The Relationship between Intellectual Capital and Company's Performance: Evidence on Pharmaceutical Sector

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Abstract.

The aim of this paper is to analyze the relationship between intellectual capital and financial performance of the pharmaceutical companies. The analyze was made on a period consist in 5 years (2013-2018), using the indicators available on the Bucharest Stock Exchange for listed companies. Financial performance was measured through Return on Equity (ROE) and Return on Assets (ROA). The intellectual capital was measured using the directs methods Market Value Added (MVA) and Economic Value Added (EVA). The results were presented in four distinct regressions composed by the indicators mentioned. Firstly, we presented the impact of intellectual capital on company's performance expressed by the relationship between Logarithmated Evaluated Value Added (LEVA) and Return on Equity, then Market Value Added and Return on Assets. Secondly, it was shown the relationship between Return on Equity and Logarithmated Evaluated Value Added followed by Return on Assets and Market Value Added. Through the results was revealed that there is an impact of intellectual capital on the company's performance and there is also an impact of company's performance on the intellectual capital.

Keywords: Economic Value Added, Market Value Added, Return on Assets, Return on Equity

1. Introduction

As we know intellectual capital is one of the most beautiful and interesting form of all existents in literature. It was solid defined for the first time in 1999 by T. Steward, where was said that it is the sum of what every employee knows in a company and can be used to develop his competitive capacity (Steward, 1999). Examining this definition we can say that intellectual capital could be the key in order to each company achieve the success.
Before intellectual capital was defined, it was classified from a non-accounting perspective by K.E.Sveiby in 1997. Sveiby divided intellectual capital into three broad categories as following: employees competences, internal structure and external structure. In the same year Edvinsson and Sveiby, and after one year Bontis and steward (1998), adopt the initial classification but renamed all the three components as: human capital, organizational capital and customer capital (Choong, 2008). Nowadays, the intellectual capital dress three big forms and they are: structural or internal capital, relational capital or external capital and human capital.

2. Literature review

Intellectual capital can be consider the key for each organization and also for our society. Even if there is no unanimously accepted definition by all specialist, most of them refers to knowledge, intangible assets, intangible value, abilities, experience etc.
As we have mentioned before, the first definition was given by Steward in 1999, and the most recent definitions are given by Sharabati et al., Kristić & Bonić in 2016 who affirm that ,,Intellectual capital consist in those elements of intangible assets that explain the difference between a company's market value and its net book value. It is appreciated as the „excess" of the recognized market value above the company's book value" (Sharabati et al., Kristić & Bonić, 2016). Another recent definition was given by Bukh, Laresen & Mouritsen who said that intellectual capital refers not only to a single component, it is fragile and needs to be approached as a whole set of components elements (Ting & Lean,2009;Amin & Aslam, 2017).

Being such a charged subject we would like to knew if it can be measured, because from all the definitions given to it, we saw that it has a qualitative form than a qualitative one. But, we found out that there are methods and models which can help us in order to measure it. The most useful methods which are also direct are: Economic value added and Market Value Added. Other ones but which measure the quality are Citation- Weightedeva Patents Method and Technology Broker Method. Also we found out that there are some models which helps us to measure it named Generic Models and they are: Balanced Scored-Card, Performance Prism, Knowledge assets map approach. But also if we talk about each company we have to mention that there are models used to measure the intellectual capital to a particularly level and they are: Skandia Navigator, Ericsson's cockpit communicator, Celemi's intangible assets monitor, Ramboll's holistic company model and Bates Gruppen CompanyIQ.

So far, we talk about what is the meaning of intellectual capital and if it could be measured. But also we would like to know if there is a relationship between intellectual capital and the company's performance.

The relationship between the intellectual capital and the company's performance determines the managers to search and discover new ways in order to describe and measure the intellectual capital (Burlea, 2003).
The impact of the intellectual capital was discovered in a lot of studies made in a lot of countries. In order to show this impact we choose some article where there is presented the impact and the influence of the intellectual capital on the company's performance.

The effect of the intellectual capital on the value of the company, has been determined by Nuryaman in 2015 through Pulic's Methods, here the return was a latent variable which is a causal relationship between intellectual capital and company's value; in this case was found a positive effect of the intellectual capital through the return (Nuryaman, 2015).

In another interesting study was made on Romania by Gogan(2015) where was investigated the relationship between intellectual capital and the company's performance in four companies where were established four hypothesis: H1- human capital has a positive impact on the performance of the organization, H2- intellectual capital has a positive impact on the performance of the organization, H3- relational capital has a positive impact on the performance of the organization, H4- structural capital has a positive impact on the performance of the organization, and all the four hypothesis were right (Gogan, 2015).

McDowell et al., have examined the innovation role in the relationship between intellectual capital and organizational performance and found out that there is a positive relationship between two components of intellectual capital as human capital and organizational capital and in this way was said that efficiently organized companies can benefit well-qualified and innovative employees in order to obtain a better performance through innovation. (McDowell, 2018).Talking about innovation, Ornek(2015) identified the relationship between intellectual capital and the innovative work behavior, and in order to construct a such relationship depends on the transfer on intellectual capital through innovation and if the transfer is made successfully there will be triggered the performance (Örnek A. &Ayas S., 2015).

The same author mention before tell us that Intellectual capital is a factor which contribute to the increase of the organization's performance, as well as the result of the continuous process of knowledge transformation. It was developed through an organizational architecture based on technology and should be permanently adapted to organizational changes in order to face the external factors (Burlea, 2003).

3. Methodology

In order to mad this study, we have made a research for the all companies listed on the Bucharest Stock Exchange from the pharmaceutical field and collect the financial dates in order to compute the indicators : ROA, ROE and other variables which we have taken into consideration

as: Turnover, Total Assets. The companies taken into consideration for our analysis are: Zentiva, Farmaceutica Remedia, Antibiotice Iași, Biopharma and Ropharma. We made the analyze for five years starting from 2013 to 2018. In order to compute the indicators we have taken into consideration the following elements: equity, total assets, total debts and net income. Because our purpose is to see if there is a relationship between intellectual capital and performance companies we used the directs methods mention before for measure the intellectual capital: Market Value Added and Economic Value Added. In order to calculate this methods we used the elements that composed them: market capitalization, interest expenses, operating result after taxes, invested capital. In order to calculate the methods mentioned before we had to calculate the weighted average cost of capital and in this way the interest rate was as a ratio between the interest expenses and the total debts and the cost of capital was approximate with ROE. All the data were processed in Eviews. The econometric analysis is based on four regressions with panel data. There are more models of panel data and the first distinction is that one based on fixed effects models and random effect models and in our paper the fixed effects were more appropriated.

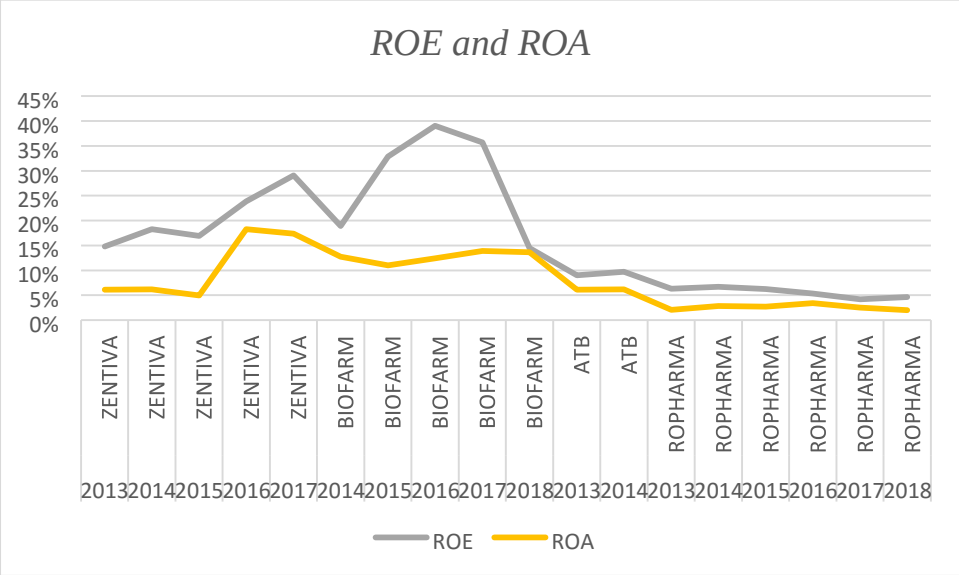
4. Results

The data used in this paper are: MVA, EVA, ROA, ROE and TA and CA and the source was Bucharest Stock Exchange. The analysed period was 2013-2015 and the data are from the five listed companies.

4.1. Descriptive statistics

In the figure 1, there is presented the evolution and the correlation between ROE and ROA. As it can be seen in the chart, they have approximately the same evolution, but in what concerns ROE, its value are larger than the values of ROA. Even if this happens , seeing their evolution there is a common stochastic trend, so there is possible to exist a cointegration relationship. Even if there is a cointegration relationship between ROA and ROE.

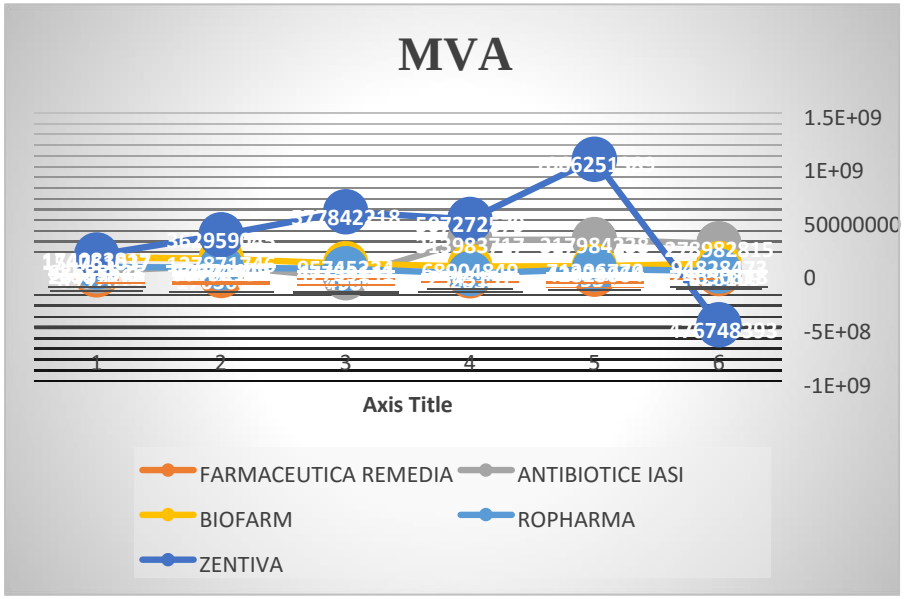
Figure 1. Evolution ROE and ROA



Source: author's work

Further, we will present the evolution of MVA and EVA, in the next two charts.

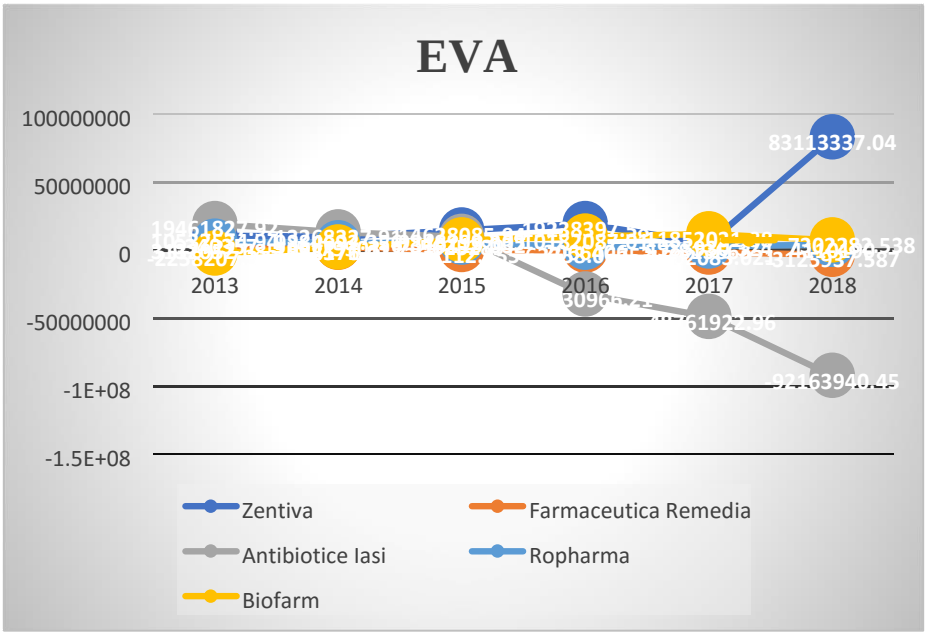
Figure 2. Evolution MVA



Source: author's work

In the previous chart, is presented the evolution MVA for all five analyzed companies. Farmaceutica Remedia, Antibiotice Iasi, Ropharma and Biofarm have approximately the same evolution, but Zentiva has a very different trend and it register two very different values in the two last years of evolution. In 2017 it has a big and positive value but in 2018 it has a big and negative value. This happens because the market capitalization is approximately 4 times higher than equity.
In what concerns the evolution of EVA, it is presented in the following chart.

Figure 3. Evolution EVA



Source: author's work
Here, Biofarm, Ropharma and Farmaceutica Remedia have approximately the same trend, but in contrast to MVA, Zentiva does not have negative values in none year only a big and positive value in 2018. But the company which stands out is Antibiotice Iasi, which until 2015 has the same trend as the other companies , but from 2016 till 2018 has only negative values. This happens because the invested capital and the cost of capital are increasing.

4.2. Econometric analysis

First, it were estimated the following regressions:

$$ROE = a + \alpha_1 \times LEVA + \alpha_2 \times LCA + \varepsilon \qquad (1)$$

$$ROA = b + \beta_1 \times MVA + \beta_2 \times TA + \varepsilon \qquad (2)$$

Where:

α_1, β_1 = coefficients

LEVA=Logarithmic Evaluated Value Added

MVA= Market Value Added
ROE=Return on Equity
ROA=Return on Assets LCA=
Logarithmic Turnover
a, b = constant
=error

Hypotheses:

H_1:EVA has a positive impact on company's performance

H_2: MVA has a positive impact on company's performance

*** In order to estimate the model we have to mention that for EVA and MVA were taken into consideration only the positive values.

Table 1. Regression panel analysis for ROE-dependent variable

Independent variables	Dependent variable	Prob.
	ROE	
LEVA	0.04*	0.0261
LCA	0.25*	0.0335
CONSTANT	-5.57*	0.0170

Significant at *p< 0.1; **p<0.05; ***p<0.03

Source: author's work

Table 2. Regression panel analysis for ROA-dependent variable

Independent variables	Dependent variable	Prob.
	ROA	
MVA	1.51*	0.0023
TA	-1.60*	0.0161
CONSTANT	0.10*	0.0001

Significant at *p< 0.1; **p<0.05; ***p<0.03

Source: author's work

In order to estimate the model for the first dependent variable, the data were tested with Panel EGLS method.

All the probabilities are smaller than 5 % (fixed value) Prob. LEVA=0,0261, Prob.LCA=0,0.0335 and the constant term also is significant with a probability of 0.0170. In what concerns the Effects Specification, R-squared is equal to 0.848861 , and this show us an

influence of approximately 85%. With all the probabilities, for a significant level of 5% H_1 is accepted , so EVA has a positive impact on company's performance and model is:

$$ROE = -5.57 + 0.04 \times LEVA + 0.25 \times LCA + \varepsilon \quad (3)$$

In order to estimate the model for the second variable, the data were estimated with Panel EGLS Method.

Here all the probabilities are smaller than 5 % (significant level): Prob.MVA=0.0023, Prob. TA= 0.0161 and also the constant is significant with a probability equal to 0.0001. For Effects Specification R-squared is 0.829410, fact which show us an influence of 82,94 %. With all the probabilities presented, H_2 is accepted MVA has a positive impact on company's performance and the model is:

$$ROA = 0.10 + 1.51 \times MVA - 1.60 \times TA + \varepsilon \quad (4)$$

In order to make as short review of what we have made, we can say that both models proposed by us are viable, there exist a positive correlation between the dependent and independent variable, they are significant, so the intellectual capital has impact on financial performance of our tested companies.

After we have estimated the first two regression in order to see if the intellectual capital has an impact on the company's performance we have estimated another two regressions in order to see if there is a relationship between company's performance and intellectual capital.

$$MVA = a + \alpha_1 \times ROA + \alpha_2 \times TA + \varepsilon \quad (5)$$

$$LEVA = b + \beta_1 \times ROE + \beta_2 \times LCA + \varepsilon \quad (6)$$

Hypotheses:

H_1:MVA has a positive impact on company's performance

H_2: LEVA has a positive impact on company's performance

*** In order to estimate the model we have to mention that for EVA and MVA were taken into consideration only the positive values and after we run we run the tests we have to mention that out constant is not significant so we have decided to take it out from our model.

Table 3. Regression panel analysis for MVA-dependent variable

Independent variables	Dependent variable	Prob.
	MVA	
ROA	2.53E+09	0.0015
TA	0.822869	0.0156
CONSTANT	-2.73E+08	0.0475

Significant at *p< 0.1; **p<0.05; ***p<0.03

Source: author's work

Table 4. Regression panel analysis for LEVA-dependent variable

Independent variables	Dependent variable	Prob.
	ROE	
ROA	5.642024	0.0005
LCA	0.758584	0.0000
CONSTANT	-	-

Significant at *p< 0.1; **p<0.05; ***p<0.03

Source: author's work

Table 5. Regression panel analysis for MVA-dependent variable

Independent variables	Dependent variable	Prob.
	MVA	
ROA	2.53E+09	0.0015
TA	0.822869	0.0156
CONSTANT	-2.73E+08	-0.0475

Table 6. Regression panel analysis for LEVA-dependent variable

Independent variables	Dependent variable	Prob.
	LEVA	
ROE	6.011174	0.0005
LCA	1.150260	0.0172
CONSTANT	-7.699379	0.3867

$$MVA = (-2.73E + 0.8) + (2.53E + 09) \times ROA + 0.822869 \times TA + \varepsilon$$

$$LEVA = -7.699379 + 6.011174 \times ROE + 1.150260 \times LCA + \varepsilon$$

Conclusions

After our research about intellectual capital, we could found that there a lot of definitions given to it, but there is not an unanimously accepted but many of them refers to notions like knowledge, experience, intangible assets. Talking about the measurement of intellectual capital we could see that there are qualitative methods but there are also quantitative which helps us to see it in a numeric form. We used the direct methods Evaluated Value Added and Market Value Added in order to measure intellectual capital and in order to measure the performance companies we used Return on Equity, Return on Assets.

In order to see if there is a relationship between intellectual capital and company's performance we have made a panel model. The results obtained after we have estimated the models shown us an impact of EVA and MVA on company's performance and also an impact of ROA and roe on intellectual capital.

So, we can say that there is a relationship between intellectual capital and company's performance.

References

[1] Achim M, Borlea N.S., (2019). *Ghid de analiză-diagnostic al stării financiare*, Ed. Risoprint, Cluj-Napoca.

[2] Anghel, I., Siminică, M., Cristea, M., Sichigea, M. and Noja, G.G, (2018). *Intellectual Capital and Financial Performance of Biotech Companies in the Pharmaceutical Industry.* Amfiteatru Economic, 20(49), pp. 631-646.

[3] Bukh, P.N., Larsen, H.T. and Mouritsen, J. (2001). *Constructing intellectual capital statements*, Scandinavian Journal of Management, Vol. 17 No. 1, pp. 87-108.

[4] Brooking, A. (1997), *The management of intellectual capital, Long Range Planning*, Vol.30, No.3, pp. 364-365.

[5] Celemi (1999). *Uncovering Hidden Assets, Celemi Annual Report*, available: www.celemi.com

[6] Chizari, M.H., Mehrjardi, R.Z., Sadrabadi, M.M. and Mehrjardi, F.K., (2016). *The Impact of Intellectual Capitals of Pharmaceutical Companies Listed in Tehran Stock Exchange on their Market Performance.* Procedia Economics and Finance, 36, pp.291–300.

[7] Choong, K.K. (2008). *Intellectual capital: definitions, categorization and reporting models, Journal of Intellectual Capital*, vol. 9, no. 4, p. 609-638.

[8] Sharabati, A.A.A., NajiJawad, S. and Bontis, N., (2010). *Intellectual Capital and Business Performance in the Pharmaceutical Sector of Jordan. Management Decision*, 48(1), pp.105-131.

[9] Starovic, D. and Marr, B. (2004). *Understanding Corporate Value: Managing and Reporting Intellectual Capital. The Chartered Institute of Management Accountants (CIMA) and Cranfield University*, London.

[10] Stewart, Thomas A. (1997). *The Intellectual Capital. The New Wealth of Organizations.* Nicho- las Brealey Publishing, Business Digest, New York, 1997

[11] Ting, I.W.K., Lean, H.H. (2009). *Intellectual Capital Performance of Financial Institutions in Malaysia. Journal of Intellectual Capital*, 10(4), pp.588-599

[12] Trandafir R.A., (2015). *The Economic Value Added (EVA)-A measurement indicator of the value creation within a company from the Romanian seaside hotel industry*, Annals of the „Constantin Brâncuși", University of Târgu Jiu, Economy Series, Issue 1, vol. I/2015

[13] -Understanding corporate value: managing and reporting intellectual capital.Available: http://www.cimaglobal.com/Documents/ImportedDocuments/intellectualcapital.pdf