



AN OPTIMIZATION OF THE FINANCIAL RESULT BY THE PRICE ELASTICITY OF SALES METHOD

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Abstract

Nowadays, companies operate in conditions of market economy. These market conditions, although providing entrepreneurial freedom and opportunities for initiative, in their deepest essence are too vague and dynamic. This uncertainty is further exacerbated by the growing globalization. In such an economic environment, it is imperative that managers objectively assess and manage their business. The financial results of sales are key business indicators to assess the business activity. The latter is determined by various factors - direct and indirect. Revenues from sales are one of the direct factors. The magnitude of these revenues is determined by both sales volume and sales prices. In this regard, the selling price, as one of the determining factors regarding financial results should be subject to ongoing research by management. This study examines the method "price elasticity of sales" as one of the important tools for economic management. This is a method that provides the capability to optimize the ratio of "price – sales". Optimizing this ratio regarding specific products ensures maximum profit and increases the profitability of the enterprise. Continuous analysis to determine the elasticity of specific products in respect to their price suggests also the implementation of an adequate pricing policy. This study presents not only the analysis methodology but also an exemplary case study demonstrating the application of the model of the price elasticity of sales. The conclusion of the report highlights that maintaining optimal ratio between price and sales volume is a key factor to improve profitability. The dynamics of market factors requires that the elasticity of products should be continuously monitored and targeted corrected.

Keywords: Optimization, financial results, management, price elasticity of sales

1 INTRODUCTION

Market conditions, within which the business operates today, are characterized by competitiveness, dynamism, and uncertainty. In

such an economic environment, it is imperative that the managers objectively assess and manage their business. A key indicator of business activity assessment within a given reporting period is the financial result of sales. The positive financial result of sales (profit) leads to an increase in equity of the company. In this sense, profit is the main inner source of funding regarding new long-term

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investments of the enterprise. In this connection, the greater magnitude of profit is, the less the need to involve more expensive external capital sources is. This enables the company to finance itself.

The financial result is indirectly affected by the selling price of the product or service that a company offers to the market. The selling price, along with sales volume, determines the value of sales revenue. Achieving an optimal balance between the two factors - revenue from sales and selling price ("price-sales") would result in the desired financial results. In this regard, the selling price as one of the determining factors regarding financial results should be subject to consistent study by the management.

Certainly, the business activity is unthinkable without the usage of techniques and technologies for the study of price, as it ultimately makes a profit. This determines the desire of management to optimize the price, which on its part would lead to optimization of the financial result. Achieving optimal financial result requires a precise analysis of the effect as a result of the increase or decrease of the price.

The pricing of products within a competitive market environment, there are two aspects - this of the company and another of the market. When considering the company (corporate) aspect, the price is formed on the basis of costs (productive and commercial) and adding the desired norm of profit or rate of profitability (or on the basis of the critical point). From the point of view of the market aspect, the price is highly dependent on market behavior, i.e. on the demand and supply. From the economic theory, it is known that the demand, respectively the sales, are heavily dependent on the price with an inverse relationship. The relationship between the volume of sold products and their prices is determined by the impact of market factors. Normally, the prices increase is accompanied by a reduction in sales and vice versa. This dependence of sales on prices is not identical concerning various types of products within the market. For some products, this dependence is very clear, while for others - it is weak or even does not exist. The intensity with which sales respond to changes in price can be measured by the so-called *Coefficient of price elasticity of demand*.

The irrefutable fact is that the demand is influenced by a number of variables, but the change of products prices is the most important one. This is the reason for the presence of a great interest to this variable. This is because if the reduction of price increases the demand it will be very important for company management to know how high sales' increase will be at given price reduction, e.g. 10%. The answer to this question gives the index *Coefficient of price elasticity of demand (also Price elasticity of sales)*.

The present report examines the method "price elasticity of sales" as one of the most important tools for economic management. This is a method that allows optimizing the ratio "price - sale." Optimizing this ratio regarding specific products ensures maximum profit and increases the profitability of the enterprise. The continuous analysis to determine the elasticity of specific products to their price suggests the implementation of an adequate pricing policy.

The main purpose of the report is to show the importance of the rational pricing of products (material or nonmaterial) to achieve desired business results. The pricing policy of the company is an integral part of corporate and marketing strategies for the development of the company and as such is very important to be reasonably managed.

2 THEORETICAL ASPECTS OF THE METHOD "PRICE ELASTICITY OF SALES"

Knowing the market conditions, as well as the right understanding of price elasticity of sales has a crucial role in implementing successful business. This would help management to show flexibility in pricing of products.

Measuring the rate at which the sales respond to changes of price is done through the coefficient of price elasticity of demand (E_d) (Savov, 1999, p. 33).

$$E_d = \frac{\Delta q \times 100}{\frac{q_0}{\Delta p \times 100} p_0} \times (-1) = \frac{\%q}{\%p} \times (-1)$$

where:

%q - percentage change of sales volume for a given period of time;

%p - percentage change of production price for the same period.

There are generally four types of products depending on the magnitude of the coefficient of price elasticity of demand:

- *First group* - lacking elasticity (the coefficient is zero);
- *Group Two* - inelastic (the coefficient is less than one);
- *Third group* - normal elasticity - (the coefficient is equal to one);
- *The fourth group* - elastic (the coefficient greater than one).

Products with lacking elasticity (first group) are characterized by the fact that the volume of sales is keeping the same regardless of the price change. Regarding inelastic products (second group) - the price changes affect very slightly on sales, i.e. customers are less sensitive to price. For this group of products, the price increase with a greater percentage (e.g. 40%), leads to a reduction of sales with a smaller percentage (e.g. 10%).

In the case of products with normal elasticity (third group), every price change (e.g. 5% increase) corresponds to an equivalent change of sales inversely (in this case - 5% decrease). Elastic products (fourth group) are characterized by the fact that the sales volume is very strongly influenced by changes in price. It could be said that customers are highly sensitive to the price. A minor price increase (e.g. 5%) would lead to a significant reduction of sales (e.g. 23%).

Knowing the type of offered products, managers can better manage the financial result in their desired direction. Since the elasticity determines the effect of price changes on the total revenue from the sale of production it is necessary to know of the relationship between them. In general, the correlation between price elasticity and total revenue can be interpreted in the following way:

- Inelastic product and total revenue - regarding inelastic products, if the price is reduced, the total revenue is also decreased. In this case, the company has an interest to increase the price.
- Normal elastic product and total revenue - concerning normal elastic products, in the

case of price reduction, the total revenue remains unchanged. In the interest of the company is to maintain a stable price, because if it is decreased, the volume of sales has to be increased to keep a constant level of the total revenue.

- Elastic products and total revenue - regarding this type of products any fall of the price leads to an increase of the total revenue. In this case, the company has the interest to reduce the price.

When trying to optimize the ratio between product price and sales volume (in order to gain maximum profit) the methodology for applying the method "Price elasticity of sales" can be represented as follows. It starts from the assumption that regarding a particular product a coefficient of price elasticity of demand is determined (based on a preliminary done market research). High values of the coefficient suggest that the optimal price is lower than the base price.

The low values of the coefficient (for elastic products) show the opposite situation - the optimal price is higher than the base one. In the first case, the profit can be optimized by reducing the price of the product, whereas concerning the second case maximum profits will be realized through the increase of the selling price. The following equations are used In order to obtain the percent (ratio) of price adjustment (Todorov, 2003, p. 67).

- obtaining the rate of price reduction:

$$\pi = (q + E_d \times q \times x) \times (p - p \times x) - (q + E_d \times q \times x) \times b - a \quad (1)$$

- obtaining the rate of price increase:

$$\pi = (q - E_d \times q \times x) \times (p + p \times x) - (q - E_d \times q \times x) \times b - a \quad (2)$$

where:

- π - an arbitrary value of profit greater than the base one;
- q - sales value;
- E_d - coefficient of price elasticity of demand;
- x - searched coefficient of reduction/increase of price (unknown in the equation);
- p - selling price
- b - average variable cost
- a - fixed costs of the enterprise for the entire period.

3 INTERPRETATION OF THE METHOD "PRICE ELASTICITY OF SALES" WITH PRACTICAL CASE

In order to illustrate the application of method "Price elasticity of sales" the following case will be developed and solved:

Company "ABC" Ltd produces product "X". For this product, as a result of a market survey a coefficient of elasticity $E_d = 4$ is determined. The basic situation at the time of the survey is as follows (Table 1):

Table 1 Basic situation in the company "ABC" Ltd

Indicators	Basic situation
Sales volume (pcs.)	1 000
Selling price (eur)	50
Sales revenue	50 000
Variable costs per unit	25
Total variable costs	25 000
Fixed costs	15 000
Full cost of sales	40 000
Gross profit from sales	10 000

The goal is: maximizing the profit by applying the method of price elasticity of sales. By market research, it is figured out that the coefficient of elasticity of this product is 4. This indicates that from the point of view of the relationship between price and volume of sales this price is not optimal.

In other words, a selling price of EURO 50 does not give maximum profit.

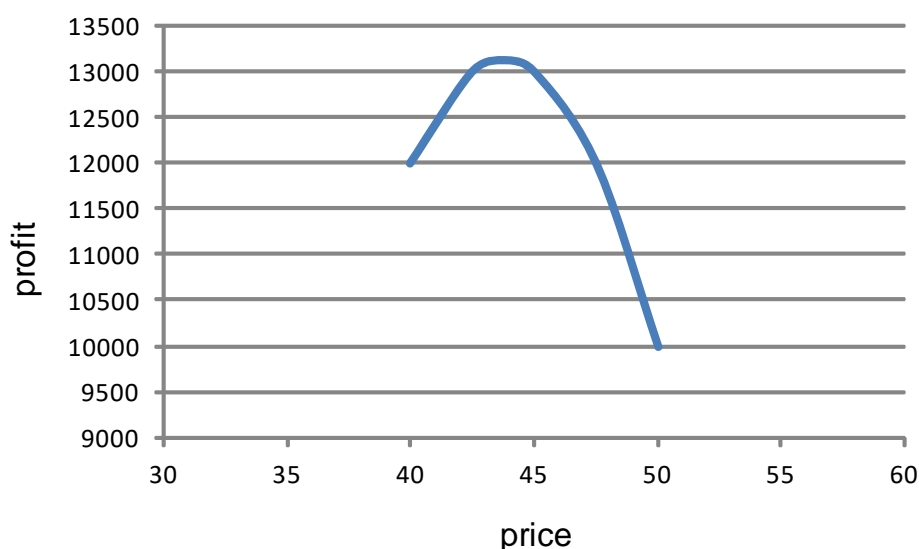


Fig. 1 Correlation between profit and cost by coefficient of elasticity

Given the high coefficient of elasticity, it can be assumed that the optimum price will be lower than the base one. Then, an arbitrary value of profit, greater than the base profit, is chosen. Let this arbitrary value of profit is 11 500 EUR. These exemplary data are put in equation (1) because it was determined that the price of the product should be reduced.

$$11500 = (1000 + 4000x) \times (50 - 50x) - (1000 + 4000x) \times 25 - 15000$$

$$200x^2 - 50x + 1,5 = 0$$

In as much as this is a square equation, it has two solutions, i.e. the relationship between the selling price and profit has the shape of a parabola (Fig. 1).

$$x_1 = \frac{50 + \sqrt{1200}}{400} = 0,21$$

$$x_2 = \frac{50 - \sqrt{1200}}{400} = 0,038$$

Therefore, the coefficient of price reduction is defined as the average of the two solutions.

$$x = \frac{0,21 + 0,038}{2} = 0,124 = 12,4\%$$

In order to verify the correctness of the obtained result regarding the coefficient of price reduction some calculations are made (shown in Table 2). In such a way the trend of profit depending on price reduction is studied (on the order of 5% to 20% and $E_d = 4$).

Table 2 The behavior of a profit by the reduction of price

Indicators	Base situation	Reduction of the price by 5%	Reduction of the price by 10%	Reduction of the price by 12.4%	Reduction of the price by 15%	Reduction of the price by 20%
q	1000	1200	1400	1496	1600	1800
p	50.00	47.50	45.00	43.80	42.50	40.00
TR	50000.00	57000.00	63000.00	65524.80	68000.00	72000.00
b	25	25	25	25	25	25
VC	25000	30000	35000	37400	40000	45000
FC	15000	15000	15000	15000	15000	15000
TC	40000	45000	50000	52400	55000	60000
GP	10000.00	12000.00	13000.00	13124.80	13000.00	12000.00

where:

- q - sales volume
- p - sale price
- TR - total revenue
- b - average costs
- VC - variable costs
- FC - fixed costs
- TC - total costs
- GP - gross profit

For example, at 5% price reduction, the expectation is that sales will increase by 5% x 4 = 20%, i.e. they will be 1200 units. Moreover, the magnitude of revenue will be 57 000 EUR.

At other equal conditions, the total costs will be 45 000 EUR. The profit will increase by 2 000 EUR and will be 12 000 EUR. At the rest percentages of price reduction (10%; 12.4%; 15%; 20%) following a similar way, the increase in sales volume and corresponding profit can be obtained. The data are shown in Table 2.

It is important to know that any price adjustment affects the coefficient of elasticity.

In the considered case, the profit is maximized when the price is reduced by 12.4%. In other words, the optimal price of product "X" is 43,80 EUR, with an initial coefficient of elasticity $E_d = 4$.

In view of having a more certain result an additional check could be done:

$$13124.80 = (1000 + 4000x) \times (50 - 50x) - (1000 + 4000x) \times 25 - 15000$$

$$200x^2 - 50x + 3,12 = 0$$

$$x_1 = \frac{50 + \sqrt{0}}{400} = 0,124$$

$$x_2 = \frac{50 - \sqrt{0}}{400} = 0,124$$

The made calculations (discriminantly is equal to zero) show that there is only one solution - a profit of 13,124.80 EUR, which will be implemented in a price reduction by 12.4%. The fact that $x_1 = x_2$ shows that the point with coordinates (43.80, 13124.80) is the highest point of the parabola.

In economic theory, it is known that empirically the following fact is established - the elasticity of product increases with increasing competition between manufacturers. In this case, with minor differences in the quality of the product, users are attracted to this one with the lowest price. The essential thing is that the company can take advantage of the reverse relationship between price and sales volume only when its production capacity allows it. Otherwise, the reduction of price is pointless.

4 CONCLUSIONS

Maintaining optimal ratio between price and sales is one of the main factors to increase the

profitability of the enterprise. The dynamics of market factors requires the elasticity of the products to be continuously monitored and corrected. No rare cases where companies fail to maximize profits due to non-compliance of prices with the ongoing state of the market and its trends. Since the reduction of price can increase the sales, this would impact on the cost price per unit of product, i.e. would increase trade profitability.

The adjustment of price based on the inverse relationship between price and volume of sales

would be possible only if the production capacity of the company allows it. For products where there is no price elasticity of sales or it is very slight, optimization of the price is completely pointless. In such a situation, the company takes the market prices of products for granted. In the end, despite the usefulness of the coefficient of elasticity, its importance should not be absolutized, since pricing is influenced by a number of other factors.

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