

Miroslav Grznár
Ľuboslav Szabo

DIFFERENTIATION IN THE DEVELOPMENT OF INDUSTRIES DURING THE PERIOD OF CRISIS¹

***Abstract:** The paper deals with the evaluation of development of industry in the Slovak Republic during the period 2005 – 2012 in terms of classification by industries and technology level in the context of development in EU-27 countries. The fastest growth was recorded in high-level technology industries, which were least affected by the crisis. Enterprises responded to the crisis by decreasing the number of employees and also by substantially increasing wages and salaries. Industries with a low level of technology recorded a slower growth; crisis impacts were smaller, and a decline in the number of workers recorded in these industries was stabilised by the end of the period. The development of crisis did not disrupt a smooth growth in wages and salaries in all industries.*

***Keywords:** industry, technology levels of industries, crisis, labour input, gross wages and salaries*

JEL : D 01, D 24

Introduction

In the years 2008 – 2009 the Slovak industry was hit by the economic and financial crisis, which acquired an almost world-wide extent due to globalisation. Industries that suffered the strongest impact were engineering and chemical industries, manufacturing of means of transport, manufacturing of metals, and building and construction industry.

The crisis that started in US financial institutions had a broad impact, and managements of enterprises were laboriously searching for tools and actions how to cope with the impacts. Typical manifestations of the crisis was a decrease in sales of production, dismissal of workers, underutilisation of production capacities, prolongation of the term of payment of buyers' invoices, more difficult access to loans, decrease in profits, and other.

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Also governments of individual countries were involved in dealing with the crisis as well as EU bodies, which adopted various measures to alleviate the impacts of the crisis, ranging from the support of public commissions, through bailout of bankrupt financial institutions and international manufacturing corporations up to stimulating domestic demand by means of “scrap metal bonuses” for automobile or electrical engineering industries.

The aim of the present paper is to evaluate the development in individual Slovak industries during the period of 2005 – 2012 and assess how the period of crisis has affected the development of performance in particular in relation to technology level of manufacturing. This development is evaluated in the context of EU industrial development, which will enable us to identify positions of the Slovak industry in this grouping.

Methods and Sources

Our analysis is based on available statistical data of the Slovak national economy and Slovak industry, in particular those of the Office for Statistics, SR and its branch and industry database. For purposes of international comparisons EUROSTAT database and EC data of the period concerned are applied.

We use standard research methods of research, e.g. analysis and synthesis, comparative studies, descriptive statistics, and graphical image.

1.1 Contemporary State-of-the-Art of Knowledge and of the Condition and Development of Industry

The evaluation of the development of industry in the Slovak Republic in cross-section of industries has been recently dealt with mainly in a professional magazine TREND, which regularly annually publishes some resulting enterprise indicators, e.g. sales, value added, number of workers, assets, etc. On the basis of its methods it makes up a succession of enterprises, so-called “TREND TOP 200” for the largest non-financial enterprises across national economy industries, as well as for manufacturing industries. These analyses and evaluations provide a valuable analytical material about developmental trends in Slovakia’s industrial trends; however, they do not consider technology level of production in individual industries.

Gulaty, R. et al. (2010) monitored the response of enterprises to recession during the period of 1980 – 1982, 1990 – 1991, and 2000 – 2002 and defined four basic strategies on the basis of how successful were the approaches applied by the enterprises during the period of crisis. The protective defensive strategy tries to decrease the risk by cost saving, decreasing number of workers, and protecting its cash flow and product portfolio. In enterprises that applied this approach there has been recorded an average 6% growth in sales and 4% growth in profits [5].

Recruitment strategy was aggressively oriented to offensive activities: enterprises are searching for new markets, new customers; they make long-term return investments. They acquire talents but ignore warning signals. Waking up to reality is expensive. The growth of these enterprises is 8% in sales and 6% in profits.

When using a pragmatic strategy, enterprises decrease costs but also invest. In the defensive approach enterprises were decreasing numbers of workers, and improving performance of processes. However, enterprises opted for offensive approaches in searching for new markets and investing in assets. This way they achieved higher growth rates than preceding groups.

Progressive strategy as the enterprises' reaction to the crisis is a combination of the same elements as in the preceding group, but in some other ratio. Enterprises improve their operative performance; look for new markets and new investments. The resulting growth is 13% in sales and 12% in profits.

Kislíngerová, E. (2010) states in her paper that from the theoretical aspect an optimum response of an enterprise to the crisis situation may be described as a fundamental adjustment to the situation and an immediate change in the previously adopted strategy towards an elementary „survival“ strategy [5].

Reactions on the part of company management to crisis phenomena in real-life enterprise conditions is, however, affected by whether representatives of enterprises accept these manifestations as the result of a random, i.e. short-term situation, or whether they realize also the possibilities of a longer duration of impacts and are ready for them in their elaborated crisis management principles, management risk or crisis plans. It is important how soon enterprise managers identify manifestations of crisis and which of these manifestations send alerts to changes needed.

In our paper Grznár, M. – Szabo, Ľ. (2012) we state in the part dealing with the analysis of enterprise response to the crisis in the SR, that the most frequently used measures included dismissing workers, however, not the key ones, investment in the development of production and innovation processes, and cost saving [1].

Jaegers, T. et al. (2013) analyse the development of industry in a longer-term horizon within EU-27 and state inter-industry differentiation, and classify industries by their technology level of production. High-level production technology industries managed to faster cope with the impacts of the crisis and achieved a 26% growth rate in during 2005 – 2012, while industries with low-technology level of production recorded a 6% decrease [4].

Hirsh, E. – Kasturi, R. (2013) deal in their paper with looking for the best industry within 63 branches of activities in the world for the period of 2001 – 2011 on the basis of an overall return of shareholders' capital indicator. On the basis of analysis, they stated that the median of performance in the period evaluated is similar for most industries, and enterprises had better stay within their own industries and try to increase their performance rather than considering the change for another industry [3].

Pružinský, M. (2010) states that the Slovak industry is lagging behind in technical and technology levels of production base, in the intensity of innovation activities, and in the effective transfer of research and development results into production. In several sectors of the Slovak industry part of production is secured at worn and torn production equipment with a higher raw materials and energy and at higher costs, frequently accompanied with unfavourable impact on the environment [6].

1.2 Manifestations of the Crisis in Industries in the Slovak Republic and the European Union

Manufacturing industries of the SR were surprised by the crisis rather unexpectedly, since during the pre-crisis period gross domestic product was successfully rising and achieved in real GDP per capita two thirds of the EU-15 average. However, for the year 2009 there was calculated a 5.8% decrease in GDP against the same period in the previous year.

Table 1 illustrates the results of the Slovak economy in recent years. Data by the year 2008 suggest a decent year-on-year or volume growth almost in all the indicators. A considerable decline in performance of the economy appeared only in the year 2008 and then in the year 2009. The period from 2010 until 2011 saw the consolidation of the national economy, but not all the industries. Building and construction industries did not pick up even in that period and the country's burden remained to be a high increase in unemployment. Industrial production however, returned to positive growth. Given the negative development the rise of average wages and salaries was a surprise. Percentage data of some indicators in Table 1 express the change against the previous year situation.

Tab. 1

Development of selected indicators of Slovakia's national economy

Indicator	unit	2006	2007	2008	2009	2010	2011	2012
GDP increment, fixed prices	%	8.5	10.4	6.2	-5.8	5.4	5.0	2.0
Industrial production	%	10.0	12.8	5.1	-18.0	19.2	10.2	8.1
Building and construction production	%	14.9	5.7	12.0	-11.3	-4.6	-1.8	-15.2
Gross monthly wages and salaries	€	622	668	734	744	785	811	805
Rate of unemployment	%	9.4	8.0	9.6	12.1	13.5	14.4	14.0

Source: <http://portal.statistics.sk>, 15.3.2013. Exchange rate 1 € = 30,126 SKK

The economic crisis hit manufacturing industries to various extent. The heaviest hit industries, whose development requires long-term investment, e.g. the building and construction industry, automobile industry, and industries producing investment goods (energy industry). Tab. 2 illustrates indices of year-on-year development in selected industries.

The building and construction industry achieved its level of performances neither in the year 2012. On the other hand, manufacturing of pharmaceutical products, the building and construction industry, as well as the chemical industry were getting into difficulties. The difficulties in the pharmaceutical industry may have been caused by a vague medicine government policy. The crisis was fastest overcome by manufacturers of machines, means of transport and manufacturing of foodstuffs.

According to EUROSTAT data of 2013 [4], overall industrial production EU-27 declined due to the financial and economic crisis during 2008 – 2009 by almost 20% and the level of 2005 was achieved only in the year 2011. Since then industrial production has been recorded as stabilized.

Tab. 2

Index of sales and performances of industrial production by selected industries

Industry	2008	2009	2010	2011	2012
Chemicals	100	83,5	115,5	112,6	95,7
Manufacture of metals	100	69,3	124,0	106,0	104,2
Machines and machinery	100	65,9	133,3	118,4	113,4
Means of transport	100	74,4	138,3	126,5	122,4
Foodstuff production	100	86,7	105,9	107,1	105,3
Pharmaceuticals	100	96,8	119,1	92,8	97,4
Computers	100	102,1	117,9	90,2	110,4
Electricity, gas	100	93,5	111,8	108,4	100,1
Building and construction industry	100	88,7	95,4	98,2	84,8
Industry total	100	82,0	119,2	110,2	107,3

Source: <http://portal.statistics.sk>, 15 March 2013

Authors quoted in the present paper analysed the development in the past crisis period in individual industries, which they classified into four groups by level of technology. High-technology level industries in EU-27 recorded during the crisis a decline about 10%; however, they fast overcame the decline and as early as in the third quarter-year 2012 their production was higher by 21% than in the year 2005 and by 12% higher than in the period of crisis. This group has come to include pharmaceutical industries, computer manufacturing, electronics, and optical products.

Industries with medium-high and medium-low technology level recorded a more distinct fall during the crisis by 31% and 26% respectively, but the growth of production in the first category of industries is rather dynamic. Industries with medium-low technology level so far have not overcome the values of the year 2005. A wide scale of industries has been included in this category, namely: chemical industry, electrical engineering, engineering, and medical industries in Sub-group 1 and petrochemical, manufacture of plastics, metals, ships in Sub-group 2.

Low-technology level industries recorded a differentiated development in the Union. A decline in the years of crisis was milder, but the value of production in the third quarter-year 2012 is very similar to the value achieved during crisis years. This category includes foodstuff, textile, wood-processing and paper industries and some other industries.

For EU-27 the authors cited indicate growth rates of industries classified by technology level of production. Some of these data are presented in Table 3.

The data show that high-level and medium-level technology industries develop fastest and their development has not been too distorted even by the crisis. On the

other hand, low-level technology industries have recorded in the countries mentioned mostly negative growth values.

Tab. 3

Average annual growth rates of industries in selected in EU countries during 2005 – 2011 in %

Country	Various technology levels			
	High	Medium high	Medium low	Low
EU 27	3.3	1.0	- 0.4	- 0.7
Eurozone	3.8	0.7	- 0.8	- 1.1
Belgium	5.1	0.6	0.4	1.0
Czech lands	5.4	7.3	1.5	-1.4
Poland	14.5	8.4	6.9	3.0
Hungary	4.6	4.0	1.0	-1.1
Germany	6.6	2.3	1.8	0.1
France	1.4	-1.7	-1.8	-1.1
Holland	3.6	1.8	1.3	0.6

Source: ([3], p.5), adjusted

Apart from the indicator of growth rate of production the paper evaluates also the development of manufacturers' prices and the number of workers, as well as hours worked and gross wages and salaries in the given four categories of industries. High-level technology industries are characteristic of the rise in production accompanied with the increase in wages and salaries of wages and salaries, but a decrease in the number of workers and number of hours worked.

Authors mention in their survey all the 27 EU countries, but no data are provided with four of the countries. They are Cyprus, Malta, Slovakia, and Slovenia. The reason why the data for these countries are missing is not explained in the paper. In another part of the present paper we will try to analyse and evaluate development of industries in terms of technology level of production in the SR in the context of the economic crisis.

1.3 Crisis and Technology Level of Production in Slovakia's Industry

The omission of Slovakia's industry from the analysis encompassing EU-27 countries has inspired us to attempt to look at developmental trends of the Slovak industry during the period of 2005 – 2012 in the classification by technology level of manufacture. The Office for Statistics, SR monitors and publishes several indicators in the statistical classification of economic activities of the SR, NACE Rev. 2, from which we have chosen data for 13 industries. If we apply methods according to Jaegers, T. et al. (2013) we will obtain the following four categories of industries by technology level of manufacture:

Tab. 4

**Industries by technology level of manufacture
High-level industries**

NACE	
21	Manufacture of basic pharmaceutical products and pharmaceutical appliances
26	Manufacture of computer, electronic, and optical products
NACE Medium-high level industries	
20	Manufacture of chemicals and chemical products
27	Manufacture of electrical equipment
28	Manufacture of machines and machinery
29 – 30	Manufacture of means of transport
NACE Medium-low technology level industries	
19	Manufacture of coke and of refined petroleum products
22 – 23	Manufacture of rubber products and plastics, and other non-ferrous mineral products
24 – 25	Manufacture of metals and metal constructions except machines and machinery
31 – 33	Other production, repair and installation of machines and machinery
NACE Low level technology industries	
10 – 12	Manufacture of foodstuffs, beverages and tobacco products
13 – 15	Manufacture of textile, clothing, leather and related leather products
16 – 18	Manufacture of wooden and paper products, printing

Source: Office for Statistics, SR, NACE (Statistical Classification of Economic Activities in the European Community) Classification, own adjustment.

The share of industries classified in this way on overall sales and performances of the Slovak industry in the given 13 industries is illustrated in the following table.

Tab. 5

**Share of selected industries on total sales and performances in the Slovak Republic
and in the EU in %**

Year	HTL	MHTL	MLTL	LTL	Total
2008	11	36	37	16	100
2012	10	43	33	14	100
EU 27, 2010	12	35	27	26	100

Source: <http://portal.statistics.sk>, 15 March 2013 own adjustment, ([3], p. 2), (HTL – high technology level, MHTL – medium high technology level, MLTL – medium low technology level, LTL – low technology level)

For the Slovak Republic there are at disposal data only from the year 2008. Comparison does not appear flattering for the SR, because the share of high-level technology industries declined in the year 2012 from 11% to 10%, but the share of medium-level technology industries from 36% to 43%. This is the influence of mainly rising manufacture of automobiles. In the EU-27 a surprising phenomenon is quite a high share of industries with low technology level, but the indicator gives the

structure of added value created from factors of costs, rather than the share of sales as in the SR.

Only two industries may be included in the category of industries with high level technology of manufacturing in Slovakia – pharmaceutical manufacture and manufacture of computers and electronics. Within the EU also aircraft industry was included there. The development of production, number of workers, and average wages as an average of the two industries mentioned is given in the following table. Index of industrial production is indicated for every final month of the year and is calculated against an average month of the year 2005, while it has been cleaned off the influence of the number of work days.

Tab. 6

Development of production, number of employed persons and wages and salaries with high technology level

Year	Index of industrial production %	Average number of employed persons	Average nominal monthly salary in €
2005	110.6	11 816	732
2006	155.7	11 264	814
2007	255.6	12 284	856
2008	190.8	12 328	930
2009	216.2	11 711	935
2010	288.9	11 031	970
2011	321.7	9 609	1 019
2012	286.4	8 776	1 136

Source: <http://portal.statistics.sk>, 15 March 2013, own adjustment

Employees are indicated in average number of persons employed and wages and salaries indicate the average nominal monthly wages/salary also for each final year month.

Production of this industry has been rising impressively by over 2.5-times. In the crisis year of 2008 it mildly declined and in the following years it continued rising. The number of workers was also rising until the crisis; after 2009 the number of workers the number of workers was falling, and in the year 2012 it achieved only 74% of the figures in the year 2005. Average nominal wages and salaries have been rising favourably and achieved in the year 2012 as much as 155% of the value of the year 2005. In EU-27 the rise in wages and salaries in this industry did not record even 10% in the same period [4].

Tab. 7

**Development of production, number of workers, and wages and salaries
at medium high technology level**

Year	Index of industrial production %	Average number of employed persons	Average nominal monthly salary in €
2005	102.3	32,141	700
2006	130.1	34,938	763
2007	149.1	36,658	795
2008	98.5	35,729	817
2009	142.5	29,257	857
2010	181.8	32,335	935
2011	183.2	34,803	951
2012	171.5	34,582	1,004

Source: <http://portal.statistics.sk>, 15 March 2013, own adjustment

In the year 2008 medium-level technology industries suffered a considerable slump in production, since the year 2010; however, the level was balanced. The number of workers declined as late as in the year 2009; the decline stopped in the following year and maintains a stable level. Development of wages was not as extensive as in the preceding group, but it still accounted for an increase by 43%.

The following table contains analogical data about selected indicators of those Slovak industries which would be included in the category of medium-low technology level. Dominating is the manufacturing of metal, plastics, and synthetic rubber. In these industries production declined in the years 2008 – 2009; however, even by the year 2012 the production did not achieve the level of the starting year 2005.

Tab. 8

**Development of production, number of employed persons and wages and salaries
at medium-low technology level**

Year	Index of industrial production %	Average number of employed persons	Average nominal monthly salary in €
2005	101.8	50,020	634
2006	105.1	49,230	725
2007	107.6	50,289	760
2008	96.9	51,020	788
2009	89.7	42,065	834
2010	97.4	43,448	870
2011	98.8	45,204	870
2012	90.9	44,625	875

Source: <http://portal.statistics.sk>, 15 March 2013, own adjustment

The number of employed persons copies the development of production and employment and accounts for 89 % of the level in the year 2005. The growth of average nominal wages and salaries in the same period accounts for 38%, a little less than in the preceding group of industries.

The last group is low-technology industries, in which foodstuff production, textiles and wood dominate. Data are given in Tab. 9.

These industries, in contrast to other ones record a relatively stable level, which has not been disturbed even by the crisis. Consumers buy foodstuff regardless the crisis, only preferring cheaper foods.

Tab. 9

Development of production, number of employed persons and wages and salaries at low technology level

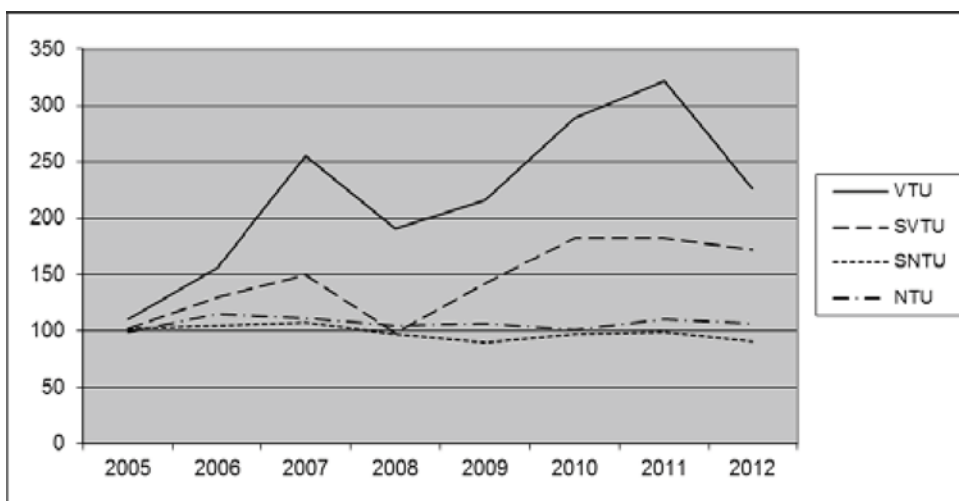
Year	Index of industrial production %	Average number of employed persons	Average nominal monthly salary in €
2005	99.0	55,455	526
2006	115.1	52,915	578
2007	111.2	50,777	597
2008	104.2	44,799	635
2009	106.1	37,468	663
2010	101.2	36,684	670
2011	110.7	37,756	659
2012	106.9	35,176	701

Source: <http://portal.statistics.sk>, 15 March 2013, own adjustment

However, enterprises responded to crisis phenomena by dismissing employed persons, whose figures decreased in the year 2012 against the initial year 2005 by 37%. The average nominal wage rose in the same period only by 33%. This created conditions for cost savings, when the productivity of labour was rising faster than wages.

Fig. 1

Indices of production development in separate technology groups of industry



Source: Own picture based on Tables 6–8. (VTU – high technology level, SNTL – medium high technology level, SVTU – medium low technology level, NTU – low technology level, SVTU – medium high technology level, SNTU – medium low technology level, NTU – low technology level)

Let us analyse now the development in the evaluated period in key indicators the index of production development, staffing levels, and gross nominal monthly wages and salaries in four sets of industries classified according to technology level of manufacturing.

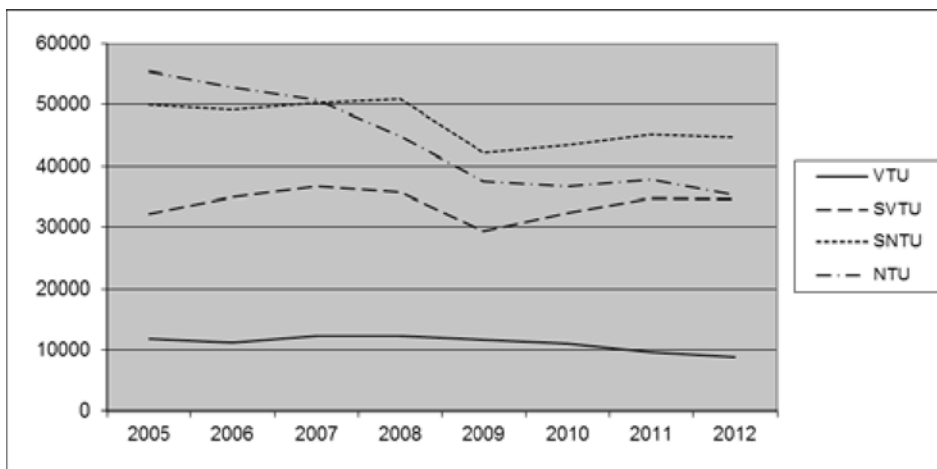
In Fig. 1 we illustrate developmental indices of production in individual technology groups of Slovakia's industry during the years 2005 – 2012. The most dynamic growth rate has the group with high-technology level of production whose development curve was however also affected by the crisis in the years 2008 – 2009 and further disruption is indicated by the year 2012. A similar development in this industry group was recorded also in the EU-27, but without the disruption in 2012 ([4], p.1).

A milder but quite prominent growth rate was also recorded in the group with medium-high technology level of manufacture, which was also affected by the crisis but it rather fast overcame the decrease and stabilized its development.

Groups with medium-high technology level of manufacture recorded a very similar development of indices of their production, which was only mildly disturbed in the years of crisis, and these groups maintained a relatively stable level. Within the EU-27, however, these groups have so far not achieved the level of the year 2005.

Average numbers of employed persons in separate technology groups

Fig. 2



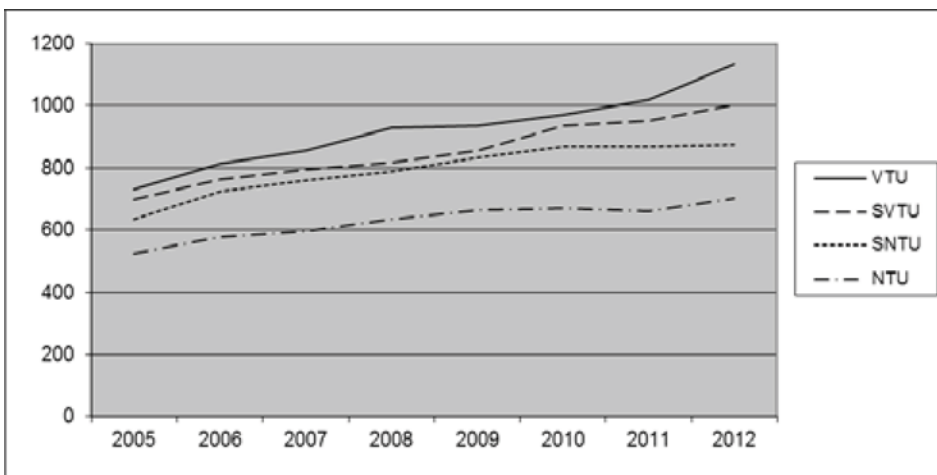
Source: Ibid

In contrast to EU-27, where the numbers of workers in crisis year were declining in all the groups of industry, Fig. 2 suggests that in the SR the number of workers in high-technology industries during the period of crisis almost did not change, and it has recorded a mild decrease only in recent years. In other industries during the crisis period the numbers of workers decreased, but these have recorded a rise again in recent years with the exception of low-technology industries.

Fig. 3 illustrates the development of average nominal wages and salaries in the given four industries by technology level of production. The amount and development of average nominal wages are depicted according to technology level of manufacture. The highest level and the fastest development of wages and salaries were recorded in industries with high level of production technology. The lowest wages and salaries and their slowest development are in low-technology level industries. In all the groups of industry, however, wages are continuing rising and the crisis period did not stop the rise at all.

Fig. 3

Average nominal monthly salary in separate technology groups in €



Source: Ibid

Conclusion

The evaluation of Slovakia's industry development in classification by technology level of manufacturing in the context of its development within EU-27 indicated some identical and some differing features. In both cases the differentiation of industries by technology level of manufacturing has been confirmed. The least affected industries by the crisis were those with high technology level and those that fastest came to terms with the crisis impacts. They achieve the highest growth rates, which are undoubtedly much higher in the SR than in the EU.

Medium-low and low technology level industries in the SR almost did record the impacts of the crisis in the production, while in the EU production decline was rather deep. However, there was recorded a decline in the number of workers, whose figures have not approached to the pre-crisis figures.

Development in the area of wages did not react at all to the crisis decline in production and average wages were smoothly rising during the entire evaluated

period, while the highest wages were recorded in high-technology level industries and the lowest ones in low-technology level industries.

The Slovak industry undoubtedly needs a more sophisticated industry based on high level technology of manufacturing and with a high export potential, in order to alleviate the risk of one-sided orientation to the automobile industry, which continues to prevail.

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