Dynamics and Correlation of the Main Indicators of Professional Scientific and Technical Activities in Constanta County

Marioara Mirea
„*Ovidius" University of Constanta, Faculty of Economic Sciences, Romania*
mm_mirea@yahoo.com

Abstract

The paper addresses an exciting topic, namely the specialized activities of professionals, with typologies of inhomogeneous activities. These activities are characterized by a high degree of training and services offers oriented to a certain professional field.

The results of the analysis allow us to identify the number of active companies in Constanta County that developed scientific and technical activities and to note the degree of profitability of the categories of professional activities.

To measure the intensity of the connection between the indicators we used the correlation method. The multiple correlation coefficient measures the intensity of the connection between the dependent variable and two or more independent variables.

Key words: professional activities, turnover, gross profit, correlation method
J.E.L. classification: C10, M21, O10, P52

1. Introduction

In Romania, professional activities are carried out on a professional basis and their exercise is regulated and conditioned by a certificate that reflects the level of professional education.

Professional activities carried out by members of a professional organization must have as an assumed fundamental objective the promotion and support of a high level in a professional field.

According to the Classification of activities in the national economy - CAEN Rev.2. set by the National Office of the Trade Register, "section M" includes specialized professional, scientific and technical activities. These activities are characterized by a high degree of training and their services provide specialized knowledge and skills. It is a statistical classification of economic activities, which is currently adopted at the level of the European Union.

"Section M" comprises seven groups of inhomogeneous activities: Legal and accounting activities; Activities of head offices; Management consultancy activities; Architectural and engineering activities, technical testing and analysis; Scientific research and development, including three types of research and development: 1) basic research; 2) applied research; 3) experimental development; Advertising and market research; Other professional, scientific and technical activities; Veterinary activities. As we can see, a large number of activities are included that offer various services and are not related to each other. I was attracted by this research approach, because I also develop a business included in these typologies of activities.

2. Theoretical background

In order to contribute to the successes of companies carrying out professional activities, employees must have fundamental skills and knowledge in the respective field. Only in this way will they be able to provide users with specialized information and skills.

In order to obtain effective results, Sandwich (1993) emphasized the need for managers to acquire high level conceptual skills, creative skills, leadership skills, administrative skills and technical skills that they can sustain in a timely manner in their work. From the perspective of a manager, specific management development practices are needed to improve performance in

specific activities (Longenecker, Fink, 2001; Popovici *et al*., 2020)

In these companies, as a rule, the managers own the business, and try to obtain the highest possible results with as few resources as possible. Because performance standards are constantly rising, companies should create opportunities to improve the skills development of both the master and the employees (Doggett *et al*, 2011, p.119). The enhancement of professional abilities and the impulse given by specialized activities to financial progress bring a positive perception on local business potential and to quality of life (Popovici *et al*., 2020)

3. Research methodology

We have compiled a database with indicators from the annual reports of companies with professional scientific and technical activities. The analyzed period was the time horizon 2014-2018, the study area being Constanta county.

We selected a number of 18 activities according to the CAEN established by the National Office of the Trade Register - Classification of activities in the national economy - CAEN Rev.2.

We used the SPSS statistical software to process statistical data and we obtained the average values of the indicators expressed in RON (Field, 2009). We conducted a quantitative research using the average indicators of the chronological series (Aivaz, 2018, p.89).

In order to capture the dynamics of the analyzed indicators, we resorted to the graphic method that allows highlighting by visual appreciation of their values.

For correlation we used parametric methods that allow the precise determination of both the connection between several variables and its intensity. To measure the intensity of the connection between the dependent variable y and the independent variables xi we used the correlation method. Depending on the nature of the link between the dependent variable y and the independent variables xi - the direct or inverse link - the correlation can be positive, in the case of the direct link, or negative, in the case of the inverse link. The multiple correlation coefficient measures the intensity of the connection between the dependent variable y and two or more independent variables xi. It must be taken into account that each independent variable has only a fraction of the total influence on the dependent variable (Aivaz, 2007a; Aivaz, 2007b).

4. Findings

The dynamics of the number of companies with scientific and technical professional activities in the analyzed horizon 2014-2018 is presented according to the data in Table no.1 and the graphical representation in Figure no.1.

Table no.1. Dynamics of the number of companies with scientific and technical professional activities, Average number of employees and Salary expenses (average value) in the time horizon 2014-2018

	2014	**2015**	**2016**	**2017**	**2018**	**2015/ 2014%**	**2016/ 2015 %**	**2017/ 2016 %**	**2018/ 2017 %**
Number of companies	1399	1405	1526	1597	1789	100.43	108.61	104.65	112.02
Average number of employees	3.60	3.44	3.28	3.20	3.44	95.56	95.35	97.56	107.50
Salary expenses (average value)	97486	101862	103526	118235	132414	104.49	101.63	114.21	111.99

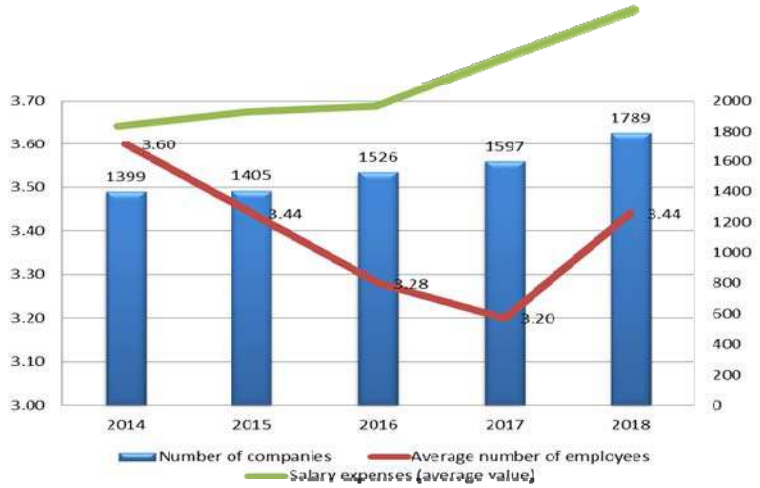
Source: Dates processed in the SPSS programme, based on the INSE indicators

We find a certain linearity in the values of the average number of employees, even if the number of companies shows a slight fluctuation. Only in 2018, there is an increase compared to 2017, by 7.50%, but to reach the level of previous years.

It should be noted that in companies with professional activities have a small number of employees, but the registered turnover is considerable, as we note in tables no.2.

Except for 2018, in the rest of the period there were reductions in the number of employees, but salary expenses increased every year.

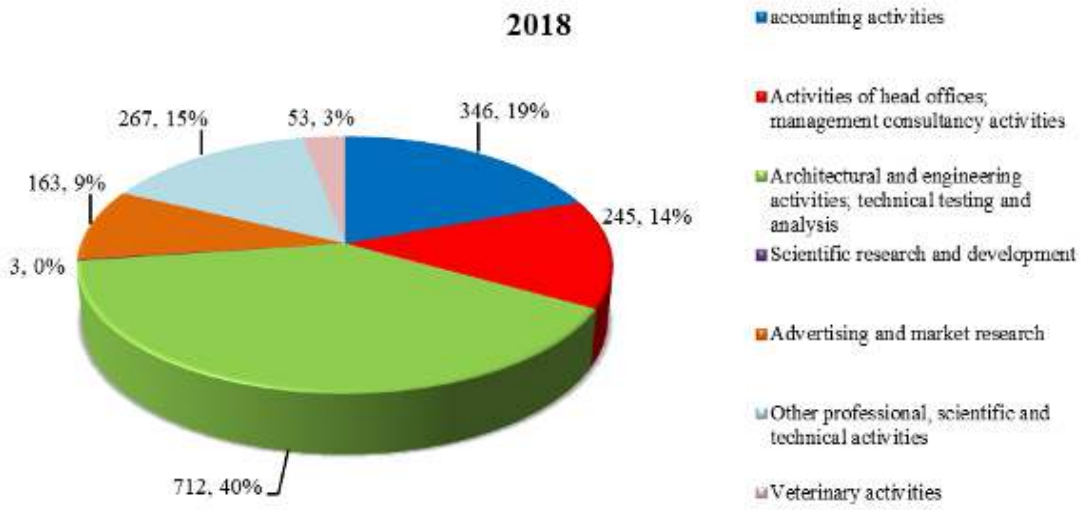
Figure no.1. Graphic representation of the number of companies with scientific and technical professional activities, Average number of employees and Salary expenses (average value) in the time horizon 2014-2018



Source: The data in the table no. 1.

We graphically represented the structure of companies by groups of professional activities only for 2018, because we found similar situations in the previous period.

Figure no.2. The structure of the number of companies with scientific and technical professional activities, in 2018



.*Source*: Authors' study based on the INSE indicators

We find that most companies in the group of activities 71 "Architectural and engineering activities; technical testing and analysis" include consulting services for architectural activities, plans and projects for buildings, urban plans and landscaping; engineering activities; testing and

technical analysis activities. With a percentage of 19% we have companies with accounting, audit and bookkeeping services.

At the opposite pole we have only three companies with research and development in social and humanities and research and development in other natural sciences and engineering.

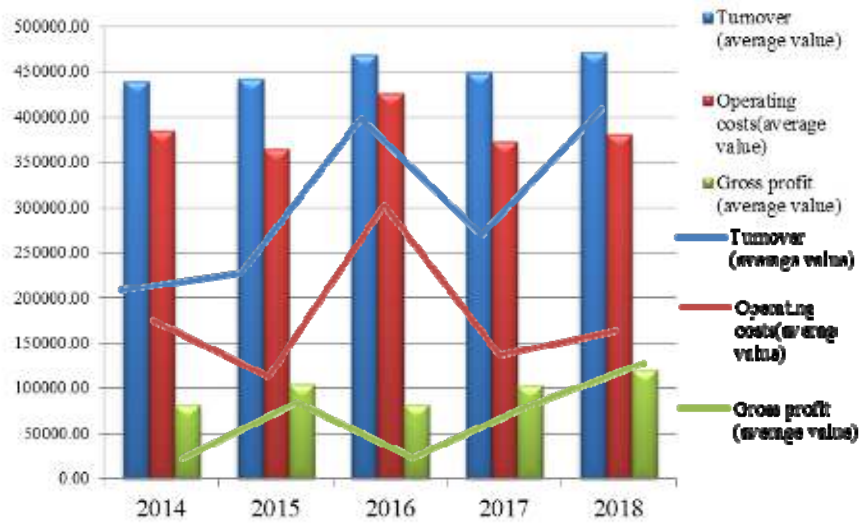
The data in Table no. 2 provides the dynamics of the indicators "Turnover", "Operating expenses" and "Gross profit", average level, in the period 2014-2018 for the analyzed activities.

Table no.2. Dynamics of the indicators "Turnover", "Operating expenses" and "Gross profit", average level, in the period 2014-2018

	2014	2015	2016	2017	2018	2015/ 2014 %	2016/ 2015 %	2017/ 2016 %	2018/ 2017 %
Turnover (average value)	438977	441900	469463	448776	471235	100.67	106.24	95.59	105.00
Operating costs (average value)	384688	364835	425986	372600	381009	94.84	116.76	87.47	102.26
Gross profit (average value)	81258	104343	81786	103103	120969	128.41	78.38	126.06	117.33

Source: Dates processed in the SPSS programme, based on the INSE indicators

Figure no.3. Graphic representation of the indicators "Turnover", "Operating expenses" and "Gross profit", average level, in the period 2014-2018



Source: The data in the table no. 2.

Except for 2016, when the operating expenses increased by 16.76% compared to 2015, which led to a decrease in gross profit (average value) by 21.62%, during the rest of the period the companies recorded values with slight increases in gross profit (average value). In 2018, the number of companies increased by 12% compared to 2017, but the gross profit (average value) increased by 17.33% compared to the same period.

The companies that register the highest values for the analyzed indicators are those that carry out testing and technical analysis activities. During 2018, 100 companies developed this kind of activities, with an average number of employees of 9.13 and registered a turnover (average value) of over 300,000 euros.

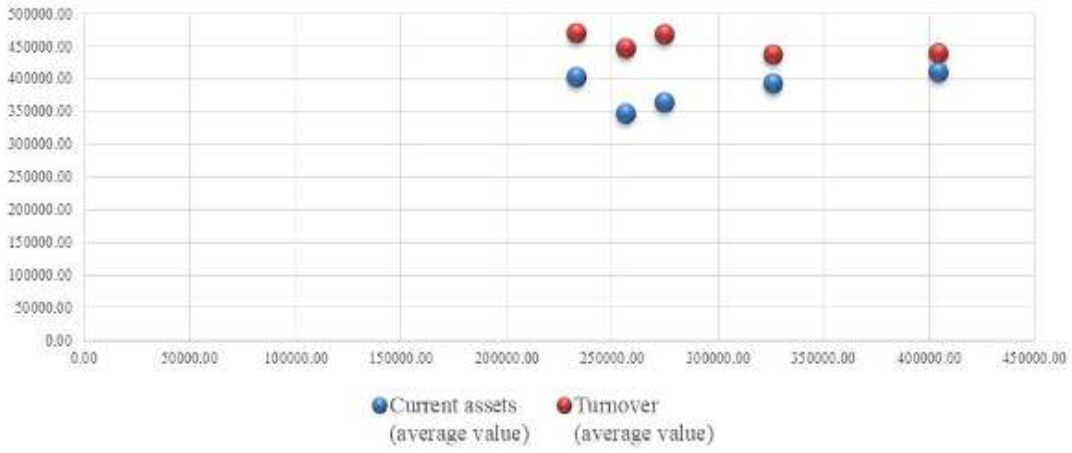
To establish the interdependence or connection between the selected variables in the analyzed statistical population we chose to use Pearson's correlation coefficient r (linear correlation coefficient). The variables selected in the analyzed statistical population are: y = Turnover (average value), x1 = Fixed assets (average value), x2 = Current assets (average value).

Table no. 3. Calculation of Pearson correlation coefficients

		Fixed assets (average value)	Current assets (average value)	Turnover (average value)
Turnover (average value) year 2014	Pearson Correlation	.327**	.598**	1
	Sig. (2-tailed)	0.000	0.000	
	N	1399	1399	1399
Turnover (average value) year 2015	Pearson Correlation	.306**	.805**	1
	Sig. (2-tailed)	0.000	0.000	
	N	1405	1405	1405
Turnover (average value) year 2016	Pearson Correlation	.262**	.586**	
	Sig. (2-tailed)	0.000	0.000	
	N	1526	1526	1526
Turnover (average value) year 2017	Pearson Correlation	.300**	.594**	1
	Sig. (2-tailed)	0.000	0.000	
	N	1597	1597	1597
Turnover (average value) year 2018	Pearson Correlation	.224**	.646**	1
	Sig. (2-tailed)	0.000	0.000	
	N	1789	1789	1789

Source: Table processed in the SPSS programme

Figure no.4. The link between the variables Current assets (average value) and Turnover (average value)



Source: The data in the table no. 3.

In the case of the analyzed statistical population, correlation coefficient has only positive values, which means that we have a direct correlation - the two correlated variables vary in the same direction (when one increases and the other increases, respectively when one decreases and the other decreases).

Correlation coefficient has higher values in the case of the variable x2 = Current assets (average value) which indicates a strong relationship between the two indicators.

This can be explained by the fact that current assets include stocks and cash resources, which directly influence turnover.

The largest dimension of the correlation coefficient ry / x2 = 0.805 is found in 2015 and indicates a strong influence between the two indicators.

We also selected the dependent variable and y = Gross profit (average value) and three factorial variables x1 = Turnover (average value), x2 = Operating costs (average value) and x3 = Average number of employees.

With respect to relevant connections, the positive value of the coefficients and their size for the technical activities indicate a strong relationship, directly proportional.

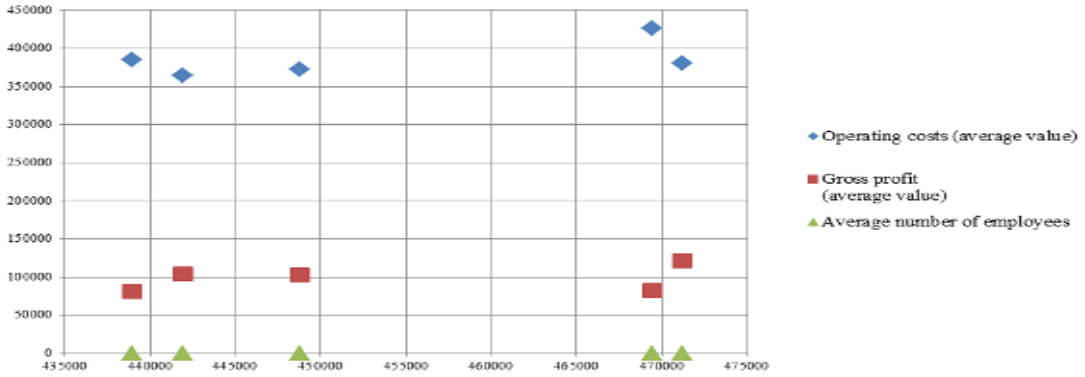
Table no. 4 Calculation of Pearson correlation coefficients

		Turnover (average value)	Operating costs (average value)	Gross profit (average value)	Average number of employees
Gross profit (average value) year 2014	Pearson Correlation	.606**	.413**	1	.259**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	1399	1399	1399	1399
Gross profit (average value) year 2015	Pearson Correlation	.727**	.585**	1	.434**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	1405	1405	1405	1405
Gross profit (average value) year 2016	Pearson Correlation	.763**	.724**	1	.452**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	1526	1526	1526	1526
Gross profit (average value) year 2017	Pearson Correlation	.570**	.450**	1	.276**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	1597	1597	1597	1597
Gross profit (average value) year 2018	Pearson Correlation	.766**	.648**	1	.474**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	1789	1789	1789	1789

Source: Table processed in the SPSS programme

The link between operating costs (average value), gross profit (average value) and number of employees (average value) presented in Figure 5 brings incentives on performance assessment in the investigated field. In order to achieve performance, managers must find the business opportunities that will concur to the achievement of sufficient revenues and fulfilment of operational objectives. Motivation for performance assessment underwent complex directions and various theorists' approaches (Munteanu, 2018), but the topics' importance needs constant research and professional monitoring.

Figure no.5. The link between the variables Operating costs (average value), Gross profit (average value) and Average number of employees



Source: The data in the table no. 4.

5. Conclusions

This study investigated the importance of professional activities in Constanta County for the period 2014-2018.

The findings of this paper present a convincing image on the importance of the typologies of professional activities. I sought to capture in this study a small part of the aspects resulting from the information reported by companies in the annual financial statements.

The data collected allow us to identify the number of active companies for Constanta County, and to note the degree of profitability of this section of activities.

Although these companies employ a small number of employees, the level of turnover and profit is high.

I noticed that for the targeted are, the most profitable professional activities include the activities from the group Architectural and engineering activities; technical testing and analysis, accounting activities, advertising and market research.

6. References

- Aivaz, K., 2007a. *Statistică Economică[Economic statistic]*. Constanta: Muntenia Publishing House.
- Aivaz, K., 2007b. *Econometrie-studii de caz [Econometrics-case studies]*. Constanta: Muntenia Publishing House.
- Aivaz, K., 2018. Aspects Regarding the Profitability of Companies in the Towns of Constanta County, in 2016 and 2017.Constanta *"Ovidius" University Annals, Economic Sciences Series*, 18(2), pp. 88-93.
- Doggett, M., McGee, P., Scott, S., 2011.Toward a Technology Management Core: Defining What the Technology Manager Needs to Know. *Association of Technology, Management, and Applied Engineering (ATMAE),* Conference Paper.
- Field, A., 2009. *Discovering Statistics Using SPSS*. London: Sage Publications Ltd.
- Longenecker,C.O., Fink,L.S., 2001. Improving management performance in rapidly changing organizations. *Journal of Management Development*, 20, pp. 7-18.
- Munteanu, I., 2018. The challenges of performance assessment in Romanian state-owned enterprises. *Challenging the Status Quo in Management and Economics*, pp.1247-1259.
- Popovici, N., Munteanu-Florea, I., Condrea, E., 2020. A Perspective on Quality of Life. *Lumen Proceedings*, *11*, pp. 45-55.
- Popovici, N., Florea, I. M., Oprisan, O., 2020. Emotional Intelligence and Entrepreneurial Skills. *Strategica*, pp. 815-824.
- Sandwich, P., 1993. A hierarchy of management training requirements: the competency domain model. *Public Personnel Management*, 22, pp. 43-62.