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METHODOLOGICAL APPROACH TO THE DEVELOPMENT OF COMPUTER SUPPORT FOR EFFICIENT DETERMINATION OF PROFIT MARGINS

Abstract: *Economic indicators are major factors in the analysis of production performance. For this reason is given a great importance to this issue. The rate of profit or margin at that sense has a key role. This paper presents a methodological approach to the development of computer support in the determination and analysis of this important indicator. The paper points out the purpose of achieving quality in this segment, which constitutes an essential factor in economic analysis. The presented solution has efficient and universal application of this approach to computer support.*
Keywords: *Economic indicators of production, software, realization of quality function*

1. INTRODUCTION

Economic indicators are one of main elements in the analysis of business performance. Numerous economic factors are the basis for various analysis of economic efficiency of financial performance.

One of key elements in the initial financial analysis of business operations are costs. By Greasley A. term cost is explained as [1] "The finance required to obtain the inputs and manage the transformation process, which produces finished goods and services". It can be given a broader interpretation to say this term, since costs include monetary shown consumptions. In other words, costs represent the value of all material and immaterial elements that are consumed during the manufacturing process and operations.

There are different systems of cost [3] that have, among other, a task to provide permanent control of spending, to create conditions for effective decision making, in order to improve enterprise performance. It should be noted that although there are many tools and techniques that are used to control costs, there are unique tools for specific areas. [4].

Financial reports, accounting and revision of relevant information, provide the financial position for performance of business enterprises. The need to improve financial reporting, accounting and auditing is a general trend in all financial systems. Many authors emphasize the importance of the current financial crisis on financial reporting, accounting and auditing [7].

In managerial practice of cost control, different techniques are used to show changes depending on income, profit, cost, or changes of profit margins in production [6]. The dynamics of the production costs can be, in essence, observed from two key areas. The total cost of production, at enterprise level, may act as a variable,

where the cost depends on changes in production, and as fixed, with costs classified as not changed with volume of production.

This paper presents a methodology for a relatively easy control of state revenues and expenditures, changes in profit margins and profits of the enterprise, depending on the volume of production. In this way managers of the company can control the profitability margins change, depending on changes in production.

The application of computer technology has a profound effect on the quality of implementation of the proposed financial analysis. This paper presents a methodological approach to the development of computer support in the determination and analysis of profit margins. This approach highlights some key elements that provide support to development and implementation of computer technology in the analysis of economic indicators. Numerous authors emphasize the importance of computer technology on quality of management operations [5] [8].

Effective implementation of such analysis affects the functioning of the entire organizational structure. "Organizational reliability and resilience are thus reframed as concepts relevant to the management of organizations seeking economic efficiency, beyond safety / risk issues" [2].

2. ANALYSIS OF PROFIT MARGINS

In this paper, the analysis of economic indicators of production is based on the function of production volume. Basic considered economic parameters are the costs of production.

Initial data base is certainly necessary to be formed in an integrated information system of companies. MS Excel is a very powerful tool for the formation of Front End user interface and individual analysis of data by the user. Importing the initial data via the ODBC technology is certainly an indispensable first step in such economic analysis. On that basis, it is enabled analysis of a number of economic parameters:

Q – Nominal volume of production
$\%$ - Percentage of output
q – Percentage volume of production
T_c – Total constant costs
T_m – Total cost of materials
T_r – Total labor costs
T_{ov} – Other variable costs
Tv – Total variable costs
T_o – Total other costs
C_k – Total cost of production during the accounting period
C_p – Total sale price
d – Profit
S_d – Profit rate

Figure 1 shows the basic economic indicators at the calculation of profit margins. Analysis of profit margins is based on different values of the nominal volume of production – Q_n. Considered production company realized the physical volume of production of $Q_n = 44 \cdot 10^3$ [pieces/year] and at the same the following structure of costs (expressed in monetary units per year):

$T_{mdn} = 18{,}1 \cdot 10^6$ – Total cost of materials for the planned nominal volume of production
$T_{rdn} = 12{,}2 \cdot 10^6$ – Total costs of the nominal volume of production
$T_c = 16 \cdot 10^6$ - Total constant costs
Critical volume of amounted production:
$Qk = 0.7 \cdot Qn$.

Automatization of calculation is obtained by means of all parameters, by the percentage increase of production volume:
C2 = A2*B2/100
C3 = A3*B3/100
C4 = =A4*B4/100
...

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Figure 1 - Main economic indicators at the calculation of profit margin

Constant costs (T_c) are the initial value of the sum of total operating costs, constant regardless of volume.

Total cost of materials in the accounting period (T_m):

E2 = 18.1*B2/100
E3 = 18.1*B3/100
E4 = 18.1*B4/100
...

Overall labor costs at the accounting period are also in a function of the volume of production:

F2 = 12.2*B2/100
F3 = 12.2*B3/100
F4 = 12.2*B4/100
...

Other costs include operational setting, amortization and more. Other variable costs (T_{ov}) are expressed as a function of production volume:

G2 = 4*B2/100
G3 = 4*B3/100
G4 = 4*B4/100
...

Total variable costs (T_v) are the sum of all variable costs of production:

H2 = E2+F2+G2
H3 = E3+F3+G3
H4 = E4+F4+G4
...

Total production costs constitute the total cost of production in the form of sum of all constant and variable costs: ($C_k = T_n + T_r + T_o$):

I2 = D2+H2
I3 = D3+H3
I4 = D4+H4
...

In addition to production costs, the total income of company i.e. selling price (C_p) is the second basic component for the analysis of results, which characterize size of business. At the function of production volume, they are expressed as follows:

J2 = 57.15*B2/100
J3 = 57.15*B3/100
J4 = 57.15*B4/100
...

Realized profit (d) represents the difference between selling prices and cost of production:

K2 = J2-I2
K3 = J3-I3
K4 = J4-I4
...

Profit margin is expressed as a ratio of profit and sales prices in a function of production volume:

L2 = K2/J2*100
L3 = K3/J3*100
L4 = K4/J4*100
...

Figure 2 is a diagrammatic representation of the movement of profitability margins in a function of

increasing production. From this diagram can be noticed a critical volume of production of the considered company $Q_k = 0.6 Q_n$.
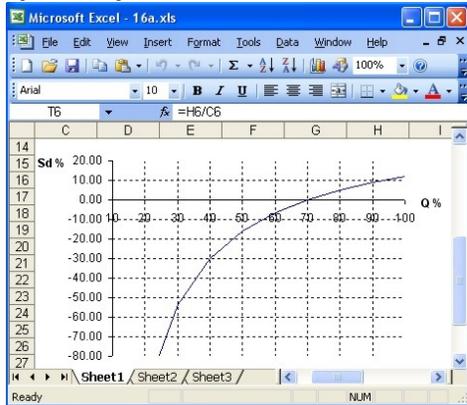

Figure 2 - A diagrammatic representation of profitability margins movement in a function of increasing production

3. ANALYSIS OF OTHER ECONOMIC INDICATORS

Taking into account basic economic parameters of the initial production - cost and sales price, of essential importance is the analysis and other major economic indicators.

Dynamics of the costs can be considered in relation to a unit of product. Figure 3 displays the calculation of previously discussed parameters reduced to a unit of product.

M2 = J2/C2
M3 = J3/C3
M4 = J4/C4
...
N2 = H2/C2
N3 = H3/C3
N4 = H3/C3
...
O2 = D2/C2
O3 = D3/C3
O4 = D4/C4
...
etc..

Where:

w_{cp} – Selling price per unit
t_v – Variable costs per unit
t_c – Constant cost per unit
w_{ck} – Cost per unit
t_m – Cost of materials per unit
t_r – Labour costs per unit
t_{ov} – Other variable costs per unit
t_v – Total variable cost per unit

Figure 3 - Calculation of economic values reduced to a unit of product

Calculated values, obtained for the w_{cp} (selling price per unit), t_v (variable cost per unit), t_m (material costs per unit), t_r (labor costs per unit), t_{ov} (other variable costs per unit), t_v (integral variable costs per unit) achieve constant values (Figure 4):

$t_m = f(Q) = const$ – cost of materials for production of one piece

$t_r = f(Q) = const$ – labor costs for production of one piece
...

By the diagrammatic presentation of the previously calculated sizes reduced to a unit of product, we can see significant characteristics of the economic parameters of production: the decline of unit cost for production of one product, in function of increasing production volume. At the same time, it is a significant decrease of constant reduced production costs per unit of product, relative to the increase in production volume.

On the Figure 4 can be seen point of intersection of unit cost (w_{ck}) and unit production costs (w_{cp}) for a single product.

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In this way, diagrammatically can be represented a critical volume of production (the threshold of profitability), the volume of production at which cost equals the price of sales and corporate income is zero. Critical volume of production is undoubtedly the most important element in the economic analysis of production.
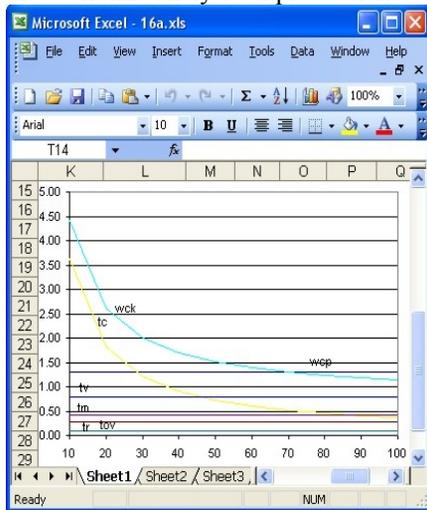

Figure 4 - A diagrammatic representation of economic sizes reduced to a unit of product

By increasing the sales, prices achieved with the previously invested funds overcoming the critical volume of production. Company begins to make profit, or profit in respect of funds invested in manufacturing.

4. CONCLUSION

This study is a methodological approach to computer support of the development for the analysis of major economic indicators of production. Presented methodology makes possible independent development of computer support for their analysis, by the end-user. Realization of profit, compared to the cost of production, is analyzed in terms of profit margins, on the basis of economic sizes reduced to a unit of product.

Presented solution is a universally applicable methodology for economic analysis regardless of the type of production. Automation of calculation procedure gives a quick and easy insight into economic parameters of production, with considering different initial values. In this way is achieved a significant impact on the quality of economic analysis of production, managerial decision making and the functioning of the entire organizational structure.

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