A Financial Model

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This short model sets out a study on a non-existent product which obeys economic norms. The number of products produced and demand are interdependent in this example and they affect the cost price and selling price which in turn affect the profit. When talking about demand it is important to state the amount of products demanded in a period of time for a given price (for example: The demand for item X is 500 items per week at a selling price of Lm4). In this example, the period of time will be fixed for all cases.

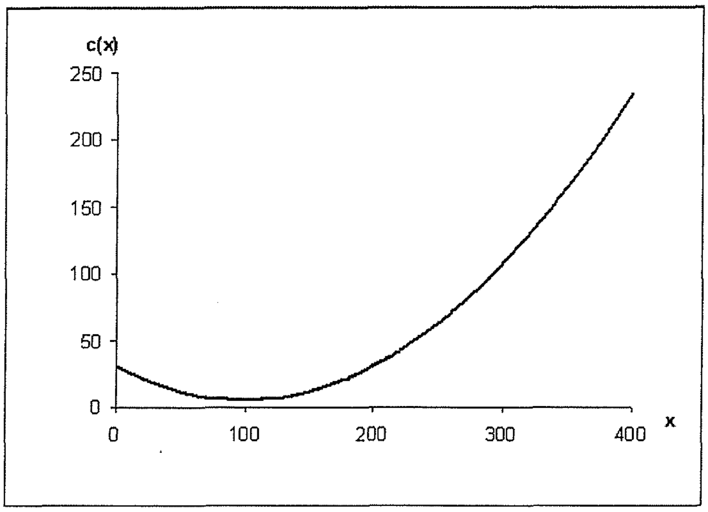

Figure 1: Production Cost

The costs of producing an item are classified as both variable and fixed costs. In my first definition of this product I took into consideration variable costs directly related to the production of the item (no transport costs). I wanted this item to cost Lm30 if one is produced and it reaches its optimum cost price (per item) when 100 items are produced and that would be Lm5 per item. So the cost price would diminish up to when 100 items are produced but it starts to increase when producing more than this number. Obviously a quadratic graph would fit this description with its minimum being at x=100. When solving simultaneously an equation $c(x) = ax^2 + bx + c$ such that $c(1) = 30, c(100) = 5$ and $c'(100) = 0$ it was found that the equation is $c(x) = \frac{25}{9801}x^2 - \frac{5000}{9801}x + \frac{299005}{9801}$ where x represents the number of items produced and $c(x)$ represents the cost price per product. The graph representing this equation is shown in Figure 1.

As mentioned above there are also post-production costs and fixed costs —named other costs in this example. Requiring the product to have an initial such cost of Lm11 and this diminishing gradually to Lm10 and staying at that cost at a certain amount, it was clear that an exponential function was required to display this. The function $o(x) = -e^{\frac{x}{100}} + 10$ where $o(x)$ represents other costs (per item) and x represents the number of items produced, shown in Figure 2.

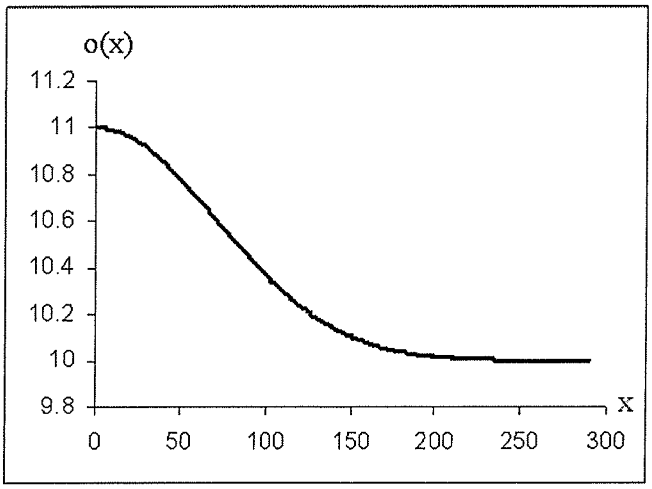

Figure 2: Post-Production Cost

There is the common notion that the cheaper an item is the greater is the demand. This is true but not in all cases since even demand has its optimum. The selling price per item changes with respect to the amount of items produced and the cost price. When not considering the cost price, the optimum selling price was to be when 200 items are produced and this would be at Lm 60. Similarly to the production cost price, a quadratic equation was needed and this was found out to be $s(x) = -\frac{1}{4000}x^2 + \frac{1}{10}x + 50$ where $s(x)$ represents the selling price. The graph depicting this quadratic is shown in Figure 3 on Page 11.

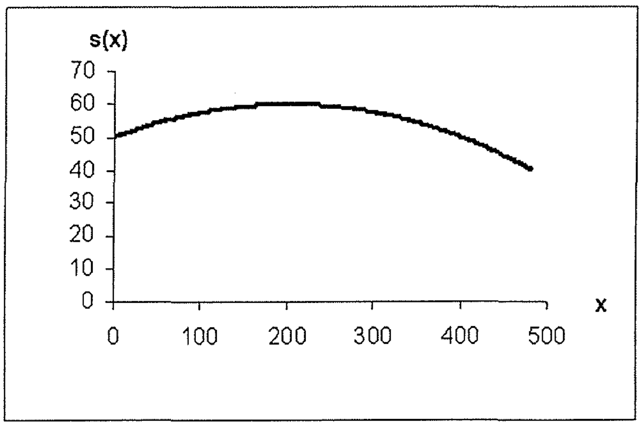

Figure 3: Selling price depending on the amount of products produced

The selling price was also determined to depend on the cost price such that $s(x) = \frac{c(x)}{4}$. So the selling price depends on the items produced and the cost price. This provides room for a 3–D diagram which would be helpful in many cases. The cost price however depends on the number of items produced and thus the above-mentioned 3–D diagram can be set to be a 2–D diagram as illustrated in Figure 4.

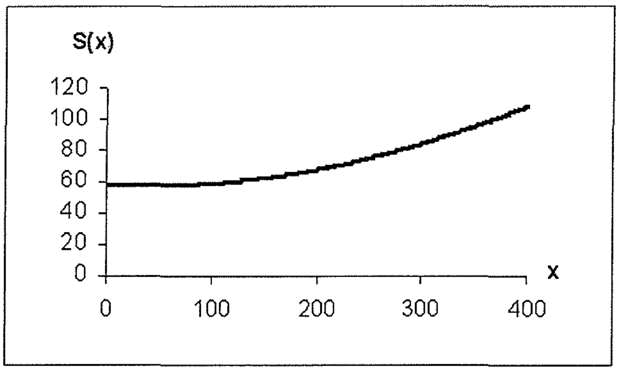

Figure 4: Selling price of each item depending on number of products produced and the latter's effect on the cost price

The profit per item would then be $p(x) = s(x) - c(x) - o(x)$. The maximum profit per item is reached when 110 items are produced and the profit at this amount is Lm 42.47. The total Profit, denoted $q(x)$, is equal to the profit per item multiplied by the number of items produced. Therefore $q(x) = x \times p(x)$. The maximum profit occurs when 153 items are produced at a profit Lm 5693.

Similarly the total cost is $x \times c(x)$ and the total sales is $x \times s(x)$. The graphs denoting these equations are shown in Figures 5 to 8.

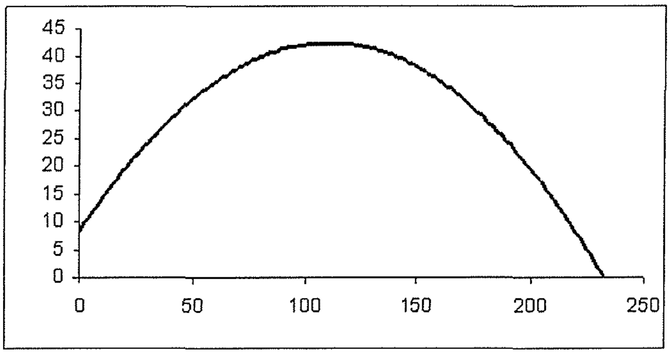

Figure 5: Profit per item

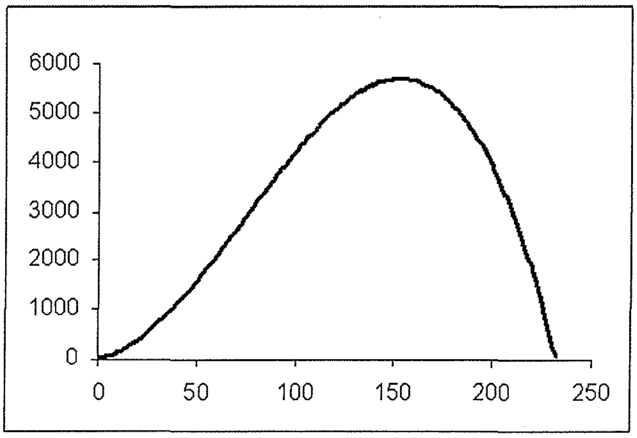

Figure 6: Total Profit

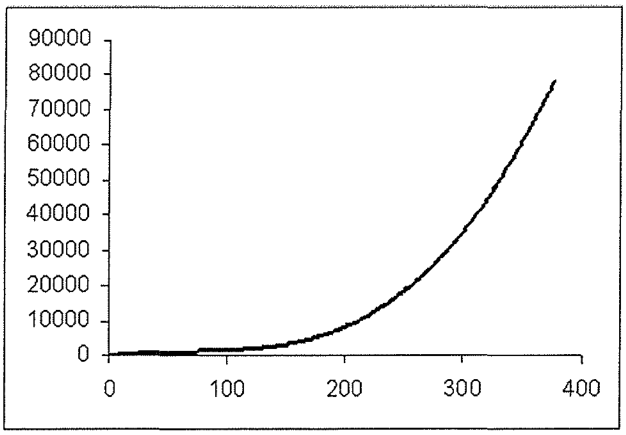

Figure 7: Total Cost

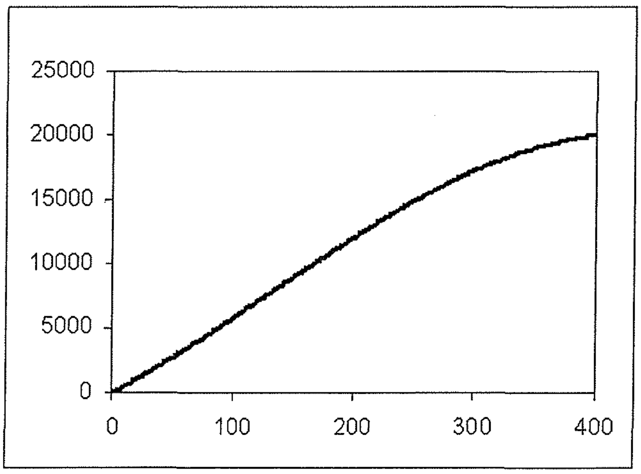

Figure 8: Total Sales

The conclusion is not necessarily obtained when the maximum profit is reached. The company that is doing this study may not necessarily have capitalist aims. It might be that it is a government company whose aim is so that the citizens have access to this particular product. Therefore in this case the company is interested in keeping the product selling price as low as possible without making a loss. In another circumstances this company could be a subsidiary and the mother company is only interested in investing a certain amount in it. Therefore it would set the total cost price at a maximum and see the maximum profit given that restriction. The conclusions and needs for this study are infinite and the use of 3-D graphing programs can be used in most cases in order to ease the reaching of a conclusion.