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APPLICATION OF MODERN METHODS IN THE ECONOMIC-FINANCIAL ANALYSIS OF ECONOMIC ENTITIES

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Abstract: *Modern methodologies, methods and tools for increasing the performance and competitiveness of economic entities play an increasingly important role in optimizing the economic and financial analysis of economic entities. Among the most used by such modern methodologies are the ABC method (Activity Based Costing) and the linear regression method.*

Keywords: *economic-financial analysis, ABC method, linear regression method, economic entity*

JEL Classification: *M 41*

1. Introduction

The purpose of the economic-financial analysis consists in obtaining a maximum profit and achieving an efficient activity, thus ensuring the survival of the entity for a long period of time. Achieving these goals required the emergence of modern methodologies and tools for economic and financial analysis. The presentation of modern methodologies joins the ABC method to support the specific analysis from the perspective of allocating costs and the elements that generated them. The linear regression method is used to develop the regression equation by which the turnover dependent variable is explained by the independent variable the average number of employees identifying a significant correlation. The linear regression model is validated by the Sig F Change value that falls within the reference level.

2. Literature review

The use of methodologies and methods that would lead to the optimization of the economic-financial analysis of the entity represented one of the most

important scientific achievements. The origin of modern methods usable in economic or financial analysis is found in the U.S.A. with the elaboration of "The Hidden Factory" by Jeffrey G. Miller and Thomas E. Vollman. The two authors subjected to a critical analysis the sectors and places of common costs(indirect), reaching the decision that the next step for controlling these costs is to develop a model that presents in detail and structures the causes of these costs. Those who made the first attempt for such a model, in 1987, are Robert S. Kaplan, Robin Cooper and Thomas H. Johnson. It's the time when in the U.S.A., the Activity Based Costing system appeared and in Germany, after the publication of the book "Calculation of costs by processes" (1989, P. Horvath and R. Mayer) began the development of the method of calculating process costs. While it followed, in different countries, the changes regarding the strategic positions of the enterprises but especially the increasing requests for information from their management, led to the development and application of modern methods to optimize the economic-financial analysis of the entity.

3. Research methodology

The methodology practically gives validity to the research process. In the case of this study, the methodology includes both general and specific approaches to the way of generating information through the economic-financial analysis of the entities in the field of constructions. Thus, the methodology aims to address ways to optimize the economic and financial analysis and thus increase the relevance of information resulting from the application of modern methods. The aim was to analyse and present solutions applicable at a practical level and not just theoretically.

This research study, related to the objectives, was based on: documentation in international and domestic literature, identification and collection of information that may be useful in research, analysis and processing of information collected, interpretation of results. The data at the level of the selected entities were processed applying modern methods in optimizing the economic-financial analysis of the economic entities and the obtained results presented as relevant in measuring their performance.

4. Application of modern methods in the economic-financial analysis of an economic entity

4.1. ABC method

The set of raw materials, people, methods that are used in obtaining a product or a work/service is the concept of activity related to the ABC method (Cucui, 2008, page 231).

According to this method, any economic entity with directly productive activities involves in addition to these secondary activities. Directly productive activities are activities whose production is delivered and visible outside the economic entity, while secondary activities are those aimed at supporting the main activities. In the literature in the economic field are presented the following advantages of the ABC method (Cucui, 2008, page 233) synthesized by Figure 1:

Figure no.1. Advantages of the ABC method

Facilitates the understanding of working methods and the causes that influence the occurrence of costs in economic entities until the delivery of the product
Allows a better determination of the causes of the variation of the costs and the performances of the enterprise
Better understanding of the value creation mechanism and more rigorous substantiation of decisions in the dynamism of the economic entity's activity
A significant part of the indirect costs related to products are direct in relation to the activities. Thus, the management of activities ensures a more efficient piloting of the economic entity in the field of constructions
The "activity" approach results in the connection between costing and strategic analysis

Source: Processing by: Cucui (2008, page 233)

The ABC method implies the observance of the following principles captured in Figure no.2.

Figure no. 2. Principles of the ABC method

In order to determine the activities with homogeneous costs, the processes in the enterprise must be taken into account and not the simple hierarchical structure
Anticipating the links between activities leads to a true map of processes and causality, which is, beyond any calculation, a factor of progress
Starting from the hypothesis that any entity produces main and secondary activities
The criterion of homogeneity of costs determines the largest possible perimeter of an activity, it is accompanied by the question on the opportunity to analyze the activity in detail, respectively the identification of information needs
ABC invites critical observation of the current state of operation of the company

Source: Processing by: Cucui (2008, page 233)

The data collected from the entity, regarding the costs related to quality are presented in Table no.1.

Table no.1. Analysis of costs related to quality in the field of construction

Category	*Measure-ment units*	*Unit costs*	*Total costs*	*% of turnover (14000000 lei)*
0	*1*	*2*	*3*	*4*
Preventive expenses:				
Elaboration of the documentation necessary to obtain the construction permit	500 h	230	115,000	0.82
Supplier evaluation	200 h	90	18.000	0.13
Training of employees in the field of quality	500 h	175	87,500	0.63
Design and improvement of quality equipment	800 h	300	240,000	1.71
Total preventive expenses			**460,500**	**3.29**
Evaluation expenses:				
Raw materials and materials destroyed during the tests			818,854	5.85
- timber	230 m3	850	195,500	
- brick	12,980 pcs	6.41	83,201.80	
- concrete	680 m3	250	170,000	
- iron concrete	68.800 kg	5.14	353,632	
- nails, wire, other materials	2.360 kg	7	16,520	
Salaries of test and inspection staff	260 h	200	52,.000	0.37
Test equipment adjustments	50 h	250	12,500	0.09
Total evaluation expenses			**883,354**	**6.31**
Internal expenses				
Recoverable scrap	89.800 pcs	1	89,800	0.64
Unrecoverable products	21.000 pcs	1	21,000	0.15
Expenditure on inventory control and rescheduling	100 h	100	10,000	0.07
Total internal expenses			**120,800**	**0.86**
External expenses				
Loss of future orders	3 pcs	500,000	1,500,000	10.71
Total external expenses			**1,500,000**	**10.71**
Total expenses			**2,964,654**	**21.17**

Source: Processing after Gheorghe(Damian) and Damian, D. (2016, page 6)

The estimation of the consequences following the application of quality costs is presented as follows (Table no.2):

Table no. 2. Estimation of the consequences following the application of quality costs

	Before applying the quality costs		***After applying the quality costs***		***Cost savings***
0	***1***	***2***	***3***	***4***	***5***
Supplier evaluation - brick purchase	(45,000 pcsx 6,82 lei) x 12 months	3,682,800 lei	(45.0000 kg x 6,4 lei) x 12 months	3,456,000 lei	226,800 lei
Employee training - productivity/year	1 pcs x 100,000 lei x 250 days	25,000,000 lei	1 pcs x 95.800 x 250 days	23,950,000 lei	1,050,000 lei
Quality equipment - maintenance/year				38,000 lei	-38,000 lei
Staff salaries/year	200 pers. x 3.000 lei x 12 months	7,200,000 lei	170 pers. x 3.000 lei x 12 months	6,120,000 lei	1,080,
Loss of raw materials and materials (timber standard)	(5 % x 50 m3 x 850 lei) x 250	2,125x250= 531,250 lei	(3% x 50 m3 x 850 lei) x 250	1,275 x 250= 318,750 lei	212,500 lei
Total cost saved					**2.531.300 lei**
Total differences					**2531300+ 2964654 = 5495954**

Source: Processing after Gheorghe (Damian) and Damian, D. (2016, page 67)

Examining the implementation of the ABC method within an economic entity in the field of construction by inserting specific costs related to quality, there is a significant improvement in production costs, including: raw material procurement costs, staff salary costs, related technological losses with raw materials and consumables and at the same time an improvement in labour productivity and increasing the quality of finished products.

Regarding the costs of purchasing raw materials, the costs of supplying the brick were tracked, due to the fact that this type of material has the highest frequency. The purchase of high quality brick at low prices was made by making profitable contracts with suppliers, after estimates and assessments were made on the suppliers' market. The mentioned price of 6.41 lei/piece is an average price. Regarding the same amount of brick for a period of one year, the value of 226,800 lei was saved.

The new production equipment introduced and the improvement of the personnel in the field of quality in order to use these equipment, directly determined a significant increase of the labour productivity at each house built, which led to an increase of the annual turnover by 1,050,000 lei. On the other hand, the number of employees decreased from 200 people to 170 people in the conditions in which the labour productivity increased, thus obtaining a reduction of the salary expenses of 1,080,000 lei. At the same time, technological losses and scrap were significantly reduced from 5% to 3% for raw materials and consumables, which led to a decrease in costs by 212,500 lei.

Following the entire process of implementing the ABC method in economic entities in the field of construction, by going through all stages and the results obtained it is observed that this method led to the optimization of economic and financial analysis with significant influences in terms of performance and competitiveness.

4.2. Linear regression method

In order to optimize the economic-financial analysis within an economic entity in the field of construction through the linear regression method, the correlation between turnover and average number of employees (Anghel and Calotă 2016, pag. 25) was studied, by going through the following stages:

Stage 1: Construction of a series of data on the evolution of turnover and average number of employees (Table no.3):

Table no. 3. Evolution of turnover and average number of employees

	Year	Turnover - lei	Average number of employees
1	2018	14,468,025	188
2	2019	15,112,321	190
3	2020	15,848,814	199

Source: own processing

Stage 2: Studying the evolution of indicators. Analysing the period 2018-2020 showed an average turnover of 15,143,053.33 lei with a peak value in 2020 of 15,848,814 lei and a minimum value in 2018 of 14,468,025 lei, which corresponds to a deviation standard of 690,907.32 lei (Table no. 4):

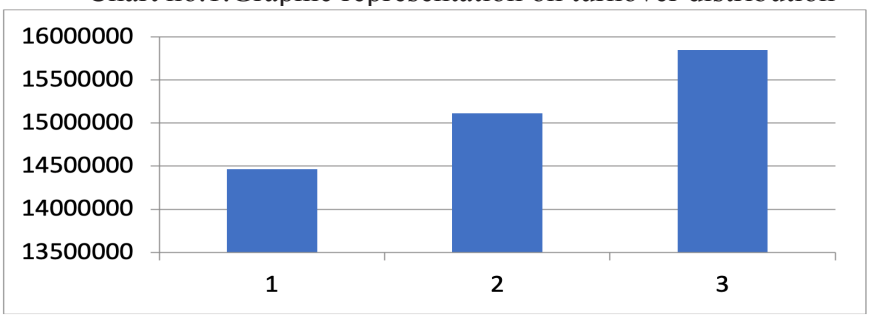
Table no. 4. The standard deviation of turnover

Descriptive Statistics			
	N	Mean	Standard Deviation
Turnover	3	15,143.053.3333	690,907.31858
Average number of employees	3	192.3333	5.85947

Source: own processing according to the SPSS application

Sub stage 2.1. - Evolution of turnover. During the period under analysis, the economic entity in the field of constructions knows an insignificant evolution of the turnover. As can be seen from Chartno. 1, the distribution of turnover follows a normal distribution.

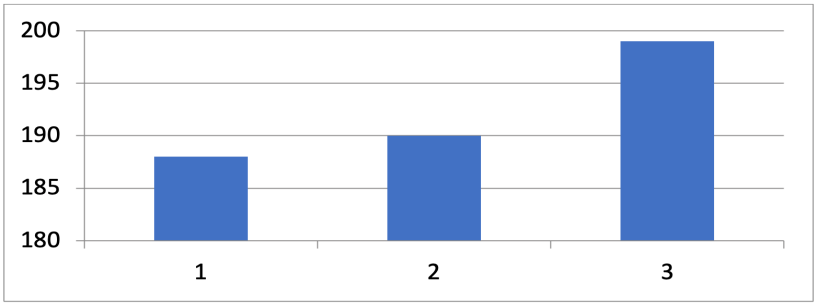
Chart no.1.Graphic representation on turnover distribution



Source: own processing according to the EXCEL application

Sub stage 2.2. - The evolution of the explanatory variable average number of employees. The number of employees increased during the 3 years from 188 to 199, registering a favourable evolution with a standard deviation of 5.85. (Chart no. 2)

Chart no. 2. Graphical representation regarding the evolution of the variable of the average number of employees



Source: own processing according to the EXCEL application

The distribution of the number of employees does not follow a normal distribution, the values between 190 and 198 being missing from the series. An analysis similar to the turnover distribution is also performed for the explanatory variable average number of employees, respectively the data series regarding the evolution of the number of employees (Table no. 5.):

Table no. 5. Case summaries on the average number of employees

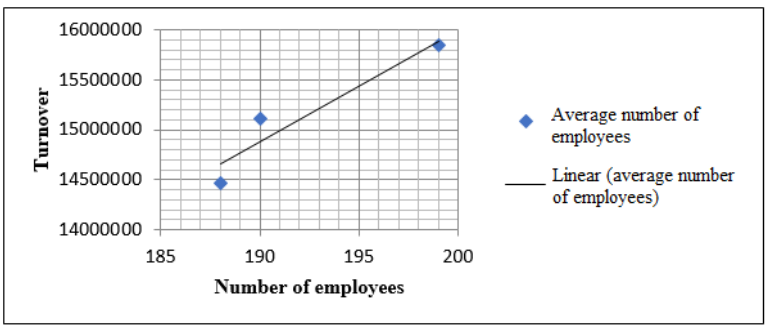
Case summaries		
		Average number of employees
Total	N	3
	Mean	192.3333
	Standard Error of Mean	3.38296
	Grouped Median	190.0000
	Sum	577.00
	Minimum	188.00
	Maximum	199.00
	Range	11.00
	First	188.00
	Last	199.00
	Standard Deviation	5.85947
	Variance	34.333
	Kurtosis	-
	Skewness	1.508

Source: own processing according to the SPSS application

Stage 3 - Application of the linear regression method

The linear regression method involves a correlation between two or more variables, in this case between the two variables turnover and the average number of employees. The correlation chart between the two variables shows us a direct connection, of linear type between them (Chart no.3)

Chart no. 3.Correlogram Turnover - Average number of employees



Source: own processing according to the EXCEL application

The two variables are positioned as follows: the turnover variable is the dependent variable, and the average number of employees' variable is the independent variable.

The equation used in the simple linear regression is as follows:

$y = \alpha + \beta \cdot x$

Where:

y = dependent variable, respectively the resultant characteristic

x = independent variable, respectively explanatory characteristic

α, β = parameters of the linear regression model

Specifically, the equation used in the linear regression applied in the economic entity in the field of constructions is: $T = \alpha + \beta \cdot No.empl.$

Where:

T = Turnover

No.empl. = Average number of employees

α, β = parameters of the linear regression model

The determination of the parameters of the linear regression model is usually done by the least squares method.

Table no.6. Determining the parameters of the regression model

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-6429751.709	6997396.310		-.919	.527	-95340101.838	82480598.421
	Dependent variable	112163.631	36370.360	.951	3.084	.200	-349965.604	574292.866
a. Dependent Variable: Turnover								

Source: own processing according to the SPSS application

Table no. 7. Summary Turnover model

SummaryModel [b]						
Model	Change Statistics					Durbin-Watson
	R Square Change	F Change	df1	df2	Sig. F Change	
1	.905[a]	9.511	1	1	.200	2.762
a. Predictors: (Constant), Average number of employees						
b. Dependent Variable: Turnover						

Source: own processing according to the SPSS application

Following the interpretations of the results from the tables obtained with the help of the SPSS application, it was obtained:

α =-6,429,751.709

β = 112,163.631

T = -6,429,751.709 + 112,163.631 x No.empl.

The determination coefficient R Square shows the share in which the dependent variable - turnover - is explained by the independent variable - average number of employees - the value of 0.905 and the proportion of 90.5% of turnover can be explained by increasing the average number of employees.

The linear regression model is validated by the Sig F Change value that falls within the reference level, being 0.20.

5. Conclusions

The economic entity must be approached as a unit providing specialized information necessary for both its internal and external environment. The conditions of the current economic and political environment, at national and international level, determine the continuous development of the information system as the main source of economic and financial information. The derivation of the accounting model is not accidental, it depends on the difficulties faced by the economic entity and on the advantages developed by the modern methods, techniques and analysis tools used additionally. Their adoption will allow to cover the interests of the categories of information users and together with the existing traditional accounting systems will allow the application of a quality accounting model. In an uncertain and complex environment, information needs never decrease but diversify and the accounting model becomes a privileged source of information conditioned by the permanent adaptation of tools and practices used to optimize economic and financial analysis within the limits imposed by legal regulations. The economic-financial analysis must be focused not only on the reporting of the information required by regulations but also on the key aspects related to the full satisfaction from the informational point of view and chosen by the need to highlight the degree of performance of the entity and the measures challenge for its growth.

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