

A business strategy and usage of chosen Result indicators as a tool against global crisis impacts on companies in automotive industry

Marek Sedláček

Abstract—The aim of this paper was to reply the questions generally connected with the issues of an accepted and realized concern business strategy. Mainly with their influence on functioning of individual subsidiary companies in the interaction with macroeconomic surrounding represented by chosen indicators not only during the global crisis period but also during the first post-crisis year. The investigation realized in automotive industry was based on the development of performance indicator values of subsidiary companies, concern as the whole and chosen macro indicators when looking for their reciprocal dependency in the period mainly connected with financial and economic crisis. In the contribution an elementary analysis of time line characteristics of chosen Result Indicators was carried out mainly with the emphasis on profit and earning indicators. With the help of regress and correlation analysis there was also researched possible relationships among chosen result indicators of company performance reciprocally with all companies, concern as the whole and chosen macro-indicators representing development of the concern biggest markets. For the following calculation of tested criteria Cohen's Coefficient was used.

Keywords—Business, crisis, result indicators, development

I. INTRODUCTION

THE years of 2007 – 2010 in the world history will be primarily connected with the entrance and marks of financial crisis, secondarily with its expansion in the form of worldwide economic recession and with declining activity of most economic subjects (states, companies, consumers, etc.) in the real economies. This was the first of the two events which was deep and destructive. The second event is the government debt crisis which and its approaching [12].

One, on global changes very sensitive and by this crisis affected sector, was the automotive industry (AI) globally and the Czech automotive in local. The AI is one of the biggest industrial sectors in the Czech Republic and during its history there have been manufactured more than 12 mil. cars included passenger cars, trucks, buses and motorcycles.

In that case also the concerns, companies and firms interested in the Czech AI were affected by the global crisis during the period 2007-2010. Great percentage of them was

affected negatively. However, even there exist exceptions which managed to profit in the crisis years and keep or increase their own production and profit. Various recession marks with different intensity have influenced the present and also company future. This kind of knowing would bring a new view on firm strategic thinking, planning and decision making. That is the main reason why companies from the Czech AI were chosen for this kind of research.

There have been already identified seven reasons why management of company performance is a dynamic system: (1) the changes of work; (2) increasing competition; (3) specific improvement initiatives; (4) national and international awards; (5) changing organizational roles; (6) changing external demands; (7) the power of information technology. These matters have become even more complicated, if not exacerbated, by the recent political and economic crises with a lot of impacts on company strategies and also performance [5].

Standard concept of company or concern strategies is possible to be defined as the ability of the company to reach its aims, its readiness to the future and company ability to face future world conditions [2], [8].

To face this situation many companies are working with some performance measures and there are a lot of different approaches to collected and termed them. There are four main types of performance measures: (1) Key Result Indicators (KRIs) that tell how the company has done in a perspective or critical success factor e.g. EBT, Return on Capital, Customer Satisfaction etc., (2) Result Indicators (RIs) tell what the company has done and they are the financial performance measures like Net Profit, Sales etc., (3) Performance Indicators (PIs) are nonfinancial indicators like percentage increase in sales top 10% customers, late deliveries etc. PIs and RIs lie between the KRIs and KPIs (4). KPIs are often described in theory as a set of measures focusing on those aspects of company performance that are the most critical for the current and future success [7].

Because of such reasons as the lack of incentives as well as an organizational culture unfavorable to performance measurement, some developing a performance measurement tool set involves a rather complicated process [4]. Against the theory and the above described way of fission is the determination and accomplishment of these business strategies in most companies are observed by means of generally so

M. Sedláček is with Thomas Bata University in Zlín, Zlín, CO 760 01Czech Republic (corresponding author to provide phone: +420-774-378-208; fax: +420-58-537-8077; e-mail: msedlacek@fame.utb.cz).

called KPIs include financial (RIs) and nonfinancial measures (PIs) and so called Strategic Gap Analysis (SGA) [9].

These measures are usually set internally in a different way in various companies. In this contribution there is an analyses of a set company measures which is internally in these companies called KPIs in general (involves KRIs, PIs, RIs). The author let the title of this set of measures KPIs (RIs) for a better identification during the process of usage and for presentations at the analysed companies. Among used and in this contribution analysed company KPIs (RIs) belong for example Earnings Before Taxes (EBT), Sales Actual (SA), Gross Inventory (GI), Gross Margin (GM) [10], [13]. The return of firms is influenced by many factors. Knowing these factors is important [11].

Current global era introduces substantial changes in thinking and in practice. The areas of strategy controlling and planning is also changing. [14]. That is why it is not possible to understand the strategy only internally. It is required to observe the fulfilment and update in the relationship to external i.e. economic company surrounding [15]. From the macroeconomic point of view in the contribution the indicators Gross Domestic Products (GDP) and Private Final Consumption Expenditure (PFCE) were used. Of course for a complex study there is a need to include external shocks with their influence on business field and so on [3].

Based on the chosen statistical methods the main aim of this work is to find out whether in the period connected with economic crisis it is advantageous to have one concern strategy or whether it is desirable to have differentiated business strategies on the level of subsidiary companies. And whether there exists any relationship between the chosen KPIs (RIs) companies (EBT, Sales Actual) and external environment represented by GDP a PFCE. This research is based on using statistical methods (Growth Rate, Simple Moving Average, Correlation and Regression Analysis, Cohen's coefficient). The advantage of this approach is its systematic way of creating the situation during the crisis. The disadvantage may be seen in the fact that the mentioned economic situations are more complex. This paper is structured as follows: description of used KPIs (RIs), statistical methods and advantages and disadvantages. Carrying out its own analysis and calculation with commentaries. Creating the model with the usage of Regress analysis, presentation and discussion about the final drafts.

II. PROBLEM FORMULATION AND METHODOLOGY

For this type of research there were chosen in total nine subsidiary companies of supranational concern from the environment of the automotive industry. The choice of the companies was made with regard to their location (an EU member), similar size, the same production programme, organization structure, markets, usage of the same KPIs (RIs) and so on so that the company comparison had great validity and was abstracted from disturbing differences.

The aim of this way chosen companies for this research

problem was to find out and mathematically quantify whether in the time connected with the economic crisis it was effective to use one concern strategy or if it was effective to have different strategies on the level of individual subsidiary companies. The secondary aim was the existence of the relationship between chosen KPIs (RIs) of researched companies (EBT) and external economic surrounding represented by indicator GDP. For the purpose of the research these KPIs (RIs) were chosen: Gross Margin - measures the overall productivity of the output of the factories according to products sold by measuring the difference between operating revenue and the costs of production, EBT – Earnings Before Taxes, Gross Inventory, Sales Actual (all measures in Mil. €, quarter periods 2006/07 – 2010/11).

For comparison with the macro-surrounding development GDP indicators were chosen GDP – Gross Domestic Product (EU17 – Eurozone) a GDP Germany (in Bill. €, the same quarter period). Also the same regions were chosen for the indicator PFCE (Quarterly Rate of Growth 2006 – 2011). The indicator PFCE and its relationship to KPI (RI) Sales Actual was researched in the form of its quarter growth rate (in %) again with the companies' biggest markets (EU17, Germany).

EU17 and Germany are the biggest markets. Using chosen statistic methods the assumption should have been confirmed or disproved that if the only strategy was suitable for all companies then the development of chosen KPIs was similar and correlation of top indicator among the companies intensive. Furthermore if the chosen strategy was successful then the correlation KPI (RI) indicator (EBT) with indicator of surrounding (GDP) was weak (non intensive). On the other hand the comparison respectively analysis of the relationship between quarter growth rate of indicator Sales Actual and quarter growth rate of indicator PFCE (growth rate compared to previous quarter) could answer the question whether there exists dependency between growth rate of Sales Actual of individual subsidiary companies and growth rate PFCE.

To represent quarterly development of individual KPIs (RIs) some chosen methods were used from elementary characteristics of time lines as calculations 1st difference and 2nd difference. Further there were used calculations of growth rate or growth coefficients or line indexes and average growth rate which is defined as geometric diameter from individual (here used quarterly) growth rate:

$$\bar{k} = (k_2 k_3 \dots k_n)^{\frac{1}{n-1}} = \sqrt[n-1]{k_2 k_3 \dots k_n} \quad (1)$$

Time lines were balanced with the help of simple moving average when progression of empiric observation (Q data) was replaced by the line of averages counted from the observation according to:

$$\bar{y}_t = \frac{1}{m} \sum_{i=-p}^p y_{t,i} = \frac{y_{t-p} + y_{t-p+1} + \dots + y_{t+p}}{m} \quad (2)$$

where y_i is estimated parameter of trend function B_{0t} gained by method of the smallest squares, moving part of interpolation is marked $m=2p+1$ and it is considered that $m < n$ where n is the whole number of observations of analysed line. In the following part of the research the preparation for making correlation matrix was done using calculations of variability extent. The dispersion was counted according to the pattern:

$$s_x^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n} \quad (3)$$

and determinant margin of error square root of dispersion according to:

$$s_x = \sqrt{s_x^2} = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}} \quad (4)$$

For finding causal relationships among statistic marks there was used regressive and correlation analysis. For counting was used mostly used type so called Linear regression which was expressed with the help of mathematic entry of regressive line:

$$y = A + B_x \quad (5)$$

at estimate of Regressive and correlation analysis parameters A, B according to patterns:

$$A = \frac{\sum y - B \times \sum x}{n} \quad (6)$$

$$B = \frac{n \times \sum xy - \sum x \times \sum y}{n \times \sum x^2 - (\sum x)^2} \quad (7)$$

Further based on input data there were used calculations of reciprocal correlation coefficients in so called correlation matrix (12 x 12) and (20 x 13). For calculation of coefficients r was used pattern:

$$r = \frac{n \times \sum xy - \sum x \times \sum y}{\sqrt{\{n \times \sum x^2 - (\sum x)^2\} \times \{n \times \sum y^2 - (\sum y)^2\}}} \quad (8)$$

Further after calculation of correlation coefficients the calculation was done which was necessary for evaluation of subject importance of effect size of the group on variability of

values observed random quantity according to so called Cohen's coefficient d . With the help of realization of weighted average of chosen dispersions:

$$s^2 = \frac{(n_1 - 1) \times s_1^2 + (n_2 - 1) \times s_2^2}{n_1 + n_2 - 2} \quad (9)$$

which is used for observing of random quantity values in two independent groups of objects with extent n_1, n_2 . Marking m_1, m_2 then had realizations of chosen value averages. Marked s_1^2, s_2^2 were realizations of chosen dispersions. Cohen's coefficient d was calculated according to pattern:

$$d = \frac{|m_1 - m_2|}{s} \quad (10)$$

Value d determines the effect of the group on variability of quantity values in scale: under 0.2 – for negligible effect, 0.2 – 0.5 – small effect, 0.5 – 0.8 middle and 0.8 and more – big.

III. RESTRICTION OF THE MAIN METHODS

One of the aims for the choice and usage of these methods was to contribute to the recognition of reciprocal relationships between observed marks (KPIs, EBT, Sales Actual) of individual companies, concern as the whole and external macroeconomic surrounding of the biggest markets of concern (EU17, Germany) represented by the GDP and PFCE (Quarterly growth rate) indicators. Particularly the method of regressive and correlative analysis is usable and used for this type of economic research. It is important to mention that this method has its certain restrictions. One of the major restrictions seems to be the choice of suitable type of regress function (in work chosen Linear regression) and also the fact that the analysis of numbers can only limitedly cover the whole substance of researched economic quantities and phenomenon as on the level of micro so in macro surrounding.

In the case of calculation of correlation coefficients with linear regression the correlation equalled 1.0 means that between two variables there exists positive linear relationship. In the case of correlation equalled -1.0 there exists negative linear relationship, in case 0.0 then the linear relationship does not exist. Restrictions of correlation is the fact that correlation is a statistic term for expressing the extent of some linear relationship and it concerns the term measurement.

The cause and consequence concern deterministic dependence. It is important to analyse and explain causal connections. Cohen's coefficient d was used to assess the size of the difference of averages which is standardized with the help of root from the averages of chosen scatters. It concerns so called subject importance.

The size of the group effect on value variability of observed quantity is then evaluated according to the line of values of

Cohen’s coefficient d. The strength of the test should reach the figure at least 0.8. Figures between 0.5–0.8, 0.2–0.5 and 0.2 mean falling effect.

IV. THE RESULTS

For carrying out the research in the period 06/07 – 10/11 while using above described methods there were chosen values of indicators EBT, Gross Inventory, Sales Actual and Gross margin. In comparison with the development of macro-surrounding in the form of regression and correlation analyses then GDP EU 17 and GDP Germany and PFCE EU 17 and PFCE Germany.

In this following part of the contribution the growth rate of individually chosen company production indicators i.e. KPIs (RIs) companies are presented and concern as the whole in set period.

A. Sales ACTUAL

In the period 06/07 – 10/11 annual average growth rate KPIs (RIs) Sales ACTUAL were reached by the concern companies using calculation of 1st and 2nd difference, growth coefficient and mainly average growth rate according to pattern (1):

Table 1: Sales ACTUAL Growth Rates

BY Average Growth Rates of Sales ACTUAL in %					
Comp.	2006/07	2007/08	2008/09	2009/10	2010/11
Co.1	5,2	7,1	-6,2	11,4	6,2
Co.2	7,3	5,0	-11,0	8,4	0,3
Co.3	30,5	-0,8	10,2	34,2	2,5
Co.4	6,0	5,9	23,1	15,0	9,4
Co.5	14,9	8,9	-13,1	24,7	0,5
Co.6	16,0	13,4	2,1	7,9	8,4
Co.7	6,6	20,1	-13,3	6,5	7,9
Co.8	13,7	16,5	-0,6	1,5	15,7
Co.9	10,7	0,9	-7,1	16,1	10,7
ΣComp.	7,9	8,0	-2,8	11,5	7,5

For better graphic illustration of indicator development Sales ACTUAL in this case used as the sum of the all companies in the time was used the method SMA according to (2):

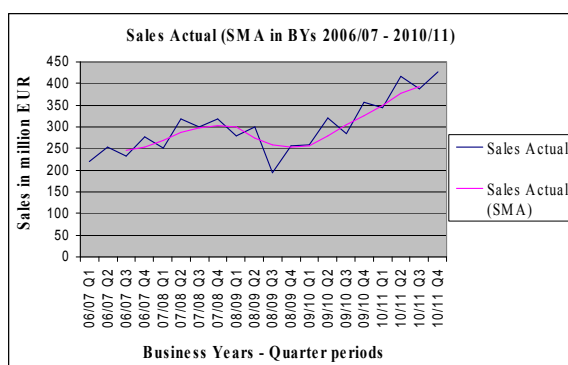


Fig. 1 Sales ACTUAL (SMA)

From the reason of corresponding ability of indicator Sales ACTUAL there was also carried out the comparison of individual companies in absolute values.



Fig. 2 Companies Sales ACTUAL

B. Gross Margin

In 06/07 – 10/11 annual average growth rate was discovered also with Gross Margin according to (1):

Table 2: Gross Margin Growth Rates

BY Average Growth Rates of Gross Margin in %					
Comp.	2006/07	2007/08	2008/09	2009/10	2010/11
Co.1	0,4	10,7	-12,4	-4,1	4,9
Co.2	26,0	32,2	-22,6	26,8	-19,3
Co.3	-62,2	28,3	16,1	23,1	109,0
Co.4	6,4	-3,8	79,9	27,9	-1,0
Co.5	-22,1	24,2	-223,9	32,0	-28,0
Co.6	4,8	1,3	24,8	11,9	12,9
Co.7	-15,5	54,1	-10,0	0,9	5,0
Co.8	-5,3	11,2	-9,5	-31,5	2,5
Co.9	0,1	-6,5	-6,5	19,0	12,7
Σcomp.	5,9	5,0	-4,7	10,0	3,2

For graphic illustration of indicator development Gross Margin for the sum of companies in the time the method SMA according to (2) was used:

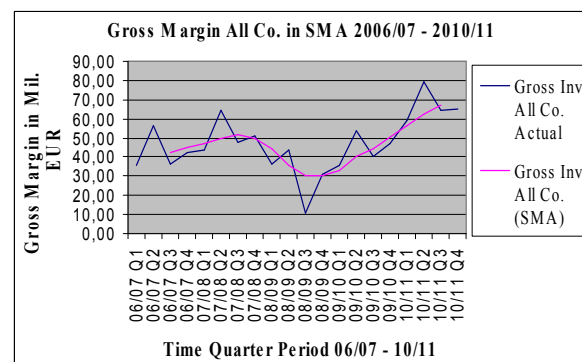


Fig. 3 Gross Margin (SMA)

C. Gross Inventory

In the same period average growth rate Gross Inventory was reached by companies using the differences, coefficients and all according to (1).

Table 3: Average Growth Rates of Gross Inventory

BY Average Growth Rates of Gross Inventory in %					
Comp	2006/07	2007/08	2008/09	2009/10	2010/11
Co.1	-5,8	2,4	-4,0	-1,2	-1,3
Co.2	-8,2	-3,0	-12,5	-7,8	3,8
Co.3	-5,0	-4,5	-21,8	-25,8	4,8
Co.4	-6,7	10,8	2,9	-13,1	-7,6
Co.5	34,6	7,4	-18,9	-11,8	13,8
Co.6	12,9	7,4	-4,1	5,1	-1,9
Co.7	-13,0	15,5	-4,2	-7,4	-3,4
Co.8	0,5	-1,3	-8,6	-3,9	-1,5
Co.9	-3,7	27,9	-16,0	7,6	-9,2
Σcomp.	-1,2	3,6	-7,2	-5,8	-0,9

For illustration of development Gross Inventory the method SMA according to (2) was used:

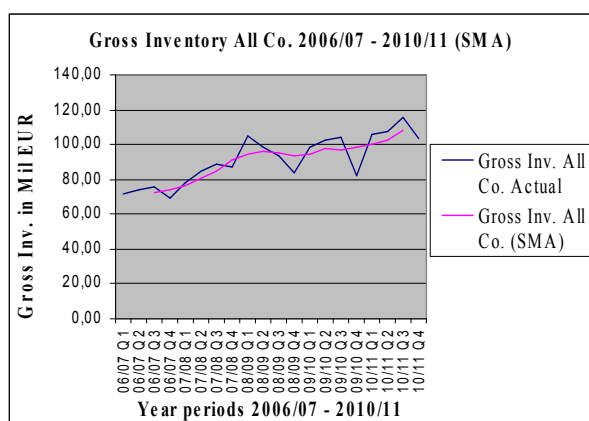


Fig. 4 Gross Inventory (SMA)

V. KEY RESULT INDICATORS AND MACROECONOMIC INDICATORS

In this part of the analysis the research of the relationships between chosen KPIs and macroeconomic indicators was carried out using regressive and correlation analysis, Cohen's coefficient and modelling of regressive lines. In the first part the relationship of EBT indicator was analyzed among individual companies (Co.1 – Co.9) and also correlation coefficients among indicators EBT of individual companies and ΣEBT against indicators GDP EU17 and GDP EU Germany.

EU17 and Germany are the biggest markets. Using chosen statistic methods the assumption should have been confirmed or disproved. In the second part there were analyzed relationships among growth rate Sales Actual of companies marked again Co.1, Co.2,...Co.9, ΣCo, ØCo and growth rate of indicators Private Final Consumption Expenditure (PFCE) in the case of the biggest markets by companies EU17 and

Germany (DE).

A. Earnings Before Taxes (EBT) and GDP

Analysis KPI EBT regressive and correlation analysis was used which came out from so called correlation matrix 12 x 12. Half-year values of the companies Co.1,...Co.9 in the matrix represent EBT in mil. EUR and GDP EU17 and Germany are also in mil. EUR.

Table 4: EBTs and GDP EU17 and Germany

BY n	EBT (Earnings Before taxes) in Mil. EUR									EU 17 GDP in Bill. EUR	DE GDP in Bill. EUR	O Co.	
	Co.1	Co.2	Co.3	Co.4	Co.5	Co.6	Co.7	Co.8	Co.9				ΣCo.
P1	-13	1,35	0,3	6,63	-3,7	4,86	0,45	4,99	1,38	3,67	4340,81	1171,69	0,40
P2	-24	2,31	1,19	4,3	1,1	5,08	0,18	0,03	4,07	-5,64	4470,81	1206,20	-0,63
P3	5,8	3,08	0,33	1,37	-1,3	14	0,81	0,47	3,11	27,73	4562,42	1225,83	3,08
P4	10,9	-2,2	2,3	1,84	1,85	10,1	1,37	3,73	2,91	32,84	4636,54	1244,21	3,65
P5	3,48	-1,2	0,49	-3,4	-9	5,64	1,21	-2,4	0,73	-4,38	4600,32	1226,50	-0,49
P6	-3,4	-4,9	2,06	1,29	-6,2	11,3	0,31	-8,3	-1,6	-9,38	4446,12	1173,91	-1,07
P7	-3,7	0,14	0,03	4	-2,8	15	1,59	-11	-0,3	3,33	4474,37	1198,83	0,37
P8	7,41	0,65	1,07	9,32	0,02	16,6	0,7	-4,8	2,72	33,68	4540,72	1222,25	3,74
P9	22,2	1,1	-0,4	9,97	3,12	13	1,01	-2,3	4,05	51,68	4609,83	1249,61	5,74
P10	16,7	-3	-1,6	11,3	-0,9	11,3	0,61	-9,9	5,37	29,93	4689,19	1275,86	3,33
Σx _i	22,9	-2,6	5,71	46,6	-18	107	8,24	-29	22,4	163,5	45371,13	12194,9	18,15

Later to the input data there were additionally calculated values s^2 according to (3), s according to (4), A according to (6), B according to (7). It was necessary to find out the estimates of parameters A and B so that they could later be substituted to the equations of regress lines of all companies from which the model was formed.

Afterwards correlation coefficients r were calculated in correlation matrix consists of 12 x 12 according to (8) and Cohen's coefficients d according to (9) and (10) for altogether 9 companies of the whole concern.

The number of periods P was reduced to altogether 10 i.e. half-year intervals The reason for this corection was simple to reduce and avoid possible mistakes and also that was chosen for a better graphic presentation of the results. These calculations and results of correlation c . are stated in Table 5.

Table 5: Correlation and Cohen's coefficients

Correlation / Cohen's Coefficients EBT and GDP (06/07 - 10/11)												
	Co.1	Co.2	Co.3	Co.4	Co.5	Co.6	Co.7	Co.8	Co.9	Σ Co.	EU	DE
Co.1	X	0,27	0,19	0,24	0,42	0,84	0,11	0,52	0,01			
Co.2	-0,26	X	0,45	1,39	0,49	3,3	0,63	0,66	1,13			
Co.3	-0,37	-0,19	X	1,28	0,89	3,4	0,3	0,93	1,02			
Co.4	0,32	0,13	-0,57	X	1,61	1,43	1,23	1,58	0,71			
Co.5	0,28	0,37	-0,08	0,62	X	3,29	1,02	0,26	1,38			
Co.6	0,55	-0,01	-0,12	0,34	0,33	X	3,45	2,9	2,65			
Co.7	0,45	-0,26	-0,07	-0,25	0	0,34	X	1,01	0,96			
Co.8	-0,22	0,47	0,35	-0,21	0,22	-0,52	-0,1	X	1,3			
Co.9	0,35	0,36	-0,1	-0,5	0,72	0,01	-0,16	0,23	X			
Σ Co.	0,82	0,19	-0,32	0,59	0,73	0,54	0,56	0,1	0,65	X		
EU	0,79	-0,24	-0,25	0,12	0,3	0,3	0,43	-0,2	0,57	0,62	X	
DE	0,77	-0,07	-0,48	0,35	0,47	0,26	0,31	-0,12	0,76	0,72	0,95	X

After calculation of correlation coefficients there were used existing estimates of parameters A and B according to (6) and (7) were created regressive lines according to (5). The model of regressive lines interpreted their values.

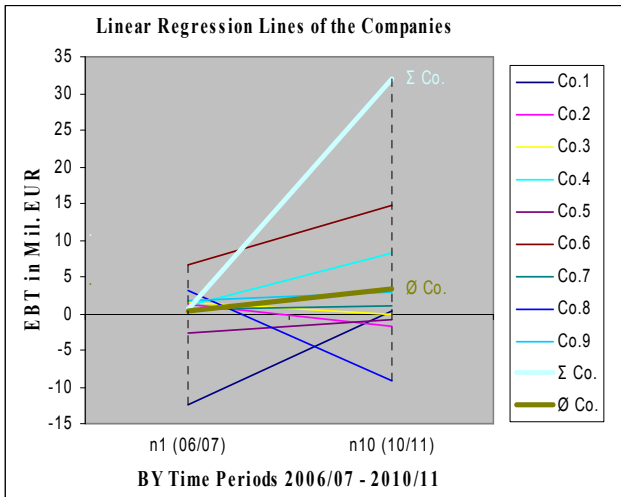


Fig 5. Linear Regression Model

B. Sales ACTUAL Growth Rate and PFCE

For the analysis of growth rate KPI (RI) Sales Actual of the companies marked Co.1, Co.2,...Co.9, ΣCo. and ØCo. regressive and correlation analysis was used once again. The analysis was based on the figures mentioned in so called correlation matrix 20 x 13 where indicator values are indicated for individual quarters of individual business years (BY) of researched period 2006/07 – 2010/11.

As well there are mentioned individual growth rate percentage values of the chosen macroeconomic indicator PFCE. The values are mentioned as 20 percentage indicators in individual researched periods for each company (the correlation matrix 20 x 13).

Table 6: Sales Actual and PFCE growth rate

Companies' Rate of Growth Sales ACTUAL and Private Consumption Expenditure EU17 / DE														
Period BY - Business Year	Companies Rate of Growth Sales ACTUAL in %										EU 17 (EU)	Ger. (DE)	Ø Comp. (%)	
	Co. 1 (y)	Co. 2 (y)	Co. 3 (y)	Co. 4 (y)	Co. 5 (y)	Co. 6 (y)	Co. 7 (y)	Co. 8 (y)	Co. 9 (y)	Comp. .Σ				
BY 06/07	(I.Q)	16,96	23	22,32	19,18	13,8	21,3	13,54	12,87	8,65	18,71	0,24	-0,05	16,85
	(II.Q)	17,14	13,21	14,11	8,52	13,12	19,37	11,35	20,8	11,82	15,63	0,78	1,46	14,38
	(III.Q)	-12,95	-7,94	-50,53	-0,81	0,23	-0,16	-8,66	-5	5,94	-8,13	-0,07	-2,25	-6,88
	(IV.Q)	14,41	18,51	-30,86	11,01	34,42	30,98	18,94	27,94	14,5	17,9	0,79	1,11	15,54
BY 07/08	(I.Q)	-8,77	-2,77	-36,31	-20,64	-10,27	-3,56	6,64	-8,89	-5,37	-8,57	0,42	0,30	-9,77
	(II.Q)	18,62	23,04	44,65	16,6	28,1	62,54	29,24	39,72	19,96	25,91	0,34	-0,18	31,39
	(III.Q)	-4,21	-12,18	-50,62	-0,04	-8,93	-7,29	-2,41	7,32	-7,55	-5,2	0,06	0,15	-9,55
	(IV.Q)	8,25	7,19	36,89	1,81	10,72	-3,13	37,27	5,36	-7,25	5,49	-0,15	0,08	10,79
BY 08/09	(I.Q)	-15,6	-10,98	-49,59	-13,7	-21,8	1,75	-17,44	-11,72	2,02	-12,03	-0,29	0,13	-15,23
	(II.Q)	4,54	-2,07	31,23	89,1	-1,82	-5,93	-7,87	9,48	25,79	7,9	-0,46	-0,31	13,61
	(III.Q)	-38,14	-47,73	-49,13	-16,79	-54,12	-26,93	-46,64	-22,27	-38,47	-35,35	-0,7	0,29	-37,80
	(IV.Q)	27,69	38,89	13,41	33,58	49,37	55,14	33,41	15,52	3,57	31,67	0	0,42	30,08
BY 09/10	(I.Q)	3,96	6,06	-69,42	10,97	-1,78	-22	6,92	9,96	0,32	0,38	-0,02	-0,73	-6,11
	(II.Q)	24,07	26,9	18,74	31,22	26,48	69,7	35,37	17,02	22,61	24,19	0,34	-0,14	30,23
	(III.Q)	-11,94	-21,49	7,93	-11,21	-7,73	-2,74	-12,95	-19,58	-4,76	-11,32	0,22	0,00	-9,39
	(IV.Q)	26,41	27,96	-21,78	30,52	66,24	10,42	2,59	11,18	33,96	26	0,14	0,61	20,83
BY 10/11	(I.Q)	-0,48	-10,01	39,21	-17,44	-1,78	-4,31	-6,78	2,05	11,51	-3,87	0,35	0,28	1,33
	(II.Q)	21,64	16,17	20,3	28,61	14,14	19,34	15,88	20,46	24,17	21,59	0,45	0,71	20,08
	(III.Q)	-11,05	-13,2	98,6	-2,09	-12,66	-2,87	-9,58	-4,69	8,24	-7,02	-0,01	0,55	5,63
	(IV.)	10,68	0	-54,93	3,69	1,74	9,77	19,65	35,02	0,84	9	-0,46	0,71	2,98
Σ	91,23	72,56	-65,78	182,3	137,5	221,4	118,7	164,6	130,5	113,1	1,97	3,325	116,99	

Later to the input data there were additionally calculated values s_2 according to (3), s according to (4), A according to (6), B according to (7). Later there were again calculated correlation coefficients r with the usage of correlation matrix 20 x 13 according to (8) and Cohen's coefficients d according to (9) and (10).

The calculation of Cohen's coefficient was used for the evaluation of the difference size of the secondary value y_1 up to y_9 , which means companies Co.1 up to Co.9 considering y_0 which is the average of all companies. The coefficient d with the value below 0.2 means not important difference of middle values.

Table 7: Cohen's coefficient Growth Rate of SA

Cohen's Coeff. Rate of Growth Sales ACTUAL (06/07-10/11)									
	Co.1	Co.2	Co.3	Co.4	Co.5	Co.6	Co.7	Co.8	Co.9
Co.1		0,05	0,24	0,24	0,1	0,3	0,07	0,22	0,12
Co.2			0,2	0,26	0,14	0,32	0,11	0,25	0,16
Co.3				0,36	0,28	0,4	0,27	0,35	0,3
Co.4					0,09	0,08	0,15	0,05	0,14
Co.5						0,18	0,04	0,08	0,02
Co.6							0,22	0,13	0,21
Co.7								0,13	0,03
Co.8									0,11
Co.9									

Subsequently the test of linear dependencies was worked out: y_0 Germany (DE) and y_0 Eurozone (EU17) which is regressive and correlation analysis including graphic presentation which represents model relationship among researched quantities according to (5).

Linear model represents dependencies between average value of growth rate Sales ACTUAL of companies (ØCo) vs. Private Final Consumption Expenditure (PFCE) in Germany (DE) and EU17 in the period 06/07 – 10/11.

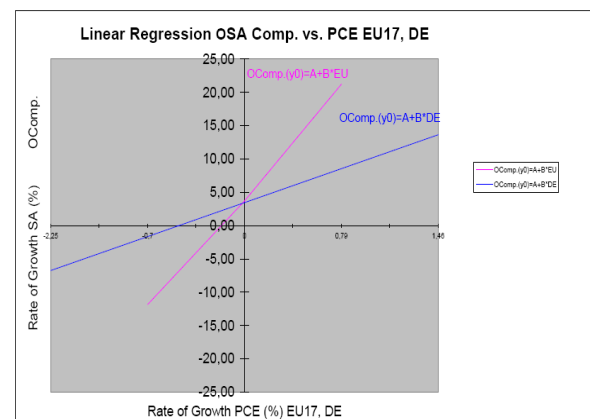


Fig 6. Linear Regression Model 2

The test of linear dependence with the help of regressive and correlation analysis represents model relationship (Fig. 5) among researched values which is:

$$y_0 (EU_{17}) = 3,7 + 22,2 * EU_{17} \quad (r = 0,49 \quad n = 20)$$

$$y_0 (DE) = 4,9 + 5,5 * DE \quad (r = 0,24 \quad n = 20)$$

where y_0 represents the average value of Sales ACTUAL growth rate as a sum of the all companies in relationship to the PFCE growth rates in the most important markets (EU17 and Germany).

VI. DISCUSSION

This part of the proceeding is devoted to the discussion the results of the research. The author choose the automotive industry in the Czech republic from many reasons. The main fact is the author's personal interest and the lack of this kind of research in the Czech republic especially in the automotive industry even if the automotive is one of the top industrial branches. In the Czech republic there are situated many famous automotive companies e.g. Hyundai, Skoda, Peugeot, Toyota, Citroen,...and also a lot of suppliers: Bosch, Automotive Lighting, Visteon.

In the parts called Results the development of individual KPIs (RIs) of subsidiary companies in the crisis period was analysed while accepting united concern business strategy in the period of 2006/07 – 2010/11. In the case of indicator Sales ACTUAL the slump in the whole growth rate was evident in the period BY 2008/09 (Q3, Q4). The period 2009/10 (Q1) then signalized gradual return to the growth see Fig. 1. Indicator slump in the given period by Co.1 by ca. 80 mil. EUR was quite evident, when with its importance or rather absolute high it influenced the whole growth most. Co.4 and Co.6 then managed to realize more or less positive growth in the whole period despite the same strategy and surrounding conditions. In the case of indicator Gross Margin the growth rate developed differently with individual companies. Co.3 and Co.6 managed to keep positive growth through the whole period. With other companies there was a slump again in 2008/09 (Q2, Q3, Q4). An extreme slump came with Co.2, Co.5 and Co.7. There can be traced great similarity in the development of the whole indicator Gross Margin and Sales ACTUAL when using the method SMA (see Fig. 1 and Fig. 3). This similarity is probably stated by the indicators' construction. The interest remains on relatively high slump in the period 08/09 with Gross Margin. General business strategy had its disadvantages again. Both Sales ACTUAL and Gross Margin are directly influenced by the relationship to the customers, number of orders, payments and so on. Strengthening of this aspect is important for the future indicator development.

All analysed indicators have their influence on top indicator EBT. Its relationship to external macro surrounding was researched also in the part Results. For finding the existence of the relationship between company and concern KPI (RI) EBT and macro indicator (GDP) of the biggest markets EU17 was chosen the correlation matrix 12×12 (Table 4) with equidistant step $\frac{1}{2}$ year marked period $t = 1, 2, \dots, 10$. Calculated values make lower correlation matrix. With the orientation in correlation matrix there was acquired knowledge about dependency closeness between indicators EBT with companies reciprocally and their dependency on EBT concern

in total the same as possible dependency with indicator of external macro surrounding of the biggest markets GDP EU17 and GDP Germany. From the correlation matrix (Table 5) there were apparent low levels of correlation among individual companies with the exception Co.5 to Co.4 (0,62) and Co.9 to Co.5 (0,72) reciprocally. At the same time in the case of correlation coefficient between Σ Co. a Co.1 (0,82). The relationship of Co. 5 to Co.4 can be proved by reciprocal interconnection in controlling, sharing development works and knowledge and capital interest. Co. 9 to Co.5 then by certain type of subordinate relation. Relation Σ Co. and Co.1 is based on the importance and influence of Co.1 on the whole concern (parent company). At the same time we can also speak about the relationship EU17 to Co.1 (0,79) and DE to Co.1 (0,77) reciprocally. It also shows relatively high values among Σ Co. and Co.4, Co.5 and Co.9. From the previous research it was evident that these companies participate on the EBT concern strongly. We can say that the relationship GDP of main markets is strong with indicator EBT Σ Co (0,62 resp. 0,72). Analysis of the period was done in the work [9]. From carried out researches follows the advantage of stated strategy in certain time mainly for Co.1 and partially for Co.4, 5, 9. When GDP of the biggest markets decreases the strategy can be evaluated as useless, decline of GDP was in strong relationship with decline of EBT concern and the strongest company. The existence of r close to 0 does not have to necessarily represent non-existence of the relationship, only of linear dependency.

As the second KPI (RI) for the research of relationship with macroeconomic surrounding represented by indicator Private Final Consumption Expenditure (PFCE) was chosen KPI (RI) Sales ACTUAL respectively with both indicators there was used growth rate in % for the period 06/07 – 10/11. It was measured quarterly to previous period. For the possibility of finding respectively testing linear dependence there was used regressive and correlation analysis, input data was used from the Table (relative indicators, 20×13). Due to the reduction there were analysed relationships between growth rate indicator Sale ACTUAL with the indicator y_0 (average growth rate Sales ACTUAL of all companies marked Co.1,...Co.9) to growth rate indicators PFCE on the biggest markets (EU17, Germany). Processing of linear dependencies test was done including graphic interpretation. The choice of independent variable EU17 and Germany (DE) was checked by the test of statistical importance which is correlation coefficient r . Correlation coefficient is important for time line of 20 figures observation has the value of 0.44.

Correlation coefficient r for r (EU17, y_0) has the value 0.49 for r (DE, y_0) then 0.24. In the case of EU17 it concerns important dependence of growth rate Sales ACTUAL (dependent variable) as the average of all companies on growth rate PFCE in EU17 (independent variable). We can claim that if the growth rate PFCE in EU17 increases (decreases) then the growth rate Sales ACTUAL increases (decreases) in average for companies. In other words Δ PFCE EU17 has important influence on Δ Sales ACTUAL (\emptyset Co.). In

the case of the relationship towards indicator PFCE DE we cannot speak about important dependence which illustrates low value r (DE, y_0). It is necessary to add that non-existence of linear relationship does not have to mean non-existence of other relationship. Usage of regressive and correlation analysis appears as convenient for the analysis of relationship among individual companies and EU17. The same indicators were used again which means growth rate Sales ACTUAL of individual companies and growth rate PFCE with EU17. Correlation coefficients r then in case of companies Co. 1, Co.2, Co.5, Co.6 and Co.9 confirmed statistic importance which means exceeding value $r = 0.44$ (statistic importance). Data from Table 6 was used for the calculation of Cohen's coefficient for assessing the difference of middle values Co.1, Co.2,..., Co.9 with regard to average value for all companies \bar{Co} or y_0 (see Table 6). Cohen's coefficient < 0.2 means not important difference of middle values. This research brought mainly the finding that Co. 3 eludes all other companies, Co. 6 then in relation to above half majority of companies ($d > 0.2$).

VII. CONCLUSION

This article introduced relatively simple attitude to the comparison of effectiveness of accepted concern strategy on subsidiary companies in the period 06/07 – 10/11 by chosen KPIs (RIs). At the same time the relationship of top productivity indicators (EBT, Growth Rate of Sales ACTUAL) were researched with macroeconomic situation on chosen markets by means of GDP and Private Final Consumption Expenditure indicators. Basic questions respectively the aim of the contribution was to answer the questions connected with the problem of accepting one concern business strategy. Mainly then with its influences on function of individual subsidiary companies which more or less follow this concern business strategy without bigger differences. The following part of the research then was looking for the relationships among companies mutually in interaction with macroeconomic surrounding not only during global crisis from years 2007 – 2010. After the research was carried out with the usage of chosen methods it is possible to point out the need of differentiated strategies on the level of subsidiary companies. Based on this need comes out certain ineffectiveness of general strategy considering the development of the strongest concern markets. By extending used methods (GUHA) it will be possible to use the results in the future research works. Even though employed risk management practices and long term prospects of the companies are important factors driving their value and performance, reflecting all these internal and external aspects into business strategies, remain a challenging task for future [6].

Last words of this papers are not so optimistic but we must keep in mind that if the current suspicions and signals are confirmed and the 2009 and 2010 recession is recycled, we can assume further problems with mortgages, including, without limitation, the reappearing problem [1].

That also could mean others big and deep problems for

firms, companies not only in automotive industry on all levels.

VIII. ACKNOWLEDGEMENT

Author thanks IGA Fame UTB for the financial support of the project „Podniky krizi navzdory“ (IGA/FaME/2012/042).

REFERENCES

- [1] C. G. Bonaci, D. Matis, and J. Strouhal, "Crisis of Fair Value Measurement? Some Defense of the Best of All Bad Measurement Bases", in *WSEAS Transactions on Business and Economics*, vol. 7, issue 2, 2010, pp. 114-125.
- [2] H. S. Dent, *The Great Depression Ahead: How to prosper in the Crass Following the Greatest Boom in History*. New York: Free Press, 2008, ch. 2.
- [3] J. Hanclova, "The Effects of Domestic and External Shocks on a Small Open Country: the Evidence from the Czech Economy", in *International Journal of Mathematical Models and Methods in Applied Sciences*, vol. 6, issue 1, 2012, pp. 366-375.
- [4] B. K. Chae, "Developing Key Performance Indicators for Supply Chain: In Industry Perspective", in *Supply Chain Management Journal*, vol. 14, issue 6, 2009, pp. 422-428.
- [5] V. S. Chau, "Managing Performance in Global Crisis", *British Journal of Management*, vol. 23, issue 1, 2012, pp. 21-25.
- [6] O. Nowak, J. Hnilica, "Improving Business Valuation with the Use of Simulation Techniques", in *International Journal of Mathematical Models and Methods in Applied Sciences*, vol. 6, issue 1, 2012, pp. 679-687.
- [7] D. Parmenter, *Key Performance Indicators: Developing, Implementing and Using Winning KPIs*. New Jersey: John Wiley&Sons, 2010, ch. 3.
- [8] E. M. Porter, *On Competition*. Boston: Harvard Business School Publishing, 2008, ch. 5.
- [9] M. Sedláček, "Key Performance Indicators as a Business Strategy Tool during the Global Crisis Period", in *WSEAS International Conference on Economics, Political and Law Science(ELPS '12)*. Zlín, Czech Republic, September 20-22, 2012, pp.136-141.
- [10] M. Sedláček, "Key Performance Indicators Against Next Global Crises in a Perspective of Automotive Industry", in *International Scientific Conference Financial Management of Firms and Financial Institutions*. Ostrava, Czech Republic, September 6-7, 2011, pp. 181-190.
- [11] M. Siminica, D. Circiumaru, and D. Simion, "The Correlation between the Return on Assets and the Measures of Financial Balance for Romain Companies", in *International Journal of Mathematical Models and Methods in Applied Sciences*, vol. 6, issue 1, 2012, pp. 249-256.
- [12] L. Smrčka, M. Artlová, "Increasing Threat of a Total Financial Crisis in the Upcoming Years", in *International Journal of Mathematical Models and Methods in Applied Sciences*, vol. 6, issue 1, 2012, pp. 782-790.
- [13] P. Vernimmen, *Corporate Finance: Theory and Practise*. Chichester: John Wiley, 2009, ch. 7.
- [14] M. Zelený, *Human Systems Management*. Singapore: World Scientific, 2005, ch.3.
- [15] Žáková Talpová, "Strategies of Domestic and Multinational Firms in the Czech Republic", in *Journal of Competitiveness*, vol. 3, issue 4, 2011, pp. 39-50.

Marek Sedláček was born in Olomouc in the Czech Republic in 1976. He is a project manager in a Czech subsidiary company which is a member of a global international concern developing and producing their products in automotive industry for famous car manufacturers. He is also a PhD combine student in Thomas Bata University in Zlín, Faculty of Management and Economics, Department of Management.

His research priorities have included investigation of strategic management, company performance and mainly company abilities to react and survive the economic crisis during the period 2007 – 2010 especially in automotive industry.

He is an author or co-author of 2 articles in the specialized conference proceedings (WSAES, IBIMA), 10 articles in the conference proceedings in the Czech Republic and the Slovak Republic.