (regular wages are fixed but overtime is variable), electricity, telephone bills, and postage.

An important consideration when assessing the nature of costs is that cost elements can be fixed over certain levels of output and variable over other levels of output. To illustrate this point, suppose a manufacturer has the capacity to increase production by ten percent without expanding its plant, but any increase in production above ten percent would require an expansion. In this example, the rent associated with the plant is fixed over relatively small increases in output. Increasing output by more than ten percent, however, would require an expansion of the plant and the payment of additional rent.

In other words, rent is a variable cost in this example over large increases in output. Discussions with company management and accounting personnel can be helpful in understanding the fixed or variable nature of costs. Depending upon the availability of data, regression analysis may provide additional insight. Regression analysis provides a means to examine and quantify relationships among variables.

In the case of cost estimation, a common inquiry is “what is the relationship between changes in output and the cost of production?” Assuming sufficient data are available, the following model might be estimated to address this question: where = cost of production during period t ; = production during period t ; = the intercept coefficient; = the production coefficient; and = a disturbance term reflecting other factors that influence the cost of production.³ The coefficient is interpreted as the cost of production when output falls to zero units. In other words, it provides an indication of the fixed cost of production.

The coefficient is interpreted as the cost of production for one additional unit of output. That is, it provides an indication of the variable cost of production. Together, 3 Depending upon the situation, model specification might be more complicated in practice. Decisions concerning the variables to include, functional form, and data aggregation are driven by the specific facts and circumstances of the investigation. -17- these coefficients can be used to estimate the total cost of production for a given level of output. In our example, the regression results might be used to calculate profit but for the alleged conduct: Profit Sales Price . Subtracting actual profits from but-for profits would yield an estimate of profits lost as a result of the alleged conduct. D. Labor and Employment Litigation Almost all employers face federal nondiscrimination requirements, and most states also have enacted employment laws specifically dealing with discrimination. These federal and state laws are intended to ensure that employers base employment practices (e.g., hiring, promotion, termination, discipline, compensation) on objective and fair measures, such as performance and merit. Employment discrimination allegations often charge employers with engaging in discrimination against a member or members of a protected class (legally protected characteristics include race, gender, ethnicity, national origin, religion, age, and disability). These allegations require plaintiffs to demonstrate that a pattern or practice of discrimination exists. Statistical analysis is commonly used to analyze such allegations.

Various statistical tests can be performed utilizing human resources, payroll, and other business data. Regression analysis can also be employed to identify patterns in data that reflect employment decisions. Regression analysis may be viewed as a tool that quantifies the relationship between a decision variable and other independent factors. For example, suppose a company faces an employment discrimination matter in which plaintiffs allege that women are being discriminated against in terms of base pay. The hypothesis we would want to test with regression analysis is that gender is not a significant factor in determining the base salary level of employees.

The following multiple regression model could be estimated: $-18-$ where base salary for employee n ; characteristics of employee n ; gender of employee n ; the intercept coefficient; the employee characteristics coefficients; the gender coefficient; and a disturbance term reflecting other factors that influence base salaries. This model is referred to as a multiple regression model since multiple explanatory variables are considered. In our example, the dependent variable is base salary and the independent variables are various characteristics of employees that might influence base salary and for which data are available.

The employer might contend that the following employee characteristics are important determinants of base salary, and as such should be included in the regression model: education, prior experience, tenure, special skills, department, and geographic region. To test the hypothesis that base salary for women is not different than the base salary for men after controlling for all of these factors, the regression model would also include a variable that reflects the gender of the employee, which is depicted in our model as G . The constant term, β_0 , is interpreted as the average base salary paid to a man who has a zero value in each independent variable (e.g., no education, no prior experience, and no tenure). The coefficients and measure the influence of the independent variables on base salary.

Estimates of these coefficients are referred to as unbiased estimates of the influence of the independent variables on the dependent variable if the variables are independent of each other, no - 19- important variables have been omitted, base salary is normally distributed, and other assumptions underlying the method of ordinary least squares hold. The difference between average base salary for men and women is estimated by the coefficient β_1 . If this coefficient is statistically significant (i.e., it has a t-statistic of more than 1.96 assuming a five percent level of statistical significance), the difference between the base salary for men and women is said to be statistically significant after accounting for other factors included in the regression model. Assuming the

regression model controls for factors influencing pay, this result would prompt us to reject the hypothesis that gender is not a significant factor in determining base salary.

Given the widespread availability of computing power and sophisticated computer software, it is possible to generate a wealth of information useful for identifying and examining outliers, testing the robustness of models, and analyzing the sensitivity of results to assumptions made. For instance, significant outliers are often examined to further evaluate the quality of the model and data.

Using the base salary example provided above, data pertaining to employees that are identified as statistically significant positive or negative outliers (i.e., employees whose actual base salary is significantly higher or lower than their predicted base salary), could be reviewed to identify potential anomalies in the data. Conclusion Implementing regression analysis requires an appreciation for the statistical underpinnings of the analysis along with a well-designed model that is founded in theory. When used properly, regression analysis is a powerful tool with many practical applications in litigation.

Part A (ONE Mark)

**Multiple Choice Questions
Online Examination**

Part B (2 Marks)

1. Define Regression
2. Write any two uses of regression analysis?
3. What is meant by linear programming?
4. Define Linear programming
5. Write the uses of linear programming for minimizing cost?

PART C (8 Marks)

1. Describe the application of linear programming for solving business problems?

2. “Regression analysis is a statistical process for estimating the relationships among variables”

Comment

3. Explain the steps of the graphical methods to obtain an optimal solution in a linear programming?

4. . Describe the role of regression analysis in cost function?

5. Discuss the application of regression analysis in cost function?

Part D (11 Marks)

1. “Linear programming is a mathematical technique for maximizing or minimizing output or cost” Comment

2. Explain the steps of the graphical methods to obtain an optimal solution to a linear programming?

3 . Discuss the application of regression analysis in cost function?

4. Explain the managerial uses of correlation analysis and regression analysis.

5. A furniture store produces beds and desks for college students. The production process requires assembly and painting. Each bed requires 6 hours of assembly and 4 hours of painting. Each desk requires 4 hours of assembly and 8 hours of painting. There are 40 hours of assembly time and 45 hours of painting time available each week. Each bed generates Rs.35 of profit and each desk generates Rs.45 of profit. As a result of a labor strike, the furniture store a the situation as a linear programming problem, which can determine number beds and desks should be produced each week to maximize weekly profits.

KARPAGAM ACADEMY OF HIGHER EDUCATION**DEPARTMENT OF MANAGEMENT****STRATEGIC COST MANAGEMENT (17MBAPF301B)****UNIT – IV (20*1=20) MARKS Multiple choice Questions**

S. NO	Question	Option - I	Option - II	Option - III	Option - IV	Option - V	Option - VI	Answer
1	_____ will represents the average relationship between variables	Regression Analysis	Correlation Analysis	LPP	Standard Deviation			Regression Analysis
2	If $r = +1$, then the relationship between the given two variables is.....	Perfectly positive	Perfectly negative	No correlation	High positive			Perfectly positive
3	If $r = -1$, then the relationship between the given two variables is.....	Perfectly positive	Perfectly negative	No correlation	Low Positive			Perfectly negative
4	If $r = 0$, then the relationship between the given two variables is.....	Perfectly positive	Perfectly negative	No correlation	Both positive and negative			No correlation
5	If $r = 0$, then the angle between two lines of regression is.....	Zero degree	Sixty degree	Ninety degree	Thirty degree			Ninety degree
6	Regression coefficient is independent of.....	Origin	Scale	Both origin and scale	Neither origin nor scale.			Origin
7	The regression line cut each other at the point of.....	Average of X only	Average of Y only	Average of X and Y	the median of X on Y			Average of X and Y
8	If two regression	Zero	Negative	Positive	One			Positive

	coefficients are positive then the coefficient of correlation must be							
9	If two-regression coefficients are negative then the coefficient of correlation must be.....	Positive	Negative	Zero	One			Negative
10	The given two variables are perfectly positive, if.....	$r = +1$	$r = -1$	$r = 0$	$r \neq +1$			$r = +1$
11	The relationship between two variables by plotting the values on a chart, known as	Coefficient of correlation	Scatter diagram	Correlogram	rank correlation			Scatter diagram
12	The geometric mean of the two regression coefficients.	Correlation coefficient	Regression coefficients	Coefficient of range	coefficient of variation			Correlation coefficient
13	If two variables are uncorrelated, then the lines of regression	Do not exist	Coincide	Parallel to each other	Perpendicular to each other			Perpendicular to each other
14	The angle between two lines of regression is ninety degree, if -----	$r = 2$	$r = 0$	$r = 1$	$r = -1$			$r = 0$
15	While drawing a scatter diagram if all points appear to form a straight line getting downward from left to right, then it is	Perfect positive correlation	simple positive correlation	Perfect negative correlation	no correlation			Perfect negative correlation

	inferred that there is-----							
16	If $r=1$, the angle between two lines of regression is-----	Zero degree	Sixty degree	Ninety degree	Thirty degree			Zero degree
17	Regression coefficient is independent of-----	Origin	Scale	Both origin and scale	Neither origin nor scale.			Origin
18	There will be only one regression line in case of two variables if-----	$r=0$	$r=2$	$r=-2$	r is either +1 or -1			r is either +1 or -1
19	The regression line cut each other at the point of-----	Average of X only	Average of Y only	Average of X and Y	The median of X on Y			Average of X and Y
20	Which is a method of measuring correlation?	Graphic correlation	Scatter diagrams	Both Graphic correlation and scatter diagrams	Either graphic correlation or scatter diagrams			Both Graphic correlation and scatter diagrams
21	If there exists any relation between the sets of variables, it is called.....	Regression	Skewness	Correlation	Quartile			Correlation
22	Which of the following measurement scales is required for the valid calculation of Karl Pearson's correlation coefficient?	Ordinal	Interval	Ratio	Nominal			Interval
23	Which of the following is the range of r ?	0 and 1	-1 and 1	-1 and 0	1 and 2			-1 and 1
24	When the two regression lines coincide, then r	0	-1	1	2			1

	is.....							
25	Regression line may be.....	0	-1	1	2			2
26	Programming is another word for -----	planning	organizing	managing	decision making			planning
27	Optimization means-----	maximization of profit	minimization of constraints	minimization of profit	maximization of cost			maximization of profit
28	The variables that appear in the objective function are called-----	decision variables	non decision variables	optimal variables	feasible variables			decision variables
29	The linear function is to be maximized or minimized is called-----	objective function	subjective function	optional function	odd function			objective function
30	LPP is a technique of finding the -----	optimal solution	approximate solution	both	infeasible solution			optimal solution
31	LPP is -----.	optimal solution	approximate solution	both	infeasible solution			optimal solution
32	In an LPP maximization model -----	A constraint optimization model	A constraint decision making model	A mathematical programming model	A constraint inventory model			A constraint optimization model
33	A Feasible solution to a LPP which is also a basic solution to the problem is called ---	basic solution	basic feasible solution	non basic feasible solution	optimal solution			basic feasible solution
34	The solution which optimizes the objective function are called -----	feasible solution	optimal solution	optional solution	arbitrary solution			optimal solution

35	A basic solution is said to be a ----- if one of more of the basic variables are Zero	Non degenerate basic solution	infeasible solution	degenerate basic solution	unbounded solution			degenerate basic solution
36	More than two decision variables problem in LPP cannot be solved by -----	simplex method	Big-M method	Graphical method	Dual simplex method			Graphical method
37	Method of penalty is also known as -----	simplex method	Big-M method	Graphical method	Dual simplex method			Big-M method
38	Another name for simplex method is -----	computational procedure	computational method	Big-M method	Dual simplex method			computational procedure
39	In ----- the entering variable is first calculated	Simplex method	Big-M method	graphical method	any one of these			Simplex method
40	Optimum solution of LPP in a Simplex procedure is always -----	unbounded	feasible	degenerate	basic feasible solution			basic feasible solution
41	Every equality constraint can be replaced equivalently by ----- inequalities.	two	three	one	four			two
42	The set of feasible solutions to an LPP is a -----	convex set	null set	concave	finite			convex set
43	The feasible region of an LPP is always-----	convex	upward	downward	a straight line			convex
44	The leaving variable is the basic variable corresponding	normal ratio q	minimum ratio q	maximum ratio q	average ratio q			minimum ratio q

	to the ----- -----							
45	The number of alternatives in a LPP is typically----- -----	finite	infinite	infeasible	feasible			finite
46	LPP deals with the problems involving only - ----- objective	one	two	more than one	more than two			one
47	Constraints appear as ----- ----- when plotted in a graph	curve	straight line	point	circle			straight line
48	An LPP having more than one optimal solution is said to have -- ----- optimal solution	no	infinite	Unbound ed	multiple			multiple
49	An LPP solution when permitted to be infinitely large is called----- -----	Unbounde d	bounded	infeasible	large			Unbounde d
50	The leaving variable row is called ----- -----	key row	key column	pivot column	leaving row			key row
51	The entering variable column is called ----- -----	key row	pivot row	pivot row	entering row			pivot row
52	The intersection of the pivot column and pivot row is called the----- -----	pivot element	leaving element	unit element	first element			pivot element
53	The coefficient of artificial variables are -M in the objective function for ---- -----	Maximizat ion Problems	Minimizat ion Problems	Assignme nt Problems	Transporta tion Problems			Maximizat ion Problems

54	If the solution space is unbounded ,then the objective value will always be-----	bounded	unbounded	feasible	infeasible			unbounded
55	Linear programming problem involves ----- objective function.	four	three	two	one			one
56	Linear programming problems involving only - ----- variables can be effectively solved by a graphical method	four	three	two	one			two
57	Linear programming problems involving only two variables can be effectively solved by a ----- method.	simplex	iteration	graphical	Big-M method			graphical
58	A typical LPP must have at least ----- --- decision alternatives.	three	two	one	Seven			two
59	The coefficient of artificial variables are +M in the objective function for ---- -----	Maximization Problems	Minimization Problems	Assignment Problems	Transportation Problems			Minimization Problems
60	The maximization problem in the primal becomes the ----- problem in the	minimization	maximization	symmetric	Un symmetric			minimization

	dual.							
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UNIT-I- Strategic Control Systems

SYLLABUS

Strategic Control Systems - Decentralization and Transfer Pricing - Choices about Responsibility Centers - Market Based and Cost Based Transfer Prices - Multinational Transfer Pricing.

INTRODUCTION:

Transfer Pricing

In the post economic liberalization, multinational companies started expanding their business transactions across the border. The rapid growth of economic activities of multinational groups led to various complex issues regarding taxation. The multinational groups have more inter business activities like transfer of goods or services. One group transfers the goods and services to another group. Such transfers cause the problem of pricing the goods or services.

Thus it may not comply with necessary rules and regulations while transferring goods or services. This noncompliance with statutory provisions may tend to create revenue loss to the exchequer. Hence, there is a need to provide statutory framework which will lead to compute the profits and tax in a fair manner.

Provisions Regulating Transfer Pricing in India

The Finance Act, 2001 introduced law of transfer pricing in India through sections 92A to 92F of the Indian Income Tax Act, 1961 which guides computation of the transfer price and suggests detailed documentation procedures.

Scope & Applicability

Transfer Pricing Regulations (“TPR”) are applicable to the all enterprises that enter into an ‘International Transaction’ with an ‘Associated Enterprise’. Therefore, generally it applies to all cross border transactions entered into between associated enterprises. It even applies to transactions

involving a mere book entry having no apparent financial impact. The aim is to arrive at the comparable price as available to any unrelated party in open market conditions and is known as the Arm's Length Price ('ALP').

Important Definitions

Transfer Pricing

"Transfer price" is a price at which the value of goods or services being transferred between independently operating units of an organization. But, the expression "transfer pricing" generally refers to prices of transactions between associated enterprises may be different from the prices at which an independent enterprise transfers to another the same goods or services.

Arm's Length Price

The term arm's length price refers to a price which is applied or proposed to be applied in a transaction between persons other than associated enterprises, in uncontrolled conditions.

Objectives of Transfer Pricing

There are three objectives that should be considered for setting out a transfer price.

(a) *Autonomy of the Division.* The prices should seek to maintain the maximum divisional autonomy so that the benefits, of decentralization (motivation, better decision making, initiative etc.) are maintained. The profits of one division should not be dependent on the actions of other divisions,

(b) *Goal congruence:* The prices should be set so that the divisional management's desire to maximize divisional earnings is consistent with the objectives of the company as a whole. The transfer prices should not encourage suboptimal decision-making.

(c) *Performance appraisal:* The prices should enable reliable assessments to be made of divisional performance.

Determination of Arm's Length Price

The arm's length price in relation to an international transaction can be determined by any of the following methods, The most appropriate method, may be chosen having regard to the nature of transaction or class of transaction or class of associated persons or functions performed by such persons or such other relevant factors as the Board may prescribed namely:—

- (a) Comparable uncontrolled price method;
- (b) Resale price method;
- (c) Cost plus method;
- (d) Profit split method;
- (e) Transactional net margin method;

Suppose more than one price is determined by the most appropriate method, the arm's length price shall be taken to be the arithmetical mean of such prices:

In case, the variation between the arm's length price so determined and price at which the international transaction has actually been undertaken does not exceed five per cent of the latter, the price at which the international transaction has actually been undertaken shall be deemed to be the arm's length price.

Computation of Arm's Length Price

The Institute of Chartered Accountant of India (ICAI) has laid down certain guidelines which are to be followed when comparable uncontrollable price is determined. The guidelines are given below.

(a) Comparable Uncontrollable Price Method

- i) Find out the price charged or paid for property transferred or services provided in a comparable uncontrolled transaction, or a number of such transactions, is identified,
- ii) Adjust such price to account for differences, if any, between

the international transaction and the comparable uncontrolled transaction, or between the enterprises entering into such transactions, which could materially affect the price in the open market;

- iii) the adjusted price arrived at is taken to be an arm's length price in respect of the property transferred or services provided in the international transaction;
- iv) If there is any variation between price charged (price paid) on the international transaction and arm's length price, then an adjustment has to be made in order to remove the variance.

(b) Resale Price Method

- (i) Find out the international transaction through which property purchased or services obtained
- (ii) Identify the price at which the property or services are resold or provided to a third party
- (iii) Deduct the normal gross profit earned by the enterprise from the resale price of such property or services. The normal gross profit can be taken of a profit on a similar transaction made with unrelated party.
- iv) The price so arrived at is further reduced by the expenses incurred by the enterprise in connection with the purchase of property or obtaining of service; The price so arrived at is adjusted to take into account the functional and other differences, including differences in accounting practices, if any, between the international transaction and the comparable uncontrolled transactions, or between the enterprises entering into such transactions, which could materially affect the amount of gross profit margin in the open market;
- v) the adjusted price arrived at is taken to be an arm's length price in respect of the purchase of the property or obtaining of the services by the enterprise from the associated enterprise;

(c) Cost Plus Method

- i) Find the direct and indirect costs of production incurred by the enterprise in respect of property transferred or services provided to an associated enterprise
- ii) Find a comparable uncontrollable transaction or a series of transaction with a third party for same property or service
- iii) The amount of a normal gross profit mark-up to such costs (computed according to the same accounting norms) arising from the transfer or provision of the same or similar property or services by the enterprise, or by an unrelated enterprise, in a comparable uncontrolled transaction, or a number of such transactions, is determined;
- iv) The normal gross profit mark-up to account the functional and other differences, if any, between the international transaction and the comparable uncontrolled transactions,
- v) The sum so arrived at, is taken to be an arm's length price in relation to the supply of the property or provision of services by the enterprise;

d) Profit Split Method

Which may be applicable mainly in international transactions involving transfer of unique intangibles or in multiple international transactions which are so interrelated determining the arm's length price of any one transaction, by which,

- i) The combined net profit of the associated enterprises arising from the international transaction, in which they are engaged, is determined;
- ii) The relative contribution made by each of the associated enterprises to the earning of such combined net profit, is then evaluated on the basis of the functions performed, assets employed or to be employed and risks assumed by each enterprise and on

the basis of reliable external market data which indicates how such contribution would be evaluated by unrelated enterprise and on the basis of reliable external market data which indicates how such contribution would be evaluated by unrelated enterprises performing comparable functions in similar circumstances;

- iii) The combined net profit is then split amongst the enterprises in proportion to their relative contributions,
- iv) The profit thus apportioned to the assessee is taken into account to arrive at an arm's length price in relation to the international transaction;

e) Transactional Net Margin Method

- i) The net profit margin realized by the enterprise from an international transaction entered into with an associated enterprise is computed in relation to costs incurred or sales effected or assets employed or to be employed by the enterprise or having regard to any other relevant base;
- ii) The net profit margin realised by the enterprise or by an unrelated enterprise from a comparable uncontrolled transaction or a number of such transactions is computed having regard to the same base;
- iii) The net profit margin arising in comparable uncontrolled transactions is adjusted to take into account of the differences, if any, between the international transaction and the comparable uncontrolled transactions, or between the enterprises entering into such transactions, which could materially affect the amount of net profit margin in the open market;
- iv) The net profit margin thus established is then taken into account to arrive at an arm's length price in relation to be international transaction.

Illustration I

X Ltd., an Indian company, sells computer CPU to its 100 per cent subsidiary Y Ltd. in United States @ \$ 50 per piece. X Ltd. also sells its computer CPU to another company Z Ltd. in United States @ \$ 90 per piece. Total income of X Ltd. for the assessment year 2012-13 is 12,00,000 which includes sales made for 100 computer CPU @ \$ 50 to Y Ltd. Compute the arm's length price and taxable income of X Ltd. The rate of one dollar may be assumed to be equivalent to 47.

Solution**Computation of Arm's Length Price and Taxable Income of X Ltd.**

Arm's length price:

$$100 \times 90 \times 47 = 4,23,000$$

Total Income	12,00,000
Add: Arm's length price	4,23,000
	16,23,000
Less: Price charged $100 \times 50 \times 47$	2,35,000
Taxable Income	13,88,000

Relevant Points

- (1) Transfer pricing is the pricing of internal transfers between profit centres.
- (2) Ideally the transfer prices should, promote goal congruence, enable effective performance appraisal and maintain divisional autonomy.
- (3) Economy theory suggests that the optimum transfer price would be the marginal cost equal for buying division's marginal revenue product. Transfer prices should always be based on the marginal costs of the supplying division plus the opportunity costs to the organization as a whole.
- (4) Because of information deficiencies, transfers pricing in practice does not always follow theoretical guidelines. Typically prices are

market based, cost based or negotiated.

- (5) Where an appropriate market price exists then this is an ideal transfer price. However, there may be no market for the intermediate product, the market may be imperfect, or the price may be considered unrepresentative.
- (6) Where cost based systems are used then it is preferable to use standard costs to avoid transferring inefficiencies.
- (7) Full cost transfer pricing for full cost plus a markup suffers from a number of limitations,; it may cause suboptimal decision-making.
The price is only valid at one output level, it makes genuine performance appraisal difficult.
- (8) Provided that variable cost equates with economic marginal cost then transfers at variable cost will avoid gross sub optimality but performance appraisal becomes meaningless.
- (9) Negotiated transfer prices will only be appropriate if there is equal bargaining power and if negotiations are not protracted.

Transfer price policies represent the selection of suitable methods relating to the computation of transfer prices under various circumstances. More precisely, transfer pricing should be closely related to management performance assessment and decision optimization. But the problem of choosing an appropriate transfer pricing for the two functions of management-performance measurement and decision optimization - does not hold any simple solution. There is no single measure of transfer price that can be adopted under all circumstances.

Transfer price is a notional value at which goods and services are transferred between divisions in a decentralized organization. The prices are set for intermediate products, which are goods, and services that are supplied by the selling division to the buying division. The goods that are received by the buying division may be processed further and before

being sold to outside world as final products. We can ask why these kinds of transfers occur within the organization. This is because of the finished goods of one division becomes the raw material of another division.

For example, we can take textile Industry; it involves various processes for getting the final product which is used by the ultimate consumer. The processes are spinning, doubling, dying, weaving, printing, garments and designing. The finished product of each division becomes the input of the next division. Therefore, the output of each division must be transferred to another. A notional profit may be added with cost price while transfer takes place for the purpose of accounting and measuring the performance of each division, because each division has responsibility centers such as profit and investment.

The price charged for the inter-departmental transfers is revenue to the selling division and cost to the buying division. That is why the concept of transfer pricing is a technique of strategic decision. The transfer price charged on goods transferred affects the profits of both transferor and transferee division. The benefit earned by one division becomes the cost of other division. However, the selling division may charge higher prices for the goods transferred due to show higher profit. It affects the buying division because cost of input become high due to the higher profit is added to the price paid by them. But the overall profitability of the organization remains unaffected.

Objectives of Transfer Prices

A sound transfer price system should accomplish the following objectives:

1. Divisional autonomy
2. Divisional performance appraisal
3. Goal congruence

1. Divisional Autonomy

The division manager must take sound decisions to show their divisions' efficiency through its responsibility centers, a sound transfer pricing system act as a motivational force and it serves the effective communication for such decision. This can happen when the division manager takes the action to improve the reported profit of his division and it improves

the profit of the company as a whole.

2. Divisional Performance Appraisal

Profit is the yardstick for measuring the performance. Transfer pricing facilitates to measure the divisional performance.

3. Goal Congruence

The division manager's goal must be positively correlated with the goal of organization as a whole. The decisions taken by the divisional managers for increasing their divisional profit should not affect the profits of the other divisions. The transfer pricing system must serve as a motivational force to the division managers and at the same time it should not go to the beyond level at which injures the goal of entire organization.

Usefulness of Transfer Pricing

The concept of transfer pricing is used:-

- To identify unit contribution to the total profit,
- To encourage profit consciousness,
- To Measure management performance,
- To Maximize operating unit profitability,
- To Locate profits to minimize tax,
- To Facilitate decentralized decision making,
- To Motivate divisional managers, towards goal congruence, and
- To serve as a tool for control.

The disadvantages of transfer pricing

- Divisional managers may try to achieve the divisional profits rather than corporate profit,
- It creates confusion on the price of the final product due to the

lengthy disagreements on prices,

- It may be incurred an additional administrative costs,
- Arguments over disposition of variances,
- Task of eliminating book profits arising from interdivisional profits.

Organisational Framework

There is various method of arriving transfer prices; the right method is used under the right conditions, but there is no single method ideal in all situations. The organizational situation may differ from one firm to another, it is mainly depends upon the nature of industry, organization structure, its culture, degree of centralization etc.

The following factors are to be considered when developing procedure for determining transfer prices:-

1. The role of the corporate office when the prices are centrally administered,
2. The degree of internal bargains,
3. Accountants' role, and
4. Whether the prices are to be related to costs or resulting from selling prices.

The company's organizational structure is very important factor which is to be considered on the following grounds:-

1. Nature of industry and size of operations,
2. Extent of vertical and lateral integration,
3. Extent of decentralization, and
4. Objectives before the management.

Other significant aspects that need to be considered are

1. Sourcing decisions
2. Manufacturing processes

3. Market situation
4. Control Exercised by the centre can include certain areas

1. Sourcing Decisions

Whether the divisions of buying and selling can take sourcing decisions by themselves or some other divisions can take such decisions.

2. Manufacturing Processes

- a. Mass, batch or unit,
- b. For stock or against specific orders, and
- c. Whether raw material, intermediate or and products.

3. Market Situation

- a. Buyer's vs. seller's market,
- b. If market price is readily available,
- c. Extent and nature of competition.

4. Control Exercised by the centre can include the following areas

- a. Sourcing,
- b. Pricing,
- c. Profitability,
- d. Return on investment,
- e. Cost performance,
- f. Approval of unit budget,
- g. Cash flow,
- h. Approval of capital expenditure,
- i. Turnover and,
- j. Market share.

Issues in Transfer Pricing

A rational system of transfer pricing is required to ensure profitability at each level. Ideally the decentralized profit centre is a device for measuring and evaluating performance as well as motivating divisional management to achieve corporate goals. When the company extends its operations beyond national borders, new dimensions and complications are added to the transfer- pricing problem.

The main issues to be considered for a universal example are:

- Taxes and duties-local sales tax, octroi, excise duty and custom duty.
- Market conditions.
- Ability of the potential customers to pay for a company's product different profit transfer rules.
- Conflicting objectives of a joint venture partner.
- Government regulations-local, state and central laws.
- Import regulations.

Types of Transfer Pricing

1. Cost-based method comprising

- i. Actual or full cost
- ii. Variable cost, and
- iii. Standard cost.

2. Revenue-based method comprising

- i. Cost-Plus,
- ii. Market price, and
- iii. Negotiated price.

3. Hybrid or Dual pricing method.

1. Cost-based method comprising

Actual or full cost

Under this method, the transfer price is fixed at full cost. There is a question arise i.e., which cost should be considered? There are different types of cost such as direct cost & indirect cost, variable cost & fixed cost and cost of production & cost of sales. The adoption of cost is differing in one firm to another, based on the nature, volume and capacity of the business enterprise. Generally, the cost of sales is adopted for fixing transfer price.

Determination of Transfer price at Full cost method:

Example problem:

Divisional Fixed cost	375,000
Variable cost per piece	5
Target volume of production	200,000 per year

Solution: 1,000,000

Variable cost = 200,000*5	
Add: Fixed cost of division	375,000
Total cost	1,375,000

Transfer price = $1,375,000/200,000$

6.88 per piece

It is easy to understand from this example is that the transfer price is fixed on full cost in the division.

Variable Cost

This concept represents the additional outlay costs incurred up to the point of transfer i.e., the expenses that are directly associated with the production and transfer of the goods and services. The direct expenses are raw materials, Wages and production of the division. These expenses are varied with the volume of output. This method is very useful for overall view when there is an excess capacity in the supplying division; it leads to the purchasing division to act accordingly.

Standard Cost

The materials, labour and overheads are charged at pre-determined rates. Under this method, the costs of goods are free from fluctuations in the components of cost. The buying division is known in advance about the transfer price; hence it can plan in well advance to show the effective performance in their appraisal.

Under this system, the fixed costs are absorbed on the allocated or predetermined fixed cost. It is a drawback of this system; however, the actual efficiency would not be considered when the actual fixed costs are absorbed at a lower rate in their controlling system. This may discourage the division's performance of cost control. That is why some companies are followed only variable costs are in estimated price or standard but actual fixed costs are absorbed in every month.

2. Revenue-based method comprising

Cost-plus mark-up pricing

Under this method, the cost of sale of goods is taken as usual in cost concept but here it is added with some percentage of profit. The percentage of profit is determined the Companies that follow cost-plus pricing method is taking the position that profit must be shown for any products or

service at every stage of movement through the corporate system. While cost plus pricing may result in a price that is completely unrelated to competitive or demand conditions in the international markets, many exporters use this approach successfully.

Market based Transfer price

A market based transfer price is derived from the price required to be competitive in the market. Under this method the goods are transferred between divisions on open market prices, which possesses the advantage for optimal decisions without any constraints. The divisions can get the status of sovereignty and it facilitates to achieve the maximum profitability of both divisions and the organization as whole.

Negotiated price

Negotiated price is the price of mutual bargain between the buying and selling divisions for transferring goods or services. The purchase division may or may not accept the deal and it may obtain outside bids and negotiate with external suppliers.

The negotiated price is suitable under the following circumstances:-

- The negotiators must share the market information.
- The full support and involvement of the top management is essential.
- The external market should be existed.
- There should be a freedom of external buying and selling for both divisions.
- The market information must be available.

Drawbacks of the negotiated pricing method:-

- The negotiation process makes time delay and the unnecessary effort while transferring the goods.
- It creates the problem of conflict among the divisions.
- The final result is based on the managers' negotiation skill.
- The cooperation among the divisions may disrupt due to conflict

among the divisions.

- The principle of decentralization is affected when the top management compromising the divisions.

3. Dual Rate Method

The dual pricing strategy overcomes the problems between buying and selling division of marginal cost. That is the selling division is credited with a price based on the total cost plus mark-up and the buying division is debited with marginal cost. This may lead to some difference between the two prices and the difference is transferred to the Transfer Price Adjustment Account. This account is adjusted with the profits of two divisions to show the correct profit for the organization as a whole.

Drawbacks of the Dual Rate method:-

- This method is not suitable when multi-variety of goods or services are being transferred to different divisions.
- The principle of decentralization is affected because the head office has to maintain the Transfer Price Adjustment Account.
- Both buying and selling divisions cannot get high incentives because of non-monitoring the performance.
- The selling division is encouraged to sell more units internal when the outside market condition is poor, and also the buying division may go for internal purchase without negotiating with external suppliers for favourable prices.

STRATEGIC CONTROL SYSTEM

Planning is said to be effective only when it produces desired results. It is hence said that planning and controlling are Siamese twins of management. Once a strategy is chosen, it has to be put into action, in such a way that the expected outcomes are realized. This process is called 'implementation'. It covers a wide range of strategic issues, decisions and actions, which are often critical for the success of a strategy.

Implementation-Defined

Implementation involves putting into action the conceptualized strategy, by formulating various programs, budgets, procedures and policies. Miller defined strategy implementation in the following words.

“Strategy implementation is the process by which strategies and policies are put into action through the development of programs, budgets and procedures.”

Significance of Implementation

The significance of implementation of strategy can be understood from the following points of view.

(i) It is part of strategy making

Strategy making process involves several steps (shaded boxes) as shown in Figure 21-1. It involves steps like resource allocation, designing organization culture, leadership that balances power and politics, and evaluation of performance at every step through standards and audit systems. If these steps are not properly taken care of, failure in strategy is inevitable. PepsiCo example illustrates how culture can be a cause of failure.

Strategy evaluation and control in strategic formulation framework.

Pepsi Co, selected a relatively inexperienced manager to implement strategy at Brazil. Mr Charles Beach from Coca-Cola was selected as franchisee for North Carolina, Puerto Rico and later for the entire South America. This fast ‘changing culture’ and ‘ready fire aim culture’ of Pepsi Co, became a problem. While Coca-Cola adds territories slowly, Pepsi Co, is very fast, this led its Brazilian operations into Chaos.

Process of Implementation

Implementation includes the following steps. Many of the steps

are discussed in the earlier lessons. We will now briefly discuss them.

- i) Resource allocation
- ii) Organisation structure design
- iii) Planning framework
- iv) Leading and staffing
- v) Change and communication.
- vi) Evaluation

Resource allocation

This has vital significance in strategy implementation. In a single product firm, it may involve assessment of the resource needs of different functional departments. In a multi divisional organisation, it implies assessing the resource needs of different SBUs or product divisions. Methods of resource allocation include use of:

- § Percentage of sales or profits
- § BCG matrix
- § Budgeting system

Organization structure design

Appropriate organization structure is to be designed to make strategy implementable.

The relation between strategy and structure is established based on organizational life cycle, corporate development stages and international businesses. Organization design involves changes like:

§ Job design- Making the jobs more challenging by job analysis and role redefinition.

§ Reengineering- Reengineering is a radical redesign of business process to achieve major gains in cost, service and time. It is an effective way of implementing turn around strategy. It breaks away old rules and procedures

Planning frame work

The managers involved in implementation should plan and develop programmes, budgets and procedures. They should also work for achieving synergy among the divisions and functional areas in order to maintain distinctive competence.

Programme

Programmes make strategy action oriented. Ex: Reliance vertical (forward) integration strategy for growth.

Budgets

This begins after programmes. It is a check on the feasibility of selected strategy. Budget is expression of programmes in quantitative terms. Without budgets implementation becomes impractical

Procedures

After programmes and budgets, studied operating procedures (SOPS) must be developed. They detail the various activities that must be carried out to complete a corporation's programme. The change during the change process, Ex: Mc Donald's developed very detailed procedure to ensure that policies are carried out in its fast food retail outlets.

Leadership and staffing

Implementation involves leading people to utilize their abilities and skill efficiently and effectively to meet organisational goals. Leaders are the key organic elements, who help the organization cope with changes. Failure of leadership may result in goal incongruence, communication break down, ambiguity etc,. Leaders help in transformation in three phases

§ Recognising need for revitalization § Creating a new vision

§ Institutionalizing change

A leader may follow any of the following leadership styles

§ Entrepreneurial-risk taking, dynamic , change oriented.

§ New scientific - Questioning the existing practices and discovering and experimenting new approaches.

§ Quasi-scientific- Balancing the tradition and innovation to maintain stability.

§ Muddling through - Pushing through different situations with reactive planning

§ Conservative -Making approaches of implementation carefully as per procedures.

§ Democratic-Participative in style involving people indecision making.

§ Middle of the road- Using an approach that is in between the democratic and task oriented.

Staffing issues involve hiring new people with new skills, firing unskilled or inappropriately skilled people, or training employed to acquire new skills. Staffing requirements are likely to follow a change in human resource strategy relating to number and quality of people.

GE's aircraft engine group used training to maintain its market shone even though work

force was cut from 42,000 to 33,000 between, 1991 to 1993.

‘Downsizing’ has become one of the practices of late in modernization strategy of banks. It involves planned elimination of positions or jobs during strategy implementation. It involves.

- § Elimination of unnecessary work
- § Contract out those works that can be done cheaper
- § Plan long run efficiencies
- § Communicate the resources for downsizing
- § Invest in remaining employees
- § Develop value added jobs.

Change and communication

Change is inevitable during implementation. Rationale for strategic changes should be communicated to workers through news letters and speeches and even in training programmes. Companies in which major cultural changes took place have the following.

- § The CEO with strategic vision, who communicated their vision to employees at all levels and constantly compared themselves with competitors for updating.
- § Vision , that is translated into key elements for implementation. They are widely communicated through contests, recognition, rewards etc,

Evaluation

The importance of strategic evaluation lies in its ability to coordinate the tasks performed by individual managers, and also groups, division or SBUs, through the control of performance. In the absence of coordinating and controlling mechanisms, individual managers may pursue goals, which are inconsistent with the overall objectives of the department, division, SBU or the whole organization. We will now discuss evaluation and control in detailed way.

The process of evaluation basically deals with four steps:

- ### Illustrative Performance Indicators in Functional Areas Across Different Grand Strategies

Strategy	Efficiency	Effectiveness	Reliability
Stability	High	High	High
Expansion	Medium	Medium	Medium
Retrenchment	Low	Low	Low

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE

Class: II MBA

Course Name: Strategic Cost Management

Course Code: 17MBAPF301B

Unit V

Semester: III

Year: 2017-19 Batch

Growth-oriented		e n		ted	
Cost reduction ori-					
Financial area	Profitability and activity ratios;			Leverage ratios; credit ratings;	Liquidity and activity ratios
		divided earnings and per share		break-even point	
	Sales revenues and quotas; sales force productivity;			Sales growth (current sales to base year's sale); new accounts opened per year;	Marketing costs divided by sales; marketing costs divided by orders; sales
Marketing area		accounts receivable divided by sales,		new products sales divided by total sales	expenses divided by total number of sales calls
	number of customer complaints		com-		
Performance indicator			Standard	Actual	Variance
Profit over sales (%)			12	10	-2
Sales revenue (Rs.crores)			26	22	-4
Capacity utilization (%)			85	90	+5
Training costs per employee (Rs)			20	22	+2
Maintenance costs as % of IT investments				1	20
				5	-5

Importance

Strategic evaluation is important due to several factors.

Need for feedback

Within an organization, there is a need to receive feedback on current performance, so that good performance is rewarded and poor performance is corrected.

Validates strategic choice

Strategic evaluation helps to keep a check on the validity of a strategic choice. An ongoing process of evaluation would, in fact, provide feedback on the continued relevance of the strategic choice made during the formulation phase.

Congruence between decisions and intended strategy

During the course of strategy implementation managers are required to take scores of decisions. Strategic evaluation can help to assess whether the decisions match the intended strategy requirements.

New Strategy planning

Lastly, the process of strategic evaluation provides a considerable amount of information and experience to strategists that can be useful in new strategic planning.

Participants in Strategic Evaluation

The various participants in strategic evaluation and control and their respective roles are

Shareholders, lenders and the public They have ownership claim on the assets of the enterprise and are therefore responsible to the strategic performance and evaluation.

Board of Directors enacts the formal role of reviewing and screening executive decisions in the light of the environment and business organizational implications.

Chief executives are ultimately responsible for all the administrative aspects of strategic evaluation and control.

SBU or profit-centre heads may be involved in performance evaluation at their levels and may facilitate evaluation by corporate-level executives.

Financial controllers, company secretaries, and external and internal auditors form the group of persons who are primarily responsible for operational control based on financial analysis, budgeting, and reporting. Audit and executive committees, set up by the Board or the chief executive, may be charged with the responsibility of continuous screening of performance.

Corporate planning staff or department may also be involved in strategic evaluation.

Middle-level managers may participate in strategic evaluation and control as providers of information and feedback, and as the recipients of directions from above, to take corrective actions.

Types of strategic controls

Controls can be broadly classified into two categories. : Strategic and operational control. Strategic control is aimed at monitoring the course of progress in the predetermined direction, and operational control with the allocation of organizational resources and evaluation of the performance of organizational units, such as, divisions, SBUs, and so on, to assess their contribution to the achievement of organizational objectives. Table 21-3 shows the differences.

Source

Based on J A Pearce-III and R B Robinson, Jr. Strategic Management: Strategy Formulation and Implementation, 3rd edn, Richard D Irwin, Homewood, Ill, 1988, pp 404-19.

Strategic controls

The different types of strategic controls are discussed in brief here.

Premise control

A company may base its strategy on important assumptions related to environmental factors (e.g., government policies), industrial factors (e.g. nature of competition), and organizational factors (e.g. breakthrough in R&D). Premise control continually verifies whether such assumptions are right or wrong. If they are not valid corrective action is initiated and strategy is made right. The responsibility for premise control can be assigned to the corporate planning staff who can identify for assumptions and keep a regular check on their validity.

Implementation control

Implementation control can be done using milestone review. This is similar to the identification-albeit on a smaller scale-of events and activities in PERT/CPM networks. After the identification of milestones, a comprehensive review of implementation is made to reassess its continued relevance to the achievement of objectives.

Strategic Surveillance

This is aimed at a more generalized and overarching control. Strategic surveillance can be done through a broad-based, general monitoring on the basis of selected information sources to uncover events that are likely to affect the strategy of an organization.

Special Alert Control

This is based on a trigger mechanism for rapid response and immediate reassessment of strategy in the light of sudden and unexpected events. Special alert control can be exercised through the formulation of contingency strategies and assigning the responsibility of handling unforeseen events to crisis management teams. Examples of such events can be the sudden fall of a government at the central or state level, instant change in a competitor's posture, an unfortunate industrial disaster, or a natural catastrophe.

Strategic momentum control

These types of evaluation techniques are aimed at finding out what needs to be done in order to allow the organization to maintain its existing strategic momentum. There are three techniques, which could be used to achieve these aims:

- Responsibility control centers,
- Critical success factors, and
- Generic strategies.

Responsibility controls form the core of management control systems and are of four types: revenue, expense, profit, and investment centers.

CSFs form the bases for strategists to continually evaluate the strategies to assess whether or not these are helping the organization to achieve the objectives.

The generic strategies approach to strategic control is based on the assumption that the strategies adopted by a firm similar to another firm are comparable. Based on such a comparison, a firm can study why and how other firms are implementing strategies and assess whether or not its own strategy is following a similar path. In this context, the concept of strategic group is also relevant. A strategic group is a group of firms that adopts similar strategies with similar resources. Firms within a strategic group, often within the same industry and sometimes in other industries too, tend to adopt similar strategies.

Strategic leap control

Where the environment is relatively unstable, organizations are required to make strategic leaps in order to make significant changes. Strategic leap control can assist such organizations by helping to define the new strategic requirements and to cope with emerging environmental realities. There are four techniques of evaluation used to exercise strategic leap control:

strategic issue management, strategic field analysis, systems modeling, and scenarios.

1. Strategic issue management is aimed at identifying one or more strategic issues and assessing their impact on the organization. A strategic issue is “a forthcoming development, either inside or outside of the organization, which is likely to have an important impact. On the basis of strategic issues, the strategists can avoid surprises and shocks, and design contingency plans to shift strategies whenever required.
2. Strategic field analysis is a way of examining the nature and extent of synergies that exist or are lacking between the components of an organization. Whenever synergies exist the strategists can assess the ability of the firm to take advantage of those. Alternatively, the strategists can evaluate the firm's ability to generate synergies where they do not exist.
3. Systems modeling is based on computer-based models that simulate the essential features of the organization and its environment. Through systems modeling, organizations may exercise pre-action control by assessing the impact of the environment on organization because of the adoption of a particular strategy.
4. Scenarios are perceptions about the likely environment a firm would face in the future. They enable organizations to focus strategies on the basis of forth-coming developments in the environment.

Several of the above techniques for strategic control-with the possible exception of responsibility centers-are of a relatively recent origin. The development of these techniques is an evidence of the expanding body of

knowledge in business policy and strategic management.

In the next part of this section, we look at techniques for operational control.

Operational control

Operational control is aimed at the allocation and use of organizational resources. Evaluation techniques for operational control, therefore, are based on organizational appraisal rather than environmental monitoring, as is the case with strategic control. Evaluation techniques can be classified into three parts.

- \$ Internal analysis,
- \$ Comparative analysis, and
- \$ Comprehensive analysis.

Internal analysis

Internal analysis deals with the identification of the strengths and weakness of a firm in absolute terms.

Value chain analysis focuses on a set of inter-related activities performed in a sequence for producing and marketing a product or service. The utility of value-chain analysis for the purpose of operational evaluation lies in its ability to segregate the total tasks of a firm into identifiable activities, which can then be evaluated for effectiveness.

An operational standard takes up the financial parameters and the non-financial quantitative parameters, such as, physical units or time, in order to assess Performance. The obvious benefit of using quantitative

factors (either financial or physical parameters) is the ease of evaluation and the verifiability of the assessment done. These are probably the most-used methods for evaluation for operational control. Among the scores of financial techniques are traditional techniques, such as, ratio analysis, or newer techniques, such as, economic value-added (EVA) and its variations, and activity-based costing (ABC). These are proven methods so far as their efficacy for evaluating operational effectiveness is concerned. Apart from the financial quantitative techniques, there are several non-financial control, such as; computation of absenteeism, market ranking, rate of advertising recall, total cycle time of production, service call rate, or number of patents registered per period

Qualitative analysis supplements the quantitative analysis by including those aspects which it is not feasible to measure on the basis of figures and numbers. The methods that could be used for qualitative analysis are based on intuition, judgement, and informed opinion. Techniques like surveys and experimentation can be used for the evaluation of performance for exercising operational control.

Comparative analysis

It compares the performance of a firm with its own past standards, or standards of other firms.

1. *Historical analysis* compares the present performance of a firm with performance over a given period of time. This method help analyse the trend or pattern.
2. *Industry norms* Performance of a company I is compared with the performance of its peers in the same industry. Evaluation on the basis of industry norms enables a firm to bring its

performance at

least up to the level of other firms and then attempt

to surpass it.

3. *Bench marking* is a comparative method where a firm finds the best

practices in an area and then attempts to bring its

own performance

in that area in line with the best practice. In order

to excel, a firm

shall have to exceed the benchmarks. In this manner,

benchmarking

offers firms a tangible method to evaluate

performance.

Comprehensive analysis

This analysis adopts a total approach rather than focusing on one area of activity, or a function or department.

1. *Balanced scorecard* method is based on the identification of four key performance measures of customer perspective,

internal business

perspective, innovation and learning perspective,

and the financial

perspective. This method is a balanced approach

to performance

measurement as a range of parameters are taken

into account for

evaluation.

2. *Key factor rating* is a method that takes into account the key factors

in several areas and then sets out to evaluate

performance on the

basis of these. This is quite a comprehensive

method as it takes a

holistic view of the performance areas in an organization.

3. *Management by Objectives* (MBO) is a system, proposed by Drucker, which is based on a regular evaluation of performance against objectives, which are decided upon, mutually by the superior and the subordinate. By the process of consultation, objective setting leads to the establishment of a control system that operates on the basis of commitment and self-control.
4. *Memorandum of understanding* (MoU) is “an agreement between a public enterprise and the Government, represented by the administrative ministry in which both parties clearly specify their commitments and responsibilities”. Having done that, the enterprises are evaluated on the basis of the MoU.

Part A (ONE Mark)

**Multiple Choice Questions
Online Examination
Part B (2 Marks)**

1. Give the meaning for market based transfer pricing
2. Define transfer price
3. Define strategic planning
4. Define strategic controlling
5. What is meant by cost based transfer price?

6. Give the meaning of negotiated transfer price?
7. Give the meaning of arbitration?
8. Who is an arbitrator?
9. What is meant by market based transfer price?
10. What is meant by multinational based transfer price?

PART C (8 Marks)

1. Discuss the strategic control process with suitable chart?
2. "Transfer Pricing is one of the most important issue in international tax" Do you agree with this statement? Explain
3. Explain the different types of strategic control system in an organization ?
4. Discuss the functions of transfer pricing with suitable illustration?
5. Explain the advantages and disadvantages of strategic control system?

Part D (11 Marks)

1. Discuss the significance of transfer pricing with suitable illustration?
2. Explain the importance of strategic control system in a manufacturing concern?
3. "Transfer Pricing is the leading edge of tax what is wrong with international" Explain
4. Explain the importance of strategic planning?
5. Discuss the functions of strategic control?

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DEPARTMENT OF MANAGEMENT

STRATEGIC COST MANAGEMENT (17MBAPF301B)

UNIT – V (20*1=20) MARKS Multiple choice Questions

S. N O	Question	Option - I	Option - II	Option - III	Option - IV	Option - V	Option - VI	Answer
1	A ----- ---- is the price at which division of a company transact with each other, such as trade of supplier or labour between departments	Target Price	Transfer price	Job cost	Product cost			Transfer price
2	----- - is also known as transfer cost	Target Price	Transfer price	Job cost	Product cost			Transfer price
3	----- are used when individual entity of a larger multi entity firm are treated and measured as separately run entities	Target Price	Transfer price	Job cost	Product cost			Transfer price
4	----- policy is generally aimed at evaluating financial performance of different business units	Target Price	Transfer price	Job cost	Product cost			Transfer price
5	----- aimed at tax avoidance	Target Price	Transfer price	Job cost	Product cost			Transfer price

6	----- measures the exchange of products and services between responsibility centers within a company	Target Price	Transfer price	Job cost	Product cost			Transfer price
7	The cost of goods paid by the parent to the subsidiary is considered the ----- -----	Target Price	Transfer price	Job cost	Product cost			Transfer price
8	----- ---- refers to the rules and methods for pricing transactions between enterprise under common ownership or control	Target Price	Transfer price	Job cost	Product cost			Transfer price
9	----- --- results in the setting of prices among divisions within an enterprise	Target Price	Transfer price	Job cost	Product cost			Transfer price
10	There are ----- ----- types of transfer price	2	3	4	5			3
11	----- - are most likely to be related to selling price	Market based transfer price	Cost based transfer price	Negotiated transfer price	Internation al transfer price			Market based transfer price
12	----- - is perhaps the easiest form of transfer pricing when	Market based transfer price	Cost based transfer price	Negotiated transfer price	Internation al transfer price			Market based transfer price

	it comes to determining the price that will be paid between divisions of the same company							
13	----- -- is the best pricing method	Market based transfer price	Cost based transfer price	Negotiated transfer price	International transfer price			Market based transfer price
14	----- serve as a tool for control	Target Price	Transfer price	Job cost	Product cost			Transfer price
15	----- is useful for identifying unit contribution to the total profit	Target Price	Transfer price	Job cost	Product cost			Transfer price
16	----- - measure the management performance	Target Price	Transfer price	Job cost	Product cost			Transfer price
17	----- will maximize the operating unit profitability	Target Price	Transfer price	Job cost	Product cost			Transfer price
18	----- will motivate the divisional managers towards goal congruence	Market based transfer price	Cost based transfer price	Transfer price	Multinational transfer price			Transfer price
19	----- will locate profits to minimise tax	Market based transfer price	Cost based transfer price	Transfer price	Multinational transfer price			Transfer price
20	----- will facilitate decentralised decision making	Market based transfer price	Cost based transfer price	Transfer price	Multinational transfer price			Transfer price
21	The problem areas arising from the use of market price for	Fluctuating price	Market mix	Product diversification	Product specification			Fluctuating price

	determining transfer prices are ----- -----							
22	The problem areas arising from the use of market price for determining transfer prices are ----- -----	Different market	Market mix	Product diversification	Product specification			Different market
23	The problem areas arising from the use of market price for determining transfer prices are ----- -----	Product differentiation	Market mix	Product diversification	Product specification			Product differentiation
24	----- will represent true opportunity cost	Cost price	Selling price	Market price	Target price			Market price
25	The concept of ----- ----- subject to varied interpretation	Profit	Cost	Price	Volume			Cost
26	Problem areas when using cost as a basis for transfer prices could be broadly covered under -----	Elements of cost	Material	Labour	Overheads			Elements of cost
27	FIFO -	First In First Out	First In Final Out	Final In First Out	First In Frame Out			First In First Out
28	LIFO -	Last In First Out	Latest In First Out	Last In Frame Out	Last In Final Out			Last In First Out
29	----- is based on negotiation between buying and	Market based transfer price	Cost based transfer price	Negotiated transfer price	International transfer price			Negotiated transfer price

	selling divisions would be more acceptable							
30	----- will vary from consignment to consignment	Purchase cost	Production cost	Total cost	Variable cost			Purchase cost
31	----- is a management tool beside being an instrument of accountants	Market based transfer price	Cost based transfer price	Transfer price	Multinational transfer price			Transfer price
32	----- effectiveness depends upon how well it is structural and used	Market based transfer price	Cost based transfer price	Transfer price	Multinational transfer price			Transfer price
33	----- is a procedure in which a dispute is submitted by agreement of the parties	Arbitrator	Arbitration	Consignment	Joint Venture			Arbitration
34	----- can only take place if both parties have agreed to it	Arbitrator	Arbitration	Consignment	Joint Venture			Arbitration
35	----- is a confidential procedure	Arbitrator	Arbitration	Consignment	Joint Venture			Arbitration
36	NAA -	National association accountants	National American accountants	Net asset assessment	New asset assessment			National association accountants
37	FERF -	Financial executive research foundation	Fund executive research foundation	Fund electronic research foundation	Finance executive research foundation			Financial executive research foundation
38	----- methods are ways of	Market based transfer	Cost based transfer	Transfer price	Multinational transfer price			Transfer price

	calculating the profit margin of transactions	price	price					
39	The provisions of - ----- -- have been introduced to ensure that income arising from an international transaction between association enterprise shall be computed having regard to the arms length price	Market based transfer price	Cost based transfer price	Transfer price	Multinational transfer price			Transfer price
40	The arm's length price is related to -----	Market based transfer price	Cost based transfer price	Transfer price	Multinational transfer price			Transfer price
41	----- planning and control begin with the establishment of the fundamental objectives of the organization	Management	Cost based transfer price	Profit	Revenue			Management
42	There are ----- ----- levels for decision making	4	5	3	7			3
43	----- - is the process of deciding on the goals of the organization	Planning	Controlling	Strategic planning	Strategic control			Strategic planning
44	----- is used in the sense of	Planning	Policy	Strategy	Organizing			Strategy

	deciding on how to combine and employ resources							
45	----- decision affect the physical, financial and organizational frame	Strategic planning	Strategic control	Policy	Framework			Strategic planning
46	----- is long term planning	Strategic planning	Strategic control	Policy	Framework			Strategic planning
47	Strategic planning is carried out at the -----	Low	Top	Middle	Top & Middle			Top
48	----- is concerned with deciding the goals of the organization	Strategic planning	Strategic control	Policy	Framework			Strategic planning
49	----- has become a crucial exercise for the top management of enterprise	Strategic planning	Strategic control	Policy	Framework			Strategic planning
50	----- is the process of evaluating, monitoring and controlling the various sub-units of the organization	Strategic planning	Strategic control	Policy	Framework			Strategic control
51	----- activities tend to conflict with one another	Strategic planning	Strategic control	Policy	Framework			Strategic control
52	----- is used to describe the process used	Strategic planning	Strategic control	Policy	Framework			Strategic control

	by organizations to control the formation and execution of strategic plans							
53	----- is a specialized form of management control	Strategic planning	Strategic control	Policy	Framework			Strategic control
54	There are ----- types of strategic control	4	3	2	7			4
55	----- is focused on the achievement of future goals, rather than the evaluation of past performance	Strategic planning	Strategic control	Policy	Framework			Strategic control
56	----- invoice tracking a strategy as its being implemented	Strategic planning	Strategic control	Policy	Framework			Strategic control
57	----- is designed to check methodically and constantly whether the premises on which a strategy is grounded on are still valid	Premise control	Special alert control	Implementation control	Strategic surveillance			Premise control
58	A----- --- is the rigorous and rapid reassessment of an organizations strategy	Premise control	Special alert control	Implementation control	Strategic surveillance			Special alert control

	because of the occurrence of an immediate / unforeseen event							
59	There are ----- types of implementation control	2	3	4	5			2
60	----- is designed to observe a wide range of events within and outside the organization	Premise control	Special alert control	Implementation control	Strategic surveillance			Strategic surveillance