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ANALYSIS OF THE PRIVATE SECURITY SECTOR TREND IN ROMANIA

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ABSTRACT

This paper aims to make an analysis of the private security sector evolution in Romania. The analysis is conducted for the period 2005–2015 and it aims at a number of core indicators for this sector, such as the average gross monthly income, number of companies, number of employees and turnover. Other important indicators for the sector could have been analyzed, but due to the lack of official information about them, they were not considered. The objectives pursued by this study refer to the trend estimation for the mentioned indicators and building a more accurate picture of this sector in Romania and its future. The problem of determining the trend of a particular statistical indicator is not simple, certain functions available in Excel being used in this study.

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INTRODUCTION

In Romania, until 2008, NACE code for companies that conducted *Investigation and protection of goods and people activities* was 7460, without any subdomain. With the new NACE classification, in 2008, *Investigation and protection activities* have the code 80 and the following subdomains:

- **8010** – Protection and guard activities;
- **8020** – Security systems activities;
- **8030** – Investigations.

2005–2015 period was chosen because in 2005 the national currency denomination took place, and for 2016 there are not yet any official data regarding the indicators that we wanted to analyze.

Considering the analyzed period and how these activities were classified, an analysis on the three subdomains mentioned above could not be conducted, but on the whole domain.

Private security industry in Romania has been in continuous development in the period analyzed for most indicators under review, except the number of employees and turnover of this sector, which registered a slight decrease in the last two years or just the last year.

Although this industry has been rapidly growing, according to CoESS reports (The Confederation of European Security Service)¹ it appears that private security sector in Romania has an insignificant share in the country's GDP.

Increasing private security industry in Romania is owed to the fact that both private institutions (banks, etc.) and state institutions (even in the sector of defense, public order and national security) have outsourced security and protective services because it is more convenient and less expensive than those from own sources. On the other hand, requests for these services have increased to various private personalities who visited Romania (concerts, etc.) and even for participation in various missions abroad.

Data collection was difficult because the sources used contain contradictory information. Overall, the data used were taken from the National Institute of Statistics website² and the database³. Unfortunately, the data

¹ ff-2011-private-security-services-in-europe-coess-facts-and-figures.pdf,p.99;ff-2013-private-security-services-in-europe-coess-facts-and-figures.pdf, p. 169–170.

² <http://statistici.insse.ro/shop/?page=tempo3&lang=ro&ind=INT109A>;<http://www.datefirme.ro/TopRaport.aspx>.

³ <http://www.datefirme.ro/TopRaport.aspx>.

available on the NIS website and in the database⁴ differ greatly. Also, the assessments made by the leaders of various companies in this area on various indicators of this sector, for example⁵ differ terribly from the official data, available for example on NIS, and for this reason, the data provided by CoESS differ greatly from the official data.

For the periods to which information was not found, estimates were made based on the behavior of such indicators in the periods in which data are available.

For a number of indicators relevant to this area information is not available. We refer here, for example, to the average age of people working in this area and the percentage of women who work in this sector. More specifically, information on these indicators can be found. Thus, for 2010, the 2011 CoESS report⁶ – mentions the average age of staff working in private security area was around 35 years and the percentage of women in this sector was around 15%.

Other indicators that would have deserved to be analyzed are those presented in⁷, where some comments on 2015 made, namely:

- 27,4% of all companies have no employees;
- 74% of all companies have less than 50 employees;
- only 2% of all companies have less than 500 employees and only 11 companies have more than 1000 employees;
- the most profitable companies are those who have, in average, more than 10 employees and less than 500, companies that represent half of the total number of companies;
- the most profitable category seems to be the one that has on average 10–50 employees and the one that has 100–250 employees.

Therefore, the indicators that we considered for the analysis of this sector were chosen for their relevance and availability of information about them.

METHODOLOGY OF RESEARCH

For private security forces, the following indicators were considered:

1. Total number of private security companies.
2. Number of security forces.

⁴ *Ibidem.*

⁵ *Ibidem.*

⁶ ff-2011-private-security-services-in-europe-coess-facts-and-figures.pdf, p. 100.

⁷ <http://securitateinromania.ro/top-50-firme-de-securitate-2015/>.

3. Yearly turnover of the private security industry (**billion lei**).
4. Salary expenses (**billion lei**).
5. The average monthly gross salary in the private security industry (**lei**).
6. The average gross salary in December in Romania (**lei**).
7. The minimum gross salary in December in Romania (**lei**).

In the table no 1 data on the indicators mentioned are listed, specifying that data on indicators 1, 2, 3 and 4 were taken from the NIS website⁸ for the period 2005–2007, and the values for the period 2008–2014 on the INS website⁹; the number of companies operating in the private security sector in 2015 was taken from the existing database on the website¹⁰; values in yellow were estimated; average gross monthly wage, i.e. values corresponding to indicator 5 were calculated as the ratio of *Salary expenses* and *Number of security forces* and values corresponding to indicators 6 and 7 were taken from sites¹¹ for the period 2005–2014¹² and for 2015.

More information about this sector are presented in the table no 2 information that relates to the distribution of companies in the private security industry in Romania, by number of employees and subdomains 8010, 8020 and 8030.

The data in the table no 2 were taken from the NIS website¹³ for the period 2005–2007, values for the period 2008–2014 from the NIS website¹⁴, and those relating to 2015 from the data base available on the website¹⁵.

An interesting situation is the one referring to companies that have no employees, and also the one relating to discrepancies between data provided by NIS¹⁶ and the database¹⁷, the situation being presented in the table no 3:

⁸ <http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109A>.

⁹ <http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109C>.

¹⁰ <http://www.datefirme.ro/TopRaport.aspx>.

¹¹ <http://www.insse.ro/cms/ro/content/castigul-salarial>; <http://legestart.ro/cum-evoluat-salariul-minim-romania-ultimilor-15-ani/>.

¹² <http://www.insse.ro/cms/files/statistici/comunicate/castiguri/a15/cs12r15.pdf>.

¹³ <http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109A>.

¹⁴ <http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109C>.

¹⁵ <http://www.datefirme.ro/TopRaport.aspx>.

¹⁶ <http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109A>;
<http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109C>.

¹⁷ <http://www.datefirme.ro/TopRaport.aspx>.

TABLE NO. 1 STATISTICAL INDICATORS FOR THE PRIVATE SECURITY SECTOR

Year Ind.	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1.	1154	1237	1324	1445	1703	1710	1726	1887	2069	2180	2421
2.	79943	92748	101290	112784	110869	109953	117107	119230	124144	123101	106881
3.	1,05	1,41	1,80	2,65	2,95	2,91	3,02	3,27	3,42	3,56	3,02
4.	0,38	0,56	0,80	1,10	1,21	1,15	1,27	1,36	1,42	1,66	1,77
5.	396	503	658	813	909	872	904	951	953	1124	1200
6.	1121	1481	1730	2023	2023	2067	2209	2343	2430	2582	2930
7.	310	330	390	540	600	600	670	700	800	900	1050

TABLE NO. 2 DISTRIBUTION OF COMPANIES BY NUMBER OF EMPLOYEES AND SUBDOMAINS

NACE	Group	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
8010	0-9	-	-	-	456	428	391	390	455	493	539	747
	10-19	-	-	-	89	117	139	167	171	205	198	138
	20-49	-	-	-	211	221	249	266	281	295	315	276
	50-249	-	-	-	290	310	340	358	367	392	374	314
	>=250	-	-	-	97	88	79	92	90	86	98	90
TOTAL		-	-	-	1143	1164	1198	1273	1364	1471	1524	1565
8020	0-9	-	-	-	126	277	304	270	322	387	449	608
	10-19	-	-	-	14	21	18	15	17	15	19	17
	20-49	-	-	-	15	10	8	13	13	16	19	11
	50-249	-	-	-	7	10	9	9	10	12	9	2
	>=250	-	-	-	2	1	0	0	0	1	0	0
TOTAL		-	-	-	164	319	339	307	362	431	496	638
8030	0-9	-	-	-	126	208	165	134	148	161	155	215
	10-19	-	-	-	11	8	5	7	10	4	2	3
	20-49	-	-	-	8	3	3	4	2	2	3	0
	50-249	-	-	-	3	1	0	1	1	0	0	0
	>=250	-	-	-	0	0	0	0	0	0	0	0
TOTAL		-	-	-	148	220	173	146	161	167	160	218
TOTAL	0-9	540	601	620	708	913	860	794	925	1041	1143	1570
	10-19	104	88	114	114	146	162	189	198	224	219	158
	20-49	169	162	193	234	234	260	283	296	313	337	287
	50-249	270	297	315	300	321	349	368	378	404	383	316
	>=250	71	89	82	99	89	79	92	90	87	98	90
TOTAL	1154	1237	1324	1455	1703	1710	1726	1887	2069	2180	2180	2421

TABLE NO. 3 SITUATION OF COMPANIES ON SUBDOMAINS SPECIFYING THOSE WITH 0 EMPLOYEES

	2011			2012			2013			2014			2015	
	Companies with 0 employees	Total number of companies	Site	Companies with 0 employees	Total number of companies	Site	Companies with 0 employees	Total number of companies	Site	Companies with 0 employees	Total number of companies	Site	Companies with 0 employees	Total number of companies
8010	219	1256	1273	365	1456	1364	363	1521	1471	373	1581	1524	409	1565
8020	76	340	307	140	395	362	185	509	431	191	602	496	202	638
8030	102	183	146	184	281	161	133	213	167	134	215	160	130	218
TOTAL	397	1779	1726	689	2132	1887	681	2243	2069	698	2398	2180	741	2421
8010		0,17			0,25			0,24			0,24			0,26
8020		0,22			0,35			0,36			0,32			0,32
8030		0,56			0,65			0,62			0,62			0,60
TOTAL		0,22			0,32			0,30			0,29			0,31

Database¹⁸ has information only from 2011, here being found also the number of companies that have no employees. On the NIS website¹⁹ the information available is only until 2014, and the information on subdomains only since 2008.

It can be noticed that the share of companies with no employees is quite high and stands at a level of approximately 25% for those operating in the subdomain 8010, at a level of about 33% for those operating in the subdomain 8020 and at a level of about 62% for those operating in the subdomain 8030, therefore having a rate of approximately 30% for the entire subdomain, data from the database²⁰ and dates from 2012 being taken into account when these rates are starting to stabilize. This information is somewhat consistent with those available in²¹ and mentioned in the introduction.

RESULTS AND COMMENTS

In this section, based on data from the previous section, we will determine the trend of the main indicators of private security sector in Romania.

We will start with the average monthly gross salary in the sector which will be based on the minimum gross salary in Romania and the average gross salary in Romania.

Based on a linear estimation, we obtain the trends in the figure below:

¹⁸ *Ibidem*.

¹⁹ <http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109A;>
[http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109C.](http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=INT109C)

²⁰ [http://www.datefirme.ro/TopRaport.aspx.](http://www.datefirme.ro/TopRaport.aspx)

²¹ [http://securitateinromania.ro/top-50-firme-de-securitate-2015/.](http://securitateinromania.ro/top-50-firme-de-securitate-2015/)

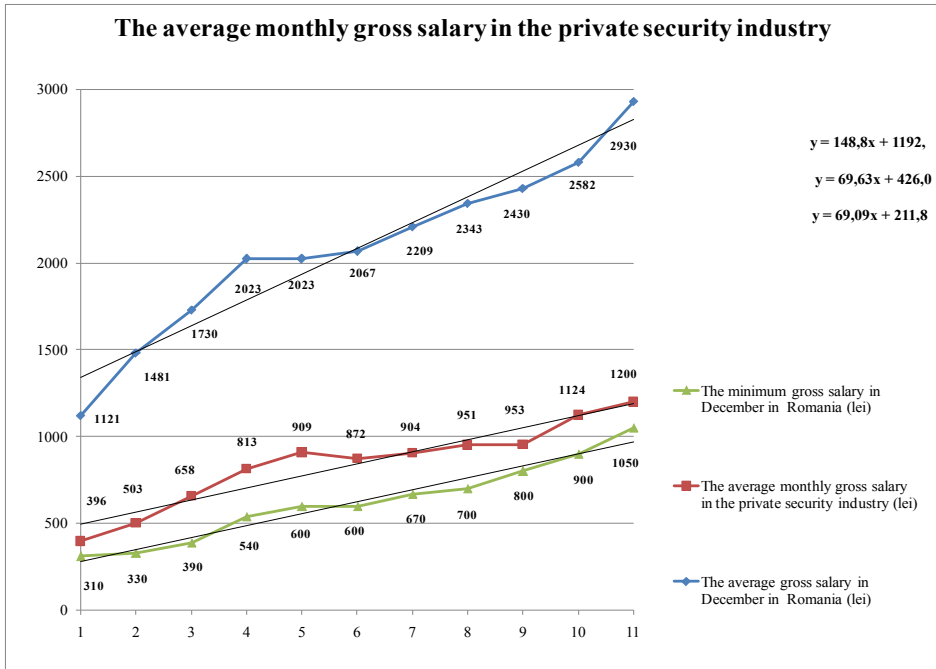


Figure no. 1. Linear adjustment of average monthly gross salary in the private security sector

Given the adjustment lines, but also the TREND function in Excel, the values below are obtained for 2016.

	Calculated from the equation line in point x=12	Calculated with „TREND” function in point x=12
The average monthly gross salary in Romania	2978,52	2978,545
The average monthly gross salary in Romania	1261,722	1261,727
The minimum monthly gross salary in Romania	1040,912	1040,909

This means that in 2016 the average monthly gross salary in this sector will be around 1,260 lei.

In general, employees in this sector are paid the minimum salary and this practically represents about 8% of the total employees in Romania who are paid the minimum salary, as outlined in²² and, as it can be seen, the average monthly gross salary in the sector keeps this trend in 2016, too.

For better adjustment of statistical data, other functions may be used, given that the linear one is the simplest. Thus, they can be adjusted with polynomials of varying degrees. In the figure below, the data are adjusted by 6 and 5 degree polynomials. For the average gross salary in the sector and the minimum monthly gross salary in Romania, 5 degree polynomials were chosen because adjustment with a 6 degree polynomial did not bring any improvement.

It should be specified that the method used for this adjustment is the *Least Squares Method*, a method for which the elements on the axis Ox (horizontal axis) are very important. An inadequate scale can lead to large errors. To adjust with a line, the scale with step 1 is usually used, and for polynomials, the higher its degree is, the lower the step must be, and as for our situation, as it can be seen, 0,1 step was used.

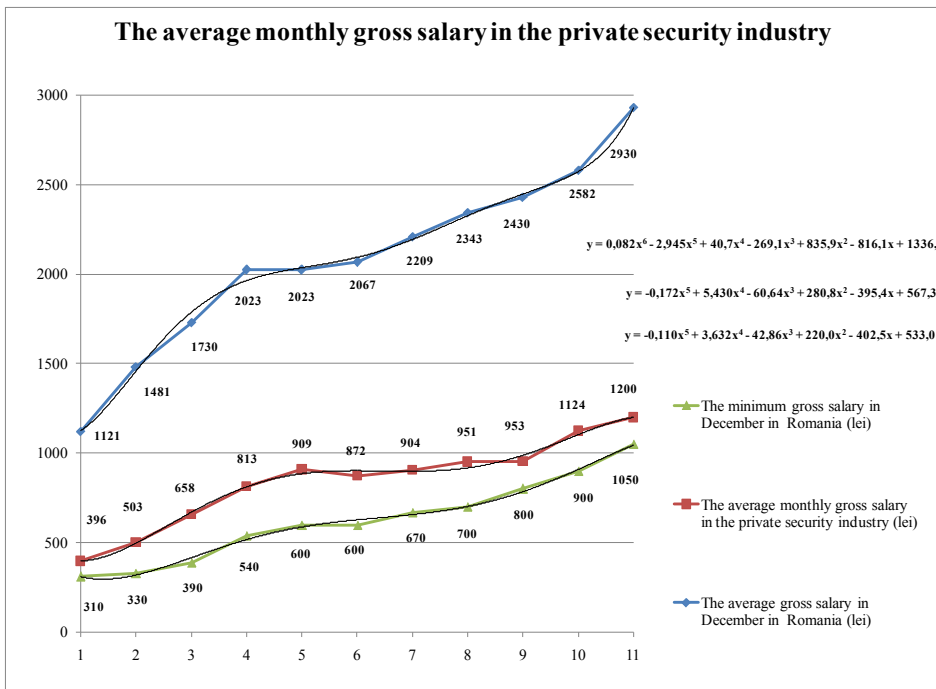


Figure no. 2. Polynomial adjustment of average monthly gross salary in the private security sector

²² <http://securitateinromania.ro/piata-de-securitate-in-romania/>.

For the values of 2016, 5 degree polynomial values are calculated, corresponding to the average gross salary in this sector in values x in the first column, then they are compared with the values in the table and finally the value for 2016 is estimated, after a correction relative to the mean of the absolute differences between the two columns of values has been made.

The results are presented in the table below:

	Values of the polynomial corresponding to x Y_p	Known values Y_c	Differences $Y_p - Y_c$	Absolute differences $ Y_p - Y_c $	Mean absolute difference
$x=0$	567,39	396	171,39	171,39	M=200,3750417
$x=0,1$	609,8057858	503	106,8057858	106,8057858	
$x=0,2$	658,2102725	658	0,210272512	0,210272512	
$x=0,3$	712,9871159	813	-100,0128841	100,0128841	
$x=0,4$	774,5334199	909	-134,4665801	134,4665801	
$x=0,5$	843,2599438	872	-28,74005625	28,74005625	
$x=0,6$	919,5913091	904	15,59130906	15,59130906	
$x=0,7$	1003,966207	951	52,96620696	52,96620696	
$x=0,8$	1096,837605	953	143,8376052	143,8376052	
$x=0,9$	1198,672955	1124	74,67295545	74,67295545	
$x=1$	1309,9544	1200	109,9544	109,9544	
x for the year 2016	Estimated value V	$V - M$			
$x=1,1$	1431,178979	1345,847338			

With this method it means that in 2016 the average gross salary in this sector will be around 1,350 lei. For a final value, the two methods will be combined, in that the average of the values obtained with it can be made, and it can be established that in 2016, the average gross salary in this sector will be around 1,300 lei ($\sim (1260 + 1350)/2$).

Using the same calculation method, the other two analyzed variables can be estimated: average monthly gross salary in Romania and the minimum monthly gross salary in Romania. We will not do this here because these two variables were used solely to see where the average monthly gross salary in the private security sector in relation to them stands.

We continue to estimate the trend in terms of the number of private security companies in Romania.

For the linear adjustment of this indicator, the graph in the figure below is obtained:

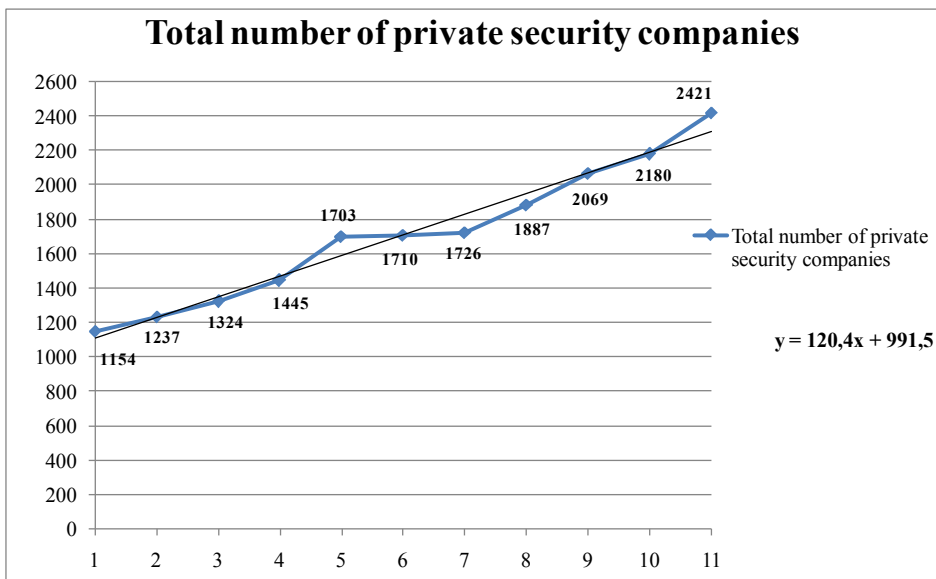


Figure no. 3. Linear adjustment in the number of private security companies sector

Given the adjustment line, and also the TREND function in Excel, the values below for the year 2016 are obtained.

	Calculated from the equation of line $y=120,45*x+991,51$ in point $x=12$	Calculated with „TREND” function in point $x=12$
Number of private security companies	2436,91	2436,85

This means that in 2016 there will be around 2437 private security companies in Romania.

For this indicator, the adjustment with the 5 degree polynomial was chosen, as an adjustment with the 6 degree polynomial did not bring any improvement, the representation being given in the figure below.

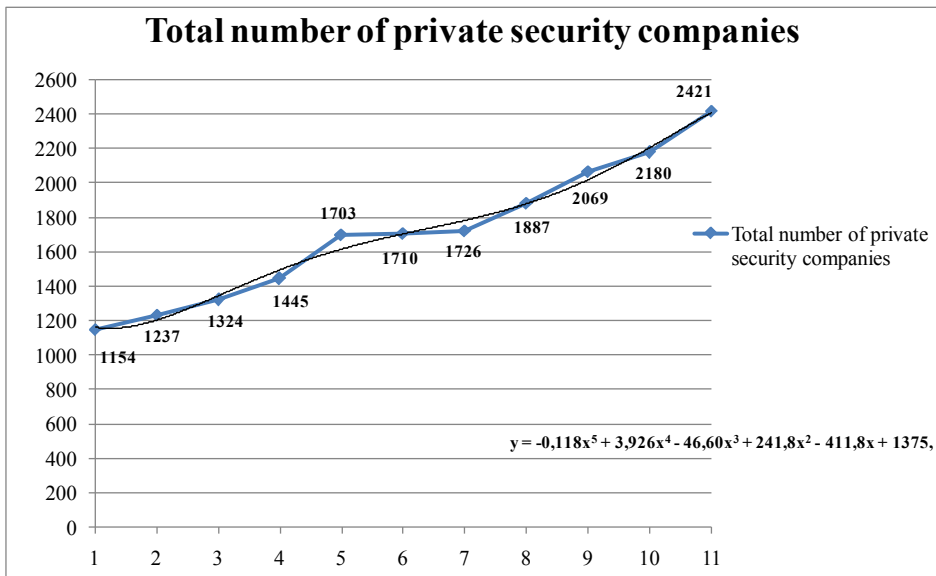


Figure no. 4. Polynomial adjustment in the number of private security sector companies

In the table below, the values of the 5 degree polynomial are calculated corresponding to this indicator in the values x in the first column, then they are compared with the values in the table and the value for the year 2016 is finally estimated, after a correction relative to the mean of the absolute differences between the two columns of values has been made.

	Values of the polynomial corresponding to x Y_p	Known values Y_c	Differences $Y_p - Y_c$	Absolute differences $ Y_p - Y_c $	Mean absolute difference
x=1	1162,47	1154	8,47	8,47	M=31,6
x=2	1205,08	1237	-31,92	31,92	
x=3	1347,02	1324	23,02	23,02	
x=4	1497,88	1445	52,88	52,88	
x=5	1618,70	1703	-84,30	84,30	
x=6	1707,69	1710	-2,31	2,31	
x=7	1785,96	1726	59,96	59,96	
x=8	1883,27	1887	-3,73	3,73	
x=9	2023,74	2069	-45,26	45,26	
x=10	2211,60	2180	31,60	31,60	
x=11	2416,90	2421	-4,10	4,10	
x corresponding to year 2016	Estimated value V	V-M			
x=12	2561,27	2529,67			

With this method it means that in 2016, in Romania there will be about 2,560 private security companies. For a final value, by combining the two methods, we get a total of about 2,500 private security companies ($\sim (2437 + 2560)/2$).

We will further estimate the linear trend of employees who work in the private security sector in Romania.

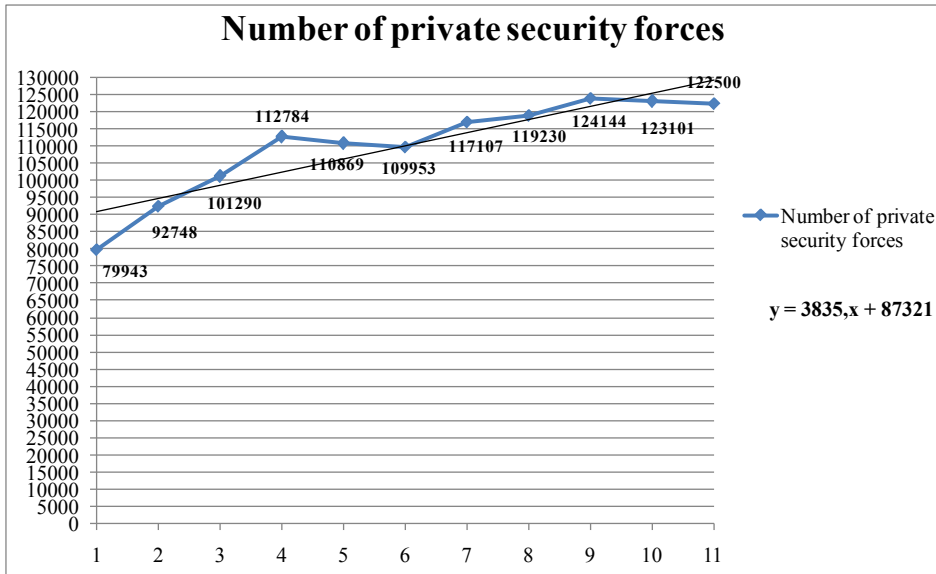


Figure no. 5. Linear adjustment in the volume of workforce in the private security sector

Given the adjustment line, and also the TREND function in Excel, the values below for the year 2016 are obtained.

	Calculated from the equation of line $y=3835,4*x+87321$ in point $x=12$	Calculated with „TREND” function in point $x=12$
Number of private security companies	133345,80	133345,67

This means that in 2016, in the private security sector in Romania there will work approximately 133 346 people.

For this indicator, the adjustment with a 6 degree polynomial was chosen, which provides better conformation on the situation, as it can be seen in the figure below.

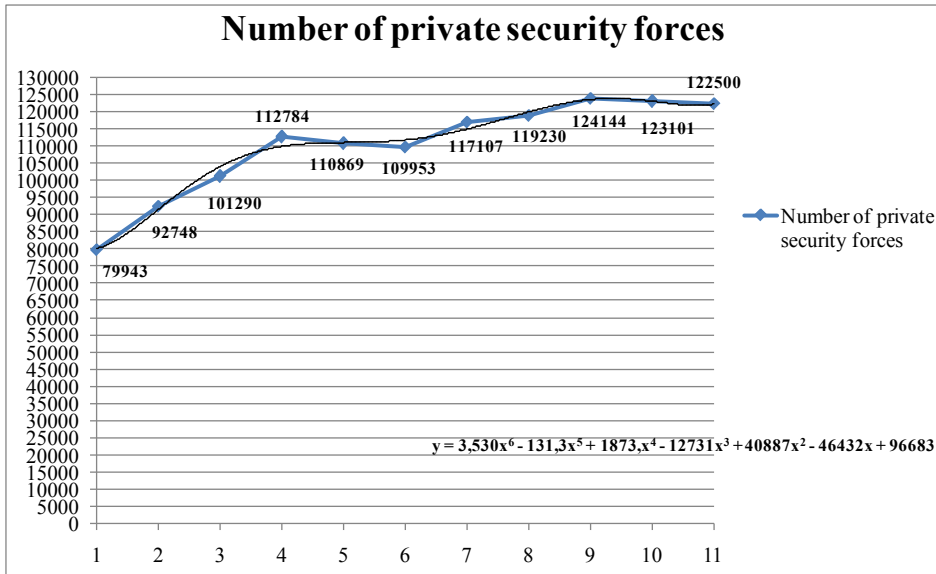


Figure no. 6. Polynomial adjustment in the volume of workforce in the private security sector

In the table below, the values of the 6 degree polynomial corresponding to this indicator are calculated, in values x in the first column, then they are compared with the values in the table and the value for the year 2016 is finally estimated, after a correction relative to the mean of the absolute differences between the two columns of values has been made.

	Values of the polynomial corresponding to x Y_p	Known values Y_c	Differences $Y_p - Y_c$	Absolute differences $ Y_p - Y_c $	Mean absolute difference
x=1	80152,97	79943	209,97	209,97	M=1275,61
x=2	91522,24	92748	-1225,76	1225,76	
x=3	104064,13	101290	2774,13	2774,13	
x=4	110004,50	112784	-2779,50	2779,50	
x=5	111113,63	110869	244,63	244,63	
x=6	111840,11	109953	1887,11	1887,11	
x=7	114986,84	117107	-2120,16	2120,16	
x=8	119928,93	119230	698,93	698,93	
x=9	123373,75	124144	-770,25	770,25	
x=10	122663,00	123101	-438,00	438,00	
x=11	121616,71	122500	-883,29	883,29	
x corresponding to year 2016	Estimated value V	V-M			
x=12	138919,39	137643,78			

With this method it means that in 2016 the private security sector in Romania there will work approximately 137 644 people. For a final value, by combining the two methods, we get a total of about 135 500 people who will work in the private security sector ($\sim (137633 + 133346)/2$).

Finally, we will deal with the linear trend of the yearly turnover of the private security industry in Romania.

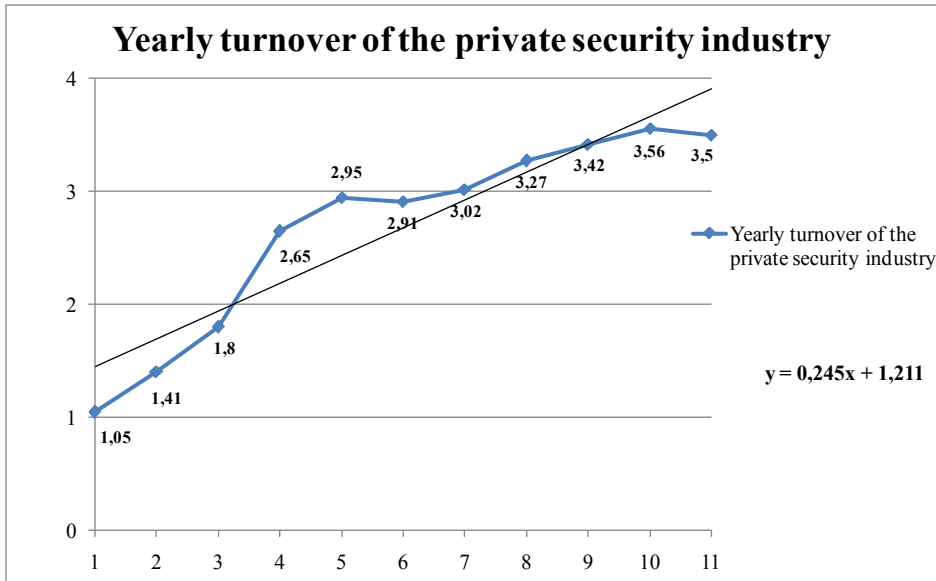


Figure no. 7. Linear adjustment of turnover in the private security sector

Given the adjustment line, and also the TREND function in Excel, the values below for the year 2016 are obtained.

	Calculated from the equation of the line in point $x=12$	Calculated „TREND” function in point $x=12$
Number of private security companies	4,16	4,16

This means that in 2016, the private security sector in Romania will have a turnover of approximately 4.16 billion lei.

For this indicator, the adjustment with a 6 degree polynomial was chosen, which provides better conformation on the situation, as it can be seen in the figure below.

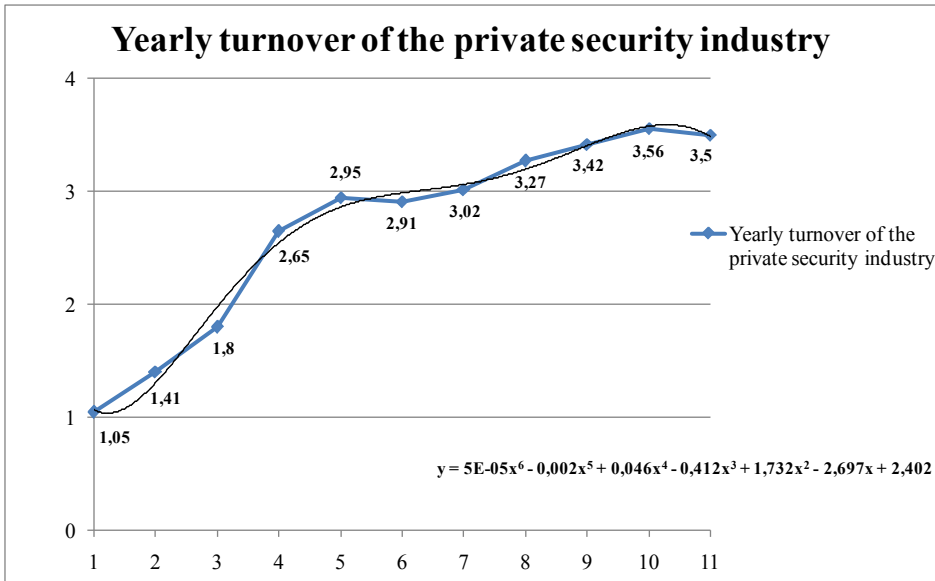


Figure no. 8. Polynomial adjustment of turnover in the private security sector

In the table below, the values of the 6 degree polynomial corresponding to this indicator are calculated, in values x in the first column, then they are compared with the values in the table and the value for the year 2016 is finally estimated, after a correction relative to the mean of the absolute differences between the two columns of values has been made.

With this method it means that in 2016, the private security sector in Romania will achieve a turnover of around 5.43 billion lei. For a final value, by combining the two methods, we obtain a value of 4.8 billion lei in turnover ($\sim (4.16 + 5.43)/2$).

Finally, we can conclude that in 2016, no major changes are expected in this sector, small increases in all indicators analyzed being recorded.

	Values of the polynomial corresponding to x Y_p	Known values Y_c	Differences $Y_p - Y_c$	Absolute differences $ Y_p - Y_c $	Mean absolute difference
x=1	1,07	1,05	0,01955	0,01955	M=0,49
x=2	1,31	1,41	-0,1009	0,1009	
x=3	1,98	1,8	0,18495	0,18495	
x=4	2,56	2,65	-0,0857	0,0857	
x=5	2,91	2,95	-0,04205	0,04205	
x=6	3,10	2,91	0,1863	0,1863	
x=7	3,29	3,02	0,27135	0,27135	
x=8	3,63	3,27	0,3647	0,3647	
x=9	4,18	3,42	0,76155	0,76155	
x=10	4,87	3,56	1,3107	1,3107	
x=11	5,53	3,5	2,03055	2,03055	
x corresponding to year 2016	Estimated value V	V-M			
x=12	5,92	5,43			

CONCLUSIONS AND DISCUSSIONS

Analyzing the four statistical indicators, and other information mentioned throughout the study, it is shown that the sector is rapidly growing, but this is not a spectacular growth that would influence Romania's GDP significantly. In fact, available data shows that the sector has an almost insignificant share in the country's GDP.

On the other hand, neither the number of employees nor the number of companies operating in this sector do not represent a significant share in the country's active population or in the total number of private companies in Romania.

There is, however, an industry that might be profitable and that can better exploit opportunities that may arise in the domestic market or on the foreign market through CoESS.

In terms of analysis and forecasting tools, they can be improved through the use of other functions available in other statistical applications or other functions can be built to make better predictions.

There still remains, however, the problem of the values' scale for the horizontal axis, for which it is important to specify the step, which must be correlated with the position that adjustments are made. Basically, a smaller step should lead to a smaller error, but this does not always happen, and this is due to the function used for the adjustment.

In conclusion, for a future study, we will try to improve the estimates made using other types of functions and scales appropriate for them.

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