LECTURE 6

BUSINESS DECISION MAKING

OBJECTIVES

On completion of this lecture, you should able to:

- **Outline the decision making process;**
- **Explain the approaches or models managers use to make decisions;**
- **Explain the Relevant Costs for decision making;**
- **Distinguish between fixed costs and variable costs;**
- **Use the knowledge of this distinction to deduce the breakeven point for some activity.**

6.1 DECISION MAKING

6.1.1 Definition: *Decision-making is a process of choosing a course between alternatives for the purpose of a desired result* (Downey, 1987). From the above definition it can be seen that decision making:

- Is an active process in which the manager is aggressively and personally involved;
- Involves choosing: there should be alternatives to choose from and they must be feasible and realistic;
- Is purposeful: should have a clear goal in mind. It should also be feasible and specific.

6.1.2 Decision making process

The process of decision making has been outlined below:-

1) ***Problem identification***: it is easy to confuse symptoms with the real problem e.g. the problem may seem to be low profits, when low profits are simply the result of an inefficient, high cost distribution system. Certain tools for problem identification can be used e.g. the cause and effect diagram/fish bone structure etc;
2) ***Summary of facts***: this step brings to the surface and highlights information pertinent to the problem and its solution;
3) ***Coming up with alternatives***: identify and list feasible alternative solutions, explore various possibilities. N.B Only feasible solutions should be considered;
4) ***Analysis:*** weighing the costs and benefits of each alternative;
5) ***Action***: Carrying out the chosen alternative.

6.2 MODELS OF DECISION MAKING

The approach managers use to make decisions usually falls into one of the two types, *the classical model or the administrative model*. The choice of the model depends on the manager's personal preference, whether the decision is programmed or non- programmed, and the extent to which the decision is characterized by risk, uncertainty and or ambiguity (availability of the necessary information). The two types of model have been discussed below:

6.2.1 Classical Model

A model of decision- making based on the assumption that managers should make logical decisions that will be in the organization's best economic interests. The classical model is considered to be *normative (quantitative decisions),* which means that the approach defines how a decision maker should make decisions and provides guidelines for reaching an ideal outcome for the organization.

In recent years, the classical approach has been given wider application because of the growth of quantitative decision techniques and the use of computers. Examples of quantitative techniques include decision trees, breakeven analysis, linear programming, replacement models, forecasting, transportation models etc.

Assumptions

1. The decision maker operates under conditions of certainty; possessing complete information. All alternative courses of action are known and potential results can be calculated;
2. The decision maker operates to accomplish objectives that are known and agreed upon. Targeted problems are precisely formulated and defined (Objective function) e.g. maximization of profit or minimization of total costs;
3. Criteria for evaluating alternatives are known. The decision maker selects the alternative that will maximize the economic return to the organization;
4. The decision maker is rational and uses logic to assign values, order preferences, evaluate alternatives and make the decision that will maximize the attainment of organisation objectives.

Advantages

- Helps decision makers be more rational e.g. many senior managers do not use a systematic process for making decisions but rely solely on intuition and personal preferences;

- Most valuable when applied to programmed decisions and to decisions characterized by certainty or risk, because relevant information is available and probabilities can be calculated.

Disadvantage

- It represents an ideal model of decision making that is quite unattainable by real people in real organizations.

6.2.2 Administrative/ (Descriptive) Model

A decision making model that describes how managers actually make decisions in situations characterized by non programmed decisions, uncertainty and ambiguity.

The administrative model is based on two concepts:

* *Bounded rationality*: people have the time and cognitive ability to process only Limited amount of information on which to base decisions;
* *Satisfice*: to choose the first solution alternative that satisfies minimal decision criteria regardless of whether better solutions presumed to exist.

Assumptions

- Decision objectives are vague, conflicting and lacking in consensus among managers. Managers often are unaware of problems or opportunities that exist within the organisation;
- Rational procedures are not always applied and when they are, they are confined to a simplistic view of the problem that does not capture the complexity of real organizational events;
- Manager's search for alternatives is limited because of human, information and resource constraints;
- Most managers settle for satisfying rather than a maximizing solution. This is partly because they have only vague criteria for what constitutes a maximizing solution.

Another aspect administrative decision making is intuition: the immediate apprehension of a decision situation based on past experience but without conscious thought.

6.3 RELEVANT COSTS FOR DECISION MAKING

The costs which should be used for decision making are often referred to as "relevant costs". CIMA defines relevant costs as "costs appropriate to aiding the making of specific management decisions"

To affect a decision a cost must be:-

a) Future: Past costs are irrelevant, as we cannot affect them by current decisions. For example a sunk cost: a cost incurred in the past that cannot be retrieved as a residual value (the value of an asset remaining unused at the end of the project) from an earlier investment. A sunk cost is not an opportunity cost and thus is not included among the costs when a proposed project or other investment is analyzed; only future return to future cost is considered. In economics sunk costs is equivalent to fixed costs in short term decision making;

b) Incremental: Meaning an expenditure which will be incurred or avoided as a result of making a decision. *Any costs which would be incurred whether or not the decision is made are not said to be incremental to the decision.*

Opportunity cost

Relevant costs may also be expressed as opportunity costs. An opportunity cost is the benefit foregone by choosing one opportunity instead of the next best alternative. It is the value of benefit sacrificed in favor of an alternative course of action.

Exercise 6.1 Relevant costs and opportunity costs

Kapiriposhi glass Ltd has been approached by a customer who would like a special job to be done for him, and is willing to pay $60,000 for it. The job would require the following materials.

Material	Total units required	Units already in stock	Book value of units in stock $/unit	Realizable value $/unit	Replacement cost $/unit
A	1000	0	-	-	16.00
B	1000	600	12.00	12.50	15.00
C	1000	700	13.00	12.50	14.00
D	200	200	14.00	16.00	19.00

1. Material B is used regularly by Kapiriposhi glass Ltd, and if units are required for this job, they need to be replaced to meet other production demands;

2. Materials C and D are in stock due to previous over buying, and they have restricted use. No other use could be found for material C, but the units of material D could be used in another job as a substitute for 300 units of material E, which currently costs $15 per unit(of which the company has no units in stock at the moment)

Required

Calculate the relevant costs of material for deciding whether or not to accept the contract. You must carefully and clearly explain the reasons for your treatment of each material.

Solution

a) Material A is not yet owned. It would have to be bought in full at a replacement cost of $16 per unit.

b) Material B is used regularly by the company. There are existing stocks (600 units), but if these are used on the proposed contract a further 600 units would have to be bought to replace them. Relevant costs are therefore 1, 000 units at the replacement cost of $15 per unit.

c) 1,000 units of Material C are needed and 700 units are already in stock. If used for the proposed contract, a further 300units must be bought at $14/unit.The existing stocks of 700 will not be replaced. If they are used for the contract, they could not be sold for $12.50/unit. The realizable value of these 700units is an opportunity cost of sales revenue foregone.

d) The required units of Material D are already in stock and will not be replaced. There is an opportunity cost of using D in the proposed contract because there are alternative opportunities either to sell the existing stocks for $16/unit($3200 in total) or avoid other purchases(of material E), which would cost 300x $ 15=$4500. Since substitution for E is more beneficial, $4500 is the opportunity cost.

e) Summary of relevant costs

	$
Material A(1,000 x $16)	16,000
Material B (1,000x $ 15)	15,000
Material C (300 x $14) + (700 x $ 12.50)	12,950
Material D	4,500
TOTAL	**48,450**

Since total revenue exceeds total cost by $11,550, Kapiriposhi glass Ltd would be advised to accept the proposed contract.

6.4 BREAKEVEN ANALYSIS/COST VOLUME ANALYSIS

It is particularly important that every agribusiness manager knows what activity levels they need to operate in order to produce profits. Break even analysis is a tool used to show the level of business necessary to break even and to earn a specific amount of profit under various cost and price assumptions. The basic concept is the breakeven point which is that volume of production where costs exactly equal revenue, resulting into neither loss nor profit. As a tool, the breakeven analysis involves a thorough examination of those parameters or variables like profit, cost and price which determine the economic viability of a business/project. It assists management not only in determining the breakeven point, but also is an essential part of yearly/annual budgeting or project planning. The basic traditional model relates total revenue/sales and total costs at a certain level of volume. The breakeven analysis given in a graphic or algebraic form helps decision makers identify how many units are required to achieve a desired level of profitability.

6.4.1 The Behavior of Costs

Costs represent the resources that have to be sacrificed to achieve a business objective. The objective may be to make a particular product or provide a particular service etc. Costs may be broadly classified as fixed costs and variable costs.

Fixed costs

They do not fluctuate with the volume of business. They remain fixed (the same) regardless of changes in volume of activity e.g. rent, insurance, lease payments etc. Fixed costs are depicted by the horizontal line, showing that regardless of the sales volume/volume of output, FCs remain the same. However as sales or volume of output increases, the fixed costs per unit of output or sale continue to drop. The implication to the agribusiness manager is that, in order to operate at efficient levels he/she should exploit the economies of scale.

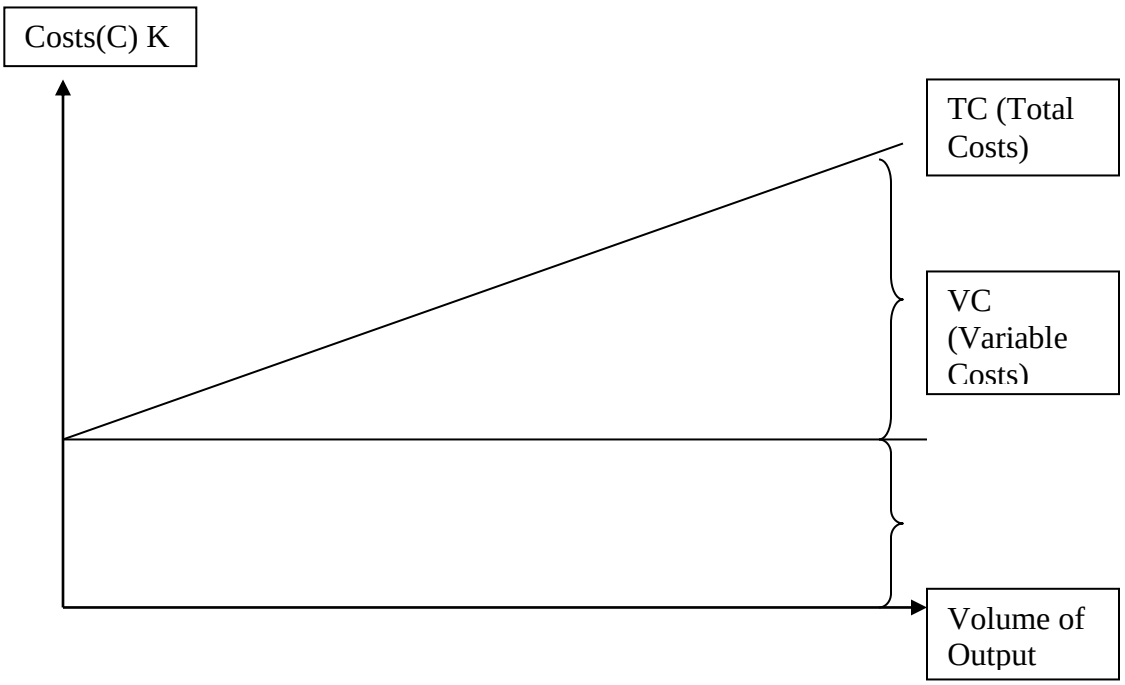
NB: *'Fixed' in this context means only that the cost is not altered by changes in the volume of activity* e.g. fixed costs are likely to be affected by inflation (rent goes up because of inflation but

not because of a change in volume of activity). Fixed costs are almost time based, i.e., they vary with the length of time concerned. The rental charge for 3 months is normally thrice that for one month. N: B Thus fixed costs vary with time, but (of course) not with the volume of output. *We should note that when we talk of fixed costs being, say ZMW600 we must add the period concerned, say, ZMW600 per month.*

Variable costs

These are costs that vary with the volume of activity e.g. raw materials, electricity etc. As with many types of business activity, variable costs tend to be relatively few in comparison with fixed costs: i.e., fixed costs tend to make up the bulk of total costs. Variable costs (VC) can be represented graphically as in Figure 6.1. At zero volume of activity the variable cost is zero on the graph implying that the variable cost will normally be the same per unit of activity/output/sales.

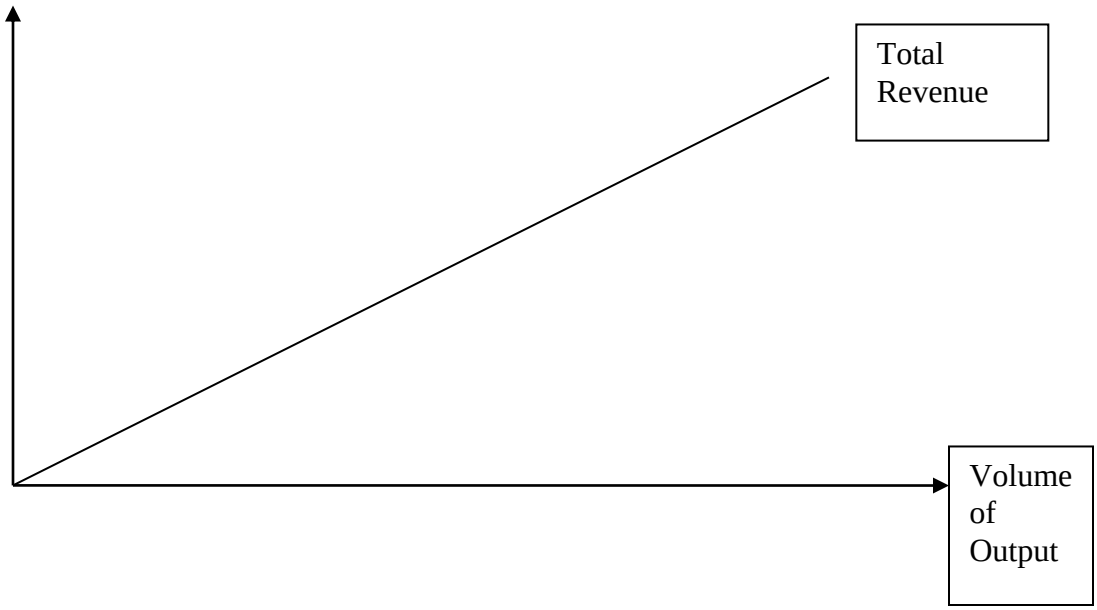
Fig: 6.1 Graph of total cost against the volume of activity/units of output



6.4.2 Revenue structure

Total Revenue line is a straight line starting at zero, showing that at zero level production there are no sales.

Figure 6.2 Graph of Revenue structure



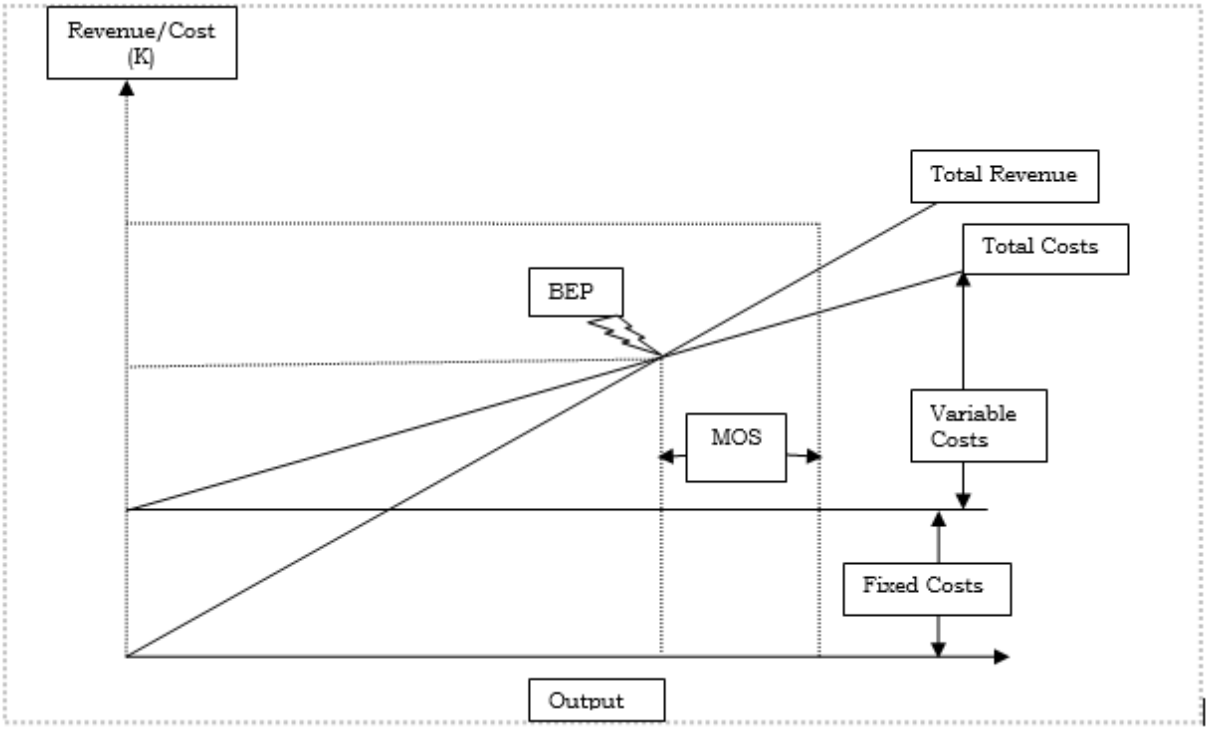
6.4.3 Breakeven Point Structure

If we superimpose, onto the total cost graph in Figure 6.1, a line representing total revenue for each volume of activity, we obtain the breakeven chart shown in the Figure 6.3 below. The profit (total sales revenue less total cost) at various volumes of activity is the vertical distance between the total sales revenue line and the total cost line at a particular volume of activity. Where the volume of activity is at **breakeven point (BEP)**, there is no vertical distance between these lines (total sales revenue equals total costs) and so there is no profit or loss; i.e., when the activity is below breakeven point, a loss will be incurred because total costs exceed total revenue. Where the business operates at a volume of activity above breakeven point, there will

be a profit because total sales revenue will exceed total costs. *The further below the BEP, the higher the loss and the further above BEP, the higher profit.*

The extent to which the planned volume of output or sales lies above the breakeven point is known as the **margin of safety**. It is the amount which actual output/sales may fall short of the budget without a loss being made, often expressed as a percentage of the budgeted sales volume. The relative margin of safety is directly linked to the relationship between selling price per unit, the variable costs per unit and the fixed costs.

Figure 6.3 Graph of breakeven point structure



Margin of safety (MOS): extent to which the planned volume of output or sales lies above the breakeven point.

As we may imagine, deducing the breakeven points by graphical means is laborious business. Since the relationships in the graph are all linear, it would be easy to calculate the breakeven point.

6.4.4 Algebraic Model

Involves the use of mathematical equations

Notations

R = Total Revenue

C = Total Costs

V = Variable Costs

F = Fixed Costs

X = Volume of output

r = Variable Cost per unit

P = Selling price per unit

At breakeven point, Total sales revenue = Total costs

i.e. Total sales revenue = Fixed costs + Total variable costs

$= F + V$

But $F + V = F + X. r$

And Total Revenue $(R) = X. P$

Thus $XP = F + Xr$

$X (P – r) = F$

Therefore volume of output at breakeven point is given by:

$$X = \frac{F}{P - r}$$

$$\frac{\text{Fixed costs}}{\text{Selling price per unit– variable cost per unit}}$$

To determine a certain level of profitability (K)

Where R – C = K

XP – (Xr + F) = K

$$X = \frac{(K + F)}{(P - r)}$$

6.4.4.1 Contribution

The bottom part of the breakeven formula i.e. sales revenue per unit less variable costs per unit (P –r) is known as contribution per unit. It is a useful figure to know in decision making context. It is called 'contribution' because it contributes to meeting the fixed costs and if there is any excess, it also contributes to profit.

Exercise 5.2

Lubinda industries Ltd makes floral pots. The fixed costs of operating the workshop for a month total $500. Each pot requires materials that cost $2. Each pot takes two hours to make and the business pays the pot maker $5 an hour. The pot makers are all on contracts such that if they do not work for any reason, they are not paid. The pots are sold to a wholesaler for $14 each.

1) What is the breakeven point for the pot making business? (The breakeven point should be given in number of pots)

$$= \frac{\text{Fixed costs}}{\text{(Sales revenue per unit – variable costs per unit)}}$$

$$= 500/ [14 – (2 + 10)]$$

$$= \textbf{250 pots}$$

Example 2

Supposing the industry expects to sell 500 pots a month. The business has the opportunity to rent a pot-making machine. Doing so would increase the total fixed costs of operating the workshop for a month to $3,000. However, the machine would reduce the labour time to one hour per pot. The pot maker would still be paid $5 an hour.

(a) How much profit would the business make each month from selling pots?

(i) Assuming that the pot making machine is not rented and;

(ii) Assuming that it is rented.

(b) What is the breakeven point if the machine is rented?

(c) What is the contribution per unit for the pot making activity?

(i) Without the machine;

(ii) With the machine.

(d) What do you notice about the figures you calculate?

(e) What is the margin of safety?

(i) Without the machine;

(ii) With the machine.

- **What advice would you give Lubinda industries Ltd about renting the machine, on the basis of the values for margin of safety?**

ANSWERS

(a) Estimated profit, per month, from pot making

	Without the Machine		**With the Machine**	
	$	**$**	**$**	**$**
Sales (500 x $14)		7,000		7,000
Less materials (500 x $2)	1,000		1,000	
Labor (500 x 2 x $5)	5,000			
(500 x 1 x $5)			2,500	
Fixed Costs	500		3,000	
Total costs		6,500		6,500
Profit		**500**		**500**

(b) Break even point with the machine

= Fixed costs

(Sales revenue per unit – variable costs per unit)

= 3,000

14 – (2 + 5)

= **429 pots**

(c) Contribution = (P – r)

(i) Without the machine

= $14 – ($2+$10)

= **$2**

(ii) With the machine

= $14 – ($2+$5)

= $7

(d) Comment on the figures:

There seems to be nothing to choose between the two manufacturing strategies regarding profits at the estimated sales volume. There is, however, a distinct difference between the two strategies regarding the breakeven point. Without the machine, the actual volume of sales could fall by a half of that which is expected (from 500 to 250) before the business would fail to make a profit. With the machine, however, a 14 percent fall from (500 to 429) would be enough to cause the business to fail to make a profit. On the other hand, for each additional pot sold above the estimated 500, an additional profit of only $2 (that is, $14 – ($2 + $10) would be made without the machine, whereas $7 (that is $14 – ($2 + $5) would be made with the machine. (N: B knowledge *of the break-even point and the planned volume of activity give some basis for assessing the riskness of the activity).*

(e) Margin of Safety

	Without the Machine (Number of pots)	With the Machine (Number of pots)
Expected Volume of sales	500	500
Break-even point	250	429
Difference (margin of safety)		
Number of pots	250	71
Percentage of estimated volume of Sales	50%	14%

(ii) **Advice regarding the margin of safety**.

It is a matter of personal judgment, which in turn is related to individual attitudes to risk, as to which strategy to adopt. Most people, however, would prefer the strategy of not renting the machine, since the margin of safety between the expected volume of activity and the break-even point is much greater. Thus, for the same level of return the risk will be lower without renting the machine.

6.4.5 Applicability

(i). **Planning for new products**: assists production and market research managers to decide on what new products to add what old products to drop to get profits. Different break even charts can be used to appraise different product policies. It would enable the principal examination of the appropriate product mix, identification of profitable or unprofitable lines of products;

(ii) **Determining product prices and pricing**: break even analysis tool is useful in relating the price and volume sensitivity so that the firm can take advantage of elasticity of demand;

(iii) **Choosing promotion strategy:** Managers can use break even analysis to select the best from the different advertising media;

(iv) **Choosing the physical distribution channels**: break even analysis is employed to assess whether an organization should maintain its current structure of its distribution network, change them or use other firms' channels;

(v) **Make or buy decision:** break even analysis helps management in the optimal allocation of its resources in deciding to make all the components of the products or buy some of them from outside the firm;

(vi) **Lease or own decision:** the break-even analysis model makes it possible for managers to determine whether it is possible to lease or own machinery/equipment in order to maximize profits;

(vii) **Budgeting control**; forming a conceptual framework for budgetary controls, profit planning and process selection. Points to management what could happen to the break even point and to profit as a result of changes in volume or any other proposed course of action;

(viii) **Improving and balancing sales**;

(ix) **Wage and salary policy determination** e.g. the effect of a wage increase or decrease on the profit margins.

General applicability of break-even analysis models; reflects the industrial importance of break-even analysis.

6.4.6 Critique of Break Even Analysis

(i) **Assumes availability of information and stable conditions** to be able to predict trends of fixed and variable costs. The degree to which we can base decisions on break-even analysis depends on the extent to which these assumptions will affect decisions. This leads to the pitfalls of the model;

(ii) **Adequacy /validity of data:** the cost volume analysis can be reasonable and sound only if a firm in question has a good accounting system and procedures such that figures are adequately valid. This is rare in many firms, especially in developing countries. Book keeping may affect the cost revenue figures;

(iii) **Linearity of curves can operate in the relevant range i.e. short run over a given range of period.** In the long run the curve may be curvilinear e.g. when the firm expands. Therefore it is suitable for the short run not the long run. For in the long run costs may not be easily classified as variable/fixed costs besides most fixed costs are not fixed over all volumes of activity. They tend to be stepped. Therefore great care must be taken in making assumptions about fixed costs. The problem is particularly heightened because most activities will probably involve fixed costs of various types (rent, supervisory salaries, administration costs,) all of which are likely to have steps at different points.

N:B This is probably not a major problem, since break even analysis is normally conducted in advance of the activity actually taking place. Our ability to predict future costs revenues etc. is somewhat limited; hence what are probably minor variations from strict linearity are unlikely to be significant compared with other forecasting errors.

(vi) **The assumption that other things are constant is not realistic there are other factors that affect a firms efficiency** e.g. the dynamic Business environment – static device which provides an over simplified relationship of cost volume – revenue relationship. Each of these parameters affects and is affected by outside factors e.g. political, social which cannot be plotted on a graph for us to enjoy the visual picture. So BEA may not be useful in highly changing atmospheres.

(vii) **Indiscriminate treatment of factors:** It tends to lump together a group of products; both bad and good performing points are viewed as one group. When this situation is so vague the performing departments cannot be distinguished from the non-performing areas. Hence it brings about a potential problem to decision makers. E.g. there is the

problem of identifying the fixed costs of one particular activity. Fixed costs tend to relate to more than one activity. For example two activities may be carried out in the same rented premises. Although there are ways of dividing FC between activities, but these tend to be arbitrary which raises questions as to the value of breakeven analysis.

6.6 Conclusion

When analyzing risk, it is important to remember that it is impossible to anticipate all possible risks and alleviate them. The best you can do is to identify as many of them as possible, and anticipate solutions to handle them before they occur.