A Study on the Organizational Output by Concluding Break Even -Point through the Application of Matlab Simulink Method

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ABSTRACT:

A strategy that integrates an organization's marketing goals into a cohesive whole, ideally drawn from market research, focuses on the ideal product mix in order to achieve maximum profit potential; the marketing strategy is set out as a marketing plan, a good idea, method, information, object, or service that is the end result of a process and serves as a need or want satisfier. It is usually a bundle of tangible and intangible attributes (benefits, features, functions, uses) that a seller offers to a buyer for purchase .Unlike the business's variable costs, the fixed costs are not directly related to the creation of the products and services. Fixed costs are the costs incurred as a result of operating the business, such as overhead expenses, depreciation, rent, insurance and taxes. In the present study calculation has been done by assigning different parameter to any organization and finding Break-Even analysis by the use of Matlab Programming (simulation).

Keywords: *Mathematical programming, Operation Management, Optimization, Simulation*

INTRODUCTION

Management structure determines how a firm's goals can be best achieved through identification and satisfaction of the customer's stated and unstated needs and wants, a situation in which the supply of an item is exactly equal to its demand. As there is neither surplus nor shortage in the market price tends to remain stable in this situation. There is also a path through which goods and services flow in one direction (from vendor to the consumer) and the generated payments flow in the opposite direction (from consumer to the vendor); in other words in such a situation a distribution channel can be as short as being direct from the vendor to the consumer or may include several interconnected intermediaries such as wholesalers, distributors, agents, retailers. Each intermediary receives the item at one pricing point and moves it to the next higher pricing point until it reaches the final buyer, also called channel of distribution, a planned mix of the controllable elements of a product's marketing plan commonly termed as 4Ps: product, price, place, and promotion, these four elements are adjusted until the right combination is found that serves the needs of the product's customers, while generating optimum income. Sometimes the first P (Product) is substituted by presentation, the following article gives the simulated results on organizational structure of different parameter analysis with manual error function generation and how the sales volume effected on the error introduction.

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Break-Even Point

The break-even point is the point where the business's sales have generated enough income to cover all of its fixed costs and expenses. At that point, all of the business's (Vienneau, 1970) incoming revenue is profit as long as the expenses and costs are not increased and the sales amounts are not reduced (Graham, 2001; Opocher and Steedman, 2009).

Formula

The break-even point is calculated by dividing the business's fixed expenses by its margin. The margin is determined by subtracting the business's total variable expenses from its total net sales amount. The margin reflects the percentage of revenue that remains after the business pays all of its expenses. It is the margin that represents the total profit after expenses (Graham, 2001). The business's total variable expenses are calculated by adding the business's total cost of goods sold to its selling expenses. The totals needed to determine the business's break-even point are located on the business's income statement, also referred to as the earning statement or profit and loss statement (Garegnani, 2001; Aswal, 2012; Aswal and Singh, 2012).

Decisions

The break-even point identifies the total amount of sales the business needs before profit can be earned. When analyzed closely, the break-even analysis also helps the business to identify excessive fixed costs (Alan, 1989; Dutt, 2005). Since the break-even point is directly related to the fixed costs, reducing and controlling these costs aids the business in achieving a lower break-even point for quicker profitability.

Fixed Costs

These costs are incurred even when the business is not in active operations, such as on holidays, in severe weather and during normal non-operating hours (Bouman, 2011), (Humphrey, 1992). There are a wide array of decisions and changes the business can implement to reduce and control fixed costs. Some decisions may include shopping around for competitive insurance rates, implementing a paperless work environment, paying bills on time to reduce interest rates and implementing (Brownlie, 1963; (Samuelson, 2000) a quality control or quality assurance program to improve accuracy and efficiency. Strategic decisions, such as these, have direct and indirect effects that reduce the business's cost of operation and breakeven point.

Contribution Margin

Contribution margin is the amount remaining from sales revenue after variable expenses have been deducted. Thus it is the amount available to cover fixed expenses and then to provide profits for the period (McGuigan, 2001; Hirshleifer, 2005) Contribution margin is first used to cover the fixed expenses and then whatever remains go towards profits. If the contribution margin is not sufficient to cover the fixed expenses, then a loss occurs for the period. This concept is explained in the following equations:

Sales revenue − Variable cost* = Contribution Margin

*Both Manufacturing and Non Manufacturing

Contribution margin − Fixed cost* = Net operating Income or Loss

*Both Manufacturing and Non Manufacturing

For further clarification of the basic concept of cost volume and profit Analysis (CVP analysis) we now take an example.

In the linear Cost-Volume-Profit Analysis model, the break-even point (in terms of Unit Sales (X)) can be directly computed in terms of Total Revenue (TR) and Total Costs (TC) (Aswal, 2012; Aswal and Singh, 2012) as:

TR=TC
P x X= TFC + V x X
P x X – V x X = TFC
(P-V) x X= TFC
X= TFC/(P-V)

Where:

TFC is Total Fixed Costs,
P is Unit Sale Price, and
V is Unit Variable Cost.

The Break-Even Point can alternatively be computed as the point where Contribution equals

Fixed Costs (Danes, 1989; Vienneau, 2005; Aswal, 2012).

The quantity (P-V) is of interest in its own right, and is called the Unit Contribution Margin (C): it is the marginal profit per unit, or alternatively the portion of each sale that contributes to Fixed Costs (Cohen, 1983; McGuigan, 2001; Aswal, 2012). Thus the break-even point can be more simply computed as the point where Total Contribution = Total Fixed Cost:

Total Contribution = Total Fixed Costs
Unit Contribution X Number of Units = Total Fixed Costs
Number of Units = total fixed costs/ Unit Contribution

In currency units (sales proceeds) to reach break-even, one can use the above calculation and multiply by Price (Colin, 1989) or equivalently use the Contribution Margin Ratio (Unit Contribution Margin over Price) to compute it as:

Break-Even (in Sales) = Fixed Costs/ C/P

R=C, Where R is revenue generated, C is cost incurred i.e. Fixed costs + Variable Costs or Q x P (Price per unit) = TFC + Q x VC (Price per unit), Q x P - Q x VC = TFC, Q x (P - VC) = TFC, or, Break Even Analysis Q = TFC/c/s ratio=Break Even.
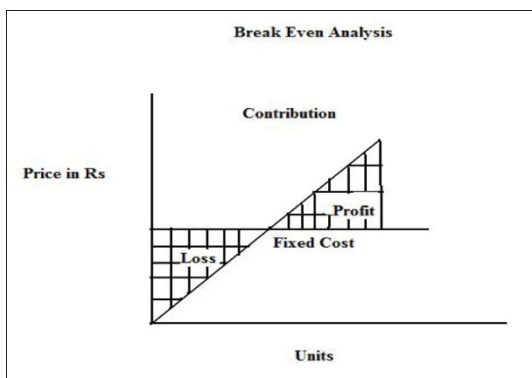

Figure 1: Break –Even Analysis (as per Contribution)

Transfer Function Model for Contribution Analysis System

In any business the estimated Fixed costs is remains constant at the time of calculation, in this way the introduction of contributory Transfer Function came, in this transfer function

Following data set is assigned.

F1(t) = 2 at (t=0) ----------denotes the Fixed Cost

F2(t) = t+1------------------denotes Contribution.

The complete company performance is denoted by the Transfer function dividing F1(s) by F2(s) ------------------------------ T(s) = F2(s)/F1(s).
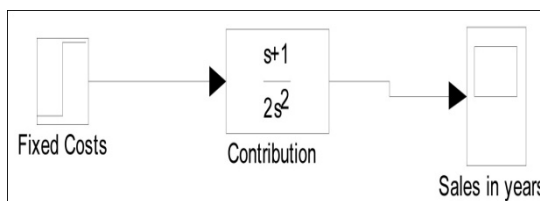

Figure 2: Model of Organization

Sales in year is a Scope which defines the output of a company and decides the projected
Break – Even point at different time intervals in year. Fixed cost is decided by the constant step function, as the contribution added to the organization and sales in the form of desired output to an organization as per figure 2.
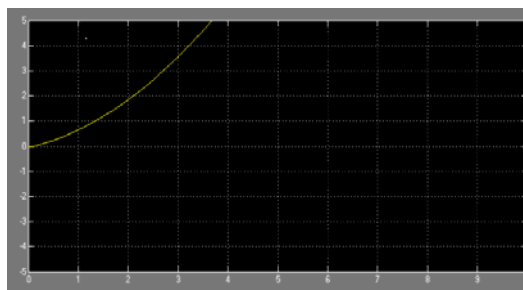Figure 3 shows organizational contribution.

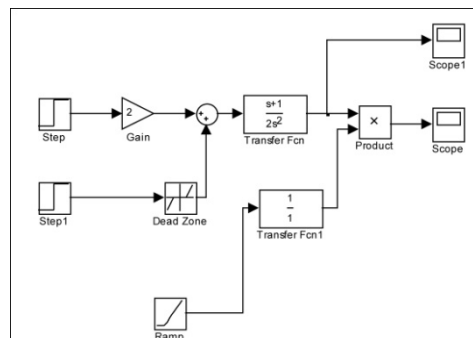**Figure 3: Organizational Contribution**

Figure 4: Simulink Model

Introduction to Error Signal

In the above model though we are giving step input signal to the system, both product line containing error function is dead zone to the product and simply a step input with gain 2, dead zone signifies deformation in product line in a system and normal operating product line increases the gain in a system, ramp signifies the growing organization system which may be an external environment factor this may inherit the properties of any organization system and may shift the break-even point of system as indicated on scope. Whereas scope 1 is the actual output of system, introduction to step signal given to figure 5 (a), which is denoted by scope 1 in Simulink model, as per the ramp input to the function cumulative output of an organization improves given by scope in Simulink model in figure 4.
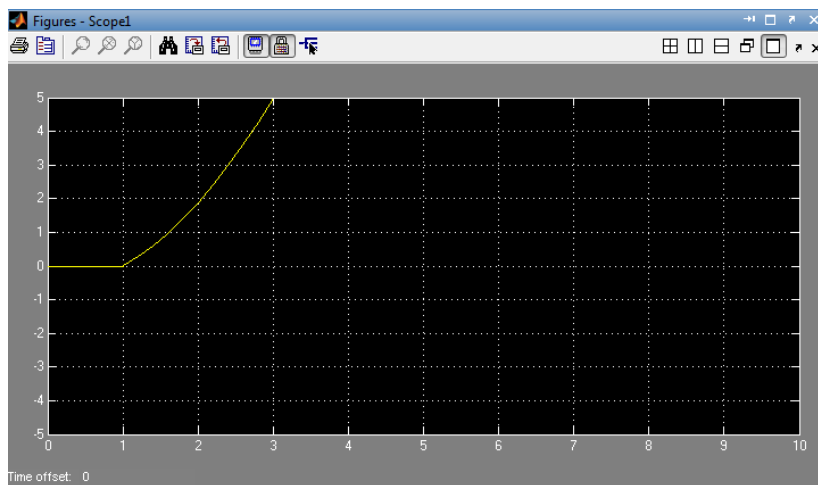

Figure 5 (a): Scope 1 (Contribution without Ramp)

Figure 5 (b): Scope (Contribution with Ramp)

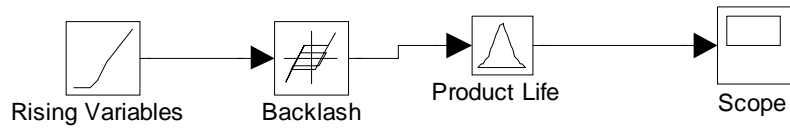**Different Abnormalities under the Growth of Product Life Span**

Figure 6: Model 1
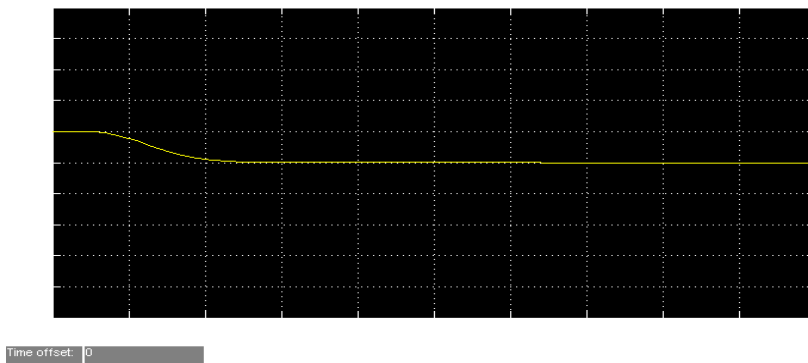

Time offset: 0

Figure 7: Curve of Product Life Cycle

a) The rising variable defined in the given model is a Ramp function, error introduced in a given model is Backlash and Product life is Matlab Variable of Desired Bandwidth (figures 6 and 7).
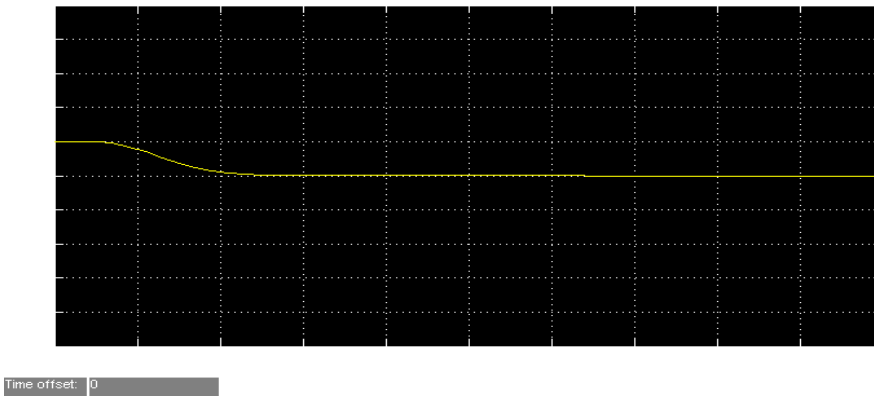

Time offset: 0

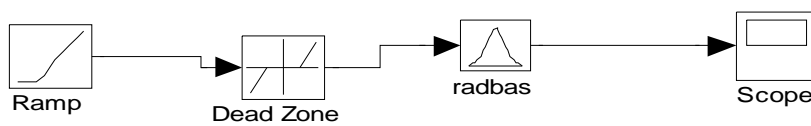**Figure 8: Smooth Decay of Product Life Cycle**

Figure 9: Model 2

b)The rising variable defined in the given model is a Ramp function, error introduced in a given model is Dead Zone and Product life is Matlab Variable of Desired Bandwidth (figures 9 and 8).
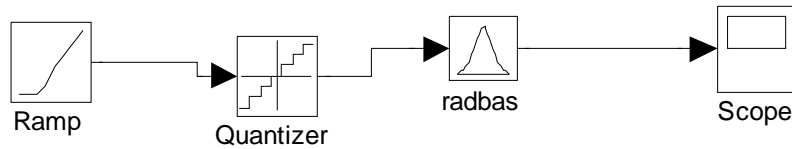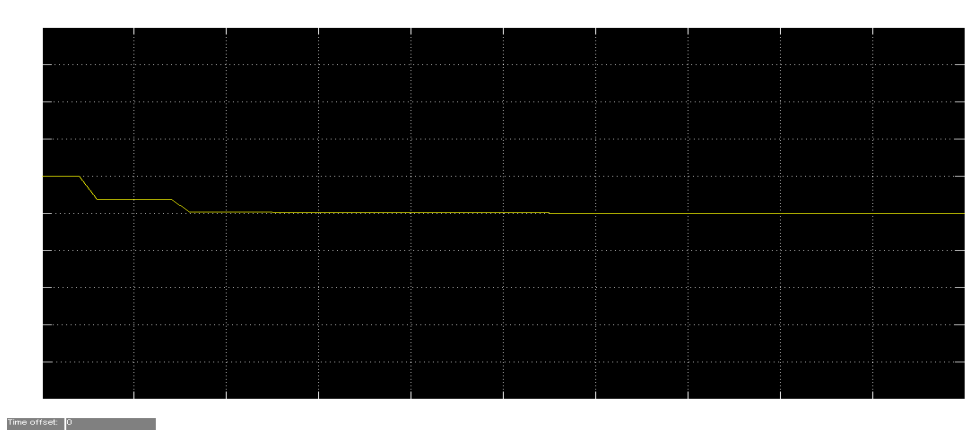

Figure 10: Model 3

Figure 11: Step Decay of Product Life Cycle

c) The rising variable defined in the given model is a Ramp function, error introduced in a given model is Quantizer and Product life is Matlab Variable of Desired Bandwidth (figures 10 and 11).

RESULTS

The results shows that every product must reach to its saturation level due to different error function will introduced in any system (say any organization), it may be
a) Due to competition
b) Consumer behavior
or any other factor, this is the end of old product and the existence of new product which will be introduced in a system.

CONCLUSION

The following output Graph depicts the waveform, which decides the different Break-Even points of an organization, as we seen in this graph this is shown by the parabolic characteristic curve and each point in the curve states that different parameter which is variable (ie fixed cost is a constant Quantity and variable parameter is only the contribution cost as it a short of compensation). Thus we can predict the possible contribution applied to maintain the profit-loss situation, keeps helpful in managing and organizing the Resources, even after generating the error signal like dead zone (denotes the extinction of product in product line), it has to decide that product should keep out from a product line. The introduction of different error signals gives the nature of product life cycle curve as well as the organizational growth; the researchers can also depict the nature of product life cycle to such an estimated output by applying certain more constraints on the basis of a different error pattern.

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