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Research Paper

Break-Even Analysis of CT Scan Facility at A Multi-Specialty Hospital

Medical Science

KEYWORDS : Cost analysis, Break-even sales of CT scan, break-even point, break-even analysis.

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ABSTRACT

Among diagnostic imaging, CT imaging attracts the attention in terms of the diffusion of the technology and medical costs. Compared to tomography and angiography, CT imaging provides not only clear images but also causes less burden to patients. Of all the medical equipment cost in a hospital, the share of radiology may be as much as 40-60%. Breakeven analysis is a method used to forecast whether a specific business activity or group of activities will be profitable. The break-even point or "the point of indifference" is that point at which the level of activity for either method results in exactly the same cost. On the surface, breakeven analysis might seem so simple that one could do it mentally. But if it is being done well, that is not so. A good breakeven analysis estimates every possible expense that varies with production. Retrospective study was carried out in the department of Imageology of Kasturba Medical college hospital, with respect to CT scan facility and the workload over 3 years period, and break even analysis was applied to know break-even point. With a selling price per scan of Rs. 1800/-, break-even point was at 3678 scans per year.

INTRODUCTION:

The introduction of Computer Tomography (CT) has been one of the most significant advances among the Imaging fraternity. CT plays a vital role in today's practice, and it is inconceivable that clinical neurosciences can practice and deliver patient care without CT. Introduced way back in 1972, technical improvements have been made at a rapid pace resulting in better image resolution and extensive utilisation for parts of the body other than the cranium. Indeed this one modality has created an impact not only in its clinical utilisation but also in bringing about bureaucratic controls, because of the cost of CT equipment. The diagnostic imaging proportion of the medical cost for outpatients increased slightly form 4.6% in 1991 to 5.1% in 1995. The proportion of CT imaging in the diagnosis has not varied greatly; 13.5-14% during the same period.[1]

However the capital investment and cost of maintenance are high, and there has been an orderly regulatory agencies propounding about the containment of costs. Studies must relate the contribution of CT to that of competing methods and document the impact of additional diagnostic information.[2]

The building and equipping of radiological department is probably the most costly of all hospital departments. In 1975, the diagnostic radiology departments represented more than 5% of all US hospital expenses.[3]

Of all the medical equipment cost in a hospital, the share of radiology may be as much as 40-60%. In teaching hospitals diagnostic radiology may consume some 10% of the yearly hospital budget.[4]

Breakeven analysis is a method used to forecast whether a specific business activity or group of activities will be profitable. It is a study of cost-volume-profit relationships. It is typically used in conjunction with business planning and cash flow projections. One might ask, what is the relevance to nonprofit organizations, which are not organized to make a profit? The question itself contains an erroneous assumption. Non-profit organisations can indeed make a profit.[5]

The reality is that nonprofits engaged in many business activities--in the fields of health care, education etc. if one of these public-purpose businesses intended only to break even or take a loss, it would most likely stagnate or fail, since no capital would be generated for expansion.[5]

It is an Analysis of proposed procurement and facilitization to compare the potential Cost of establishing a second source with the potential savings due to competitive pressure from the second source. [6]

The Break-Even Point is the,

1) The point at which revenues from sales exactly equal total Incurred Cost, i.e., Revenues = Variable Costs + Fixed Costs.

2) The unit at which the Cumulative product sales equal or recover the Cost of the investment required to produce the product.

3) In decision-making analysis, such as Make or Buy or Lease versus Buy, etc., the break-even point or "the point of indifference" is that point at which the level of activity for either method results in exactly the same cost. This type of decision-making often involves the utilization of Assumptions for various levels of activity, such as number of units needed.[7]

Variable Cost (s) is a Cost that changes with the rate of production of goods, production quantity, or the performance of services.[8]

Variable costs are costs of buying or manufacturing or delivering your product or service. Are only incurred when you produce sales of product or service; directly related to production. Include costs of employees hired temporarily and only to deliver the product or service. Are often described by accountants as "direct" costs.

Fixed operating costs are costs you incur at fixed levels regardless of the amount of product you produce and deliver. Are incurred on a regular basis. Are often described by accountants as "indirect" costs or "overhead." Some activities may have to reach the breakeven point on Day one--not through revenues but through subsidies. These may include "soft" pre-development loans or grants from cities, housing trust funds, foundations, etc. [10]

Many countries particularly in the developing world are seeking to orientate their health services towards a more equitable and efficient utilization of resources. A detailed analysis of the financing of the health services is important in such an undertaking. The cost analysis of health care helps us to identify what went wrong with earlier projections, and improve the next services of projections. [11]

AIMS & OBJECTIVES:

1) To study the physical facilities provided at the CT scan facility of Kasturba Hospital.

2) To observe the Workload of the CT..

3) To calculate the Break-even point(sales) of the CT scan facility for one year.

METHODS& METHODOLOGY:

RETROSPECTIVE STUDY: Keeping in view of aims & objectives, the costs was studied for 1-year period, and break even analysis was applied to know break-even point.

FOR BREAK-EVEN ANALYSIS: The revenue on CT scan facility was calculated as:

1) The costs and number of cases done per year were collected.

The costs on CT scan facility was calculated in the method as elaborated below.

A. Fixed Costs:
1. Equipment Costs:
a. Cost of the CAT scan. Depreciation @ 10% per annum was considered (Straight-line method).
b. Cost of the Auxillary equipment.
c. Furniture @ 10% depreciation per annum.
d. Maintenance costs. (Machine was under Comprehensive maintenance contract)

2. Land & Building cost: The area was 1800 sq. feet. The rental value per annum was considered.

2. Staff: Salaries – 6 people were required for single shift. (CT was running for 1 shift)

3. Consumables:
a. Films and Film Processing Chemicals.
b. Contrast.
c. Stationery.
d. Electricity – Machine, AC, electrical fittings, Computers etc.
e. Computer discs and printers.

4. Miscellaneous expenses.

RESULTS:
The CT scan facility is around 3000 sq. ft. in area, shared along with the MRI scan. It is to be noted that both the modalities of diagnostic investigations share the corridors, the Reception area, and the air-conditioning facility.

The observations made during this study are for a period of one year.

TABLE 1: SHOWING FIXED COSTS PER YEAR & VARIABLE COSTS PER SCAN:

Fixed Costs (F):	In Rupees
Depreciation of the Machine	19, 62, 500
Comprehensive Maintenance Contract	8, 50, 000
Land & Building Cost	1, 33, 650
Salaries	6, 86, 740
Furniture	22, 556
Administrative Overheads	3, 50, 069
Total	40,05,515.60
Variable Costs (V):	
Electricity Cost	401
Films	91.50
Contrast	181.50
Film Covers	7.10
Processing Chemicals	12
Printer & Stationery	16.10
Miscellaneous	2.50
Total	711.70

Selling Price **(S)** of each Scan, considering for the workload during the period of study, was Rs. 1801.

Computing the Break-even sales at this hospital's CT scan facility by using the formula, At this volume of activity our Operating Profit was '0'.

DISCUSSION:
Once you've determined your breakeven point, you can use it to examine the effects of increasing or decreasing the role of fixed costs in your operating structure.

The extent to which a business uses fixed costs (compared to variable costs) in its operations is referred to as "operating leverage." The greater the use of operating leverage (fixed costs, often associated with fixed assets), the larger the increase in profits as sales rise and the larger the increase in loss as sales fall.

$$X = \frac{F}{S - V} = \frac{40, 05, 515.60}{1801 - 712} \Rightarrow 3678 \text{ Units}$$

If sales exceed break-even point, profit arises and if sales fall below the break-even point, loss emerges. Hence, break-even point is also termed a point at which loss ceases and above which profit begins. As the study is done for a year, at the current costs and sales price 3678 scans need to be done to achieve break-even in annual costs. Any scans done above 3678 would be profitable for that year for the organisation.

The Volume of activity and the profits as against the Break-even sales at CT scan facility of this hospital in the previous years were: 3505 & 4329.

TABLE 2: COMPARISION OF SCANS DONE IN PRECEEDING 3 YEARS:

Years	B. E. S.	Scans	Less / excess	Loss/profit (in rs.)
Year 1	3678	3505	-173	-7785
Year 2	3678	4329	651	29, 295
Year 3	3678	4040	362	16, 290

After performing the study, I am in full agreement with some of the points raised by Mario D' Souza regarding the relevance of cost analysis and cost concepts. [12]

1) With cost analysis an institution or enterprise can predict in advance whether a profit is possible on certain level of performance.
2) Data on costs helps in fixing minimum price for the tests to be performed without incurring huge losses.
3) It also points out to loop holes of wasteful or unnecessary expenditure related to scarce resources.
4) It measures the efficiency of the test carried out in the past and points to the measures to be undertaken in rectifying inefficiency.
5) It helps the institution or organisation in necessary planning, forecasting and budgeting.
6) It determines the breakeven point wherein revenue equals expenditure and pinpoints level of activity for possible profits if any.

CONCLUSION:
As the CT scan facility in this Hospital is achieving the breakeven, the stress is on the marketing strategies (health card, comprehensive health check-up etc.) that can be developed to achieve more profits for the organisation to invest the savings into a second source of revenues. Networking the resources with the local hospitals can be considered, as they are the ones who refer the cases more, to increase the sales of the equipment.

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