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ECONOMIC ASPECTS OF AUTOMOTIVE ENTERPRISES DEVELOPMENT IN SLOVAKIA

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Abstract:

Contribution deals with present position and potential of development in automotive industry in Slovakia with goal to know specification of factors, participating at the development in detail. Rate of automotive enterprises in the frame of Slovak Republic creates important part of Slovakian industry, when there are recorded high annual sales and employment. The contribution specifies consequently key crisis areas that must be dealt, as well as present trends and key indexes of automotive industry development.

Key words:

Economic development, automotive industry, Slovakia, logistics, key performance indexes

INTRODUCTION

Automotive enterprises present broad net of organizations and companies, covering area of design, development, production of components for automotive industry, marketing, sale, or single car production. It is the reason automotive enterprises are considered as one of the most important economic sector, not only from the view of turnover. In spite mentioned the sector has broad spectrum of activity, its activities are not considered in area of maintenance and repair for final products users as service provider. Beginning of automotive enterprises was yet in 1890, since then there is world expansion to the economy to present time. But in spite of the sector success we must forget not neither development trends nor potential orientations of development that could be positive for the sector. From this view

permanent determination of factors that could influence given sector in the future is considerable not only for the business analytics, but also for the broad net of interest groups.

1 PRESENT STATE OF PROBLEM SOLVING

As one of the important pillar industries the automotive industry plays a significant role in the national economy and social development. There is therefore the need to follow up economic development of automotive industry. In this area Jiang, et.al (2018) analyzed fixed assets, intangible assets, the operating expenses, and the number of employee as inputs and the operating income as output, we conduct efficiency evaluations of automotive firms The results speak automotive industry will still be a driving force of the economy. [3]

Today's economy organizations have to continuously adapt to changing external requirements. This often necessitates the adoption of new technologies and consequently the implementation of new applications that are costly to maintain and operate. This area had been studied by Khosroshahi (2016) with applications of a global automotive company [6].

At present, energy exhaustion and environment pollution has attracted more and more attention, which given birth to the new energy and economically effective automobiles. However, as the emerging industry oriented to energy conservation and emissions reduction, new energy automobile industry encounters obstruction from technology input and externality of economy in the industry development and marketization [4]. These make space for using of such composite structures in the automotive industry, producing vehicles that would be able to meet both fuel economy and safety standards [8].

1.1 Development trends and milestones of automotive enterprises in Slovakia

Slovakian economy is also presently consisted from more than 298 automotive enterprises, where the production is orientated mainly to the western part of the country. During the last period it was recorded 5.2% improving of production effectiveness of the sector against previous years [10]. The data confirm the result of growing innovation power of the country. Slovakia belongs among EU28 from the view of SII – Summary Innovation Index (2013) average growth of innovation power by 1.49%, (in 2016 – 2.5%) while SII Slovakia is 0.328 (in 2017 improved by 2%) [2].

Over the past 20 years automotive industry has been an important source of foreign direct investment in Slovakia, presenting 44% rate on total industrial production and 40% rate on total industrial export, with approximately 11.3% annual growth (for example between 2014-2015) [12].

Slovakia has also high rate of employees in „medium high-tech“ and „high-tech“ production, mainly due to the relatively small market and high concentration of automotive enterprises in western part of the country (Table 1).

Tab. 1 Rate of automotive enterprises in Slovakia

Number of automotive enterprises	Total number of employees	Profit total	Sales total
298	113 910	400.0 mil.EUR	28 735.6 mil.EUR

Source: [10]

In spite of innovation process in area of production, employees must presently meet existing critical space in production, where we can mention for example:

- Redundancy of machines capacities, which are not totally used and adapted to real production program,
- High level of physical and moral depreciation of machinery,
- Production technology is low adapted to new and many times changing production programs, and technology involved is heavily dependent on stability of the important process parameters [9]
- Prevailing technological arrangement of working places, existing reserves during using of production structures,
- Ongoing shortages in area of automatization, continuing of material flow and compatibility with information system,
- Lack of innovation ability due to the lack of human capital

Critical space in production is confirmed by low annual change of production of vehicles in Slovakia, when in 2016 it presented only 0.1%, which is low for example in comparing with Czech Republic – 8.3% and Poland – 3.2% [11].

Such critical factors urge specification of continual improving in connection with development trend (Table 2), in favor of long term development of automotive enterprises in dynamic competition.

Tab. 2 Trend of automotive enterprises development

Trend from the view of investment	Trend from the global point of view
-product, technological and regional diversification with positive impacts to employment and development in SMEs area	-„In-store“ logistics
-initiation of investment to engineering activities, research and development and sophisticated services (including centers of shared services)	-Cooperation
-gradual transition from semi-automatized production operation, characterized by high rate of manual work to system with higher rate of robotized operation, which depends also on incoming problem of working power lack in some sectors	-Reverse Logistics
-permanent pressure to increasing of quality, productivity and flexibility as a need to observe and strengthen competition advantage.	-Management of demands fluctuation
	-Identification – new systems of demarcation
	-Effectiveness of sources

Source: [5], [13]

Further direction of automotive development should be analyzed in the frame of the efficiency, supporting sustainability [10]. This can be measured by key performance indexes (KPI), which in comparing with present trend of efficiency evaluation are compared in Table 3.

Tab. 3 New KPIs in relation to the environment

Influences	Trends	New key indexes of performance (KPIs) supporting sustainability
External influences	Economic trend: -New markets and new economic balance	<ul style="list-style-type: none"> - Energy consumption - CO₂ emission (greenhouse gas) - Traffic congestion - Water consumption - Compliance with security - Infrastructure simplification
	Ecologic trend: -Sustainability and lac of natural resources	
	Demographic trend: -Aging of population and urbanization	
	New technologies: -Information explosion	
	Regulatory measurements: -new principles and measurements	
Internal influences	Consumer behavior: -value chain	
	Products flow: -reengineering and logistics	
	Information flow: -management of complexity by transparency using	

Source: own processing according [5]

Except of new development trends potential possibilities and threats in automotive areas had been defined by SWOT analysis (Figure 1):

	Value	Weight	Weighted value
Strengths:			
Long term tradition of engineering production	6	0.20	1.2
Skills from several years activity of automotive enterprises	7	0.30	2.1
Expansion of production capacities in automotive production, production of boilers and bearings	3	0.10	0.3
Development of research and design activities	4	0.15	6.0
Advantageous position from the view of logistics, proximity of western European markets	5	0.18	0.9
Cooperation of public and private sector	1	0.04	0.04
Price of work, low tax burden	2	0.03	0.06
Weaknesses:		1.0	
Persisting high work rate on production	3	0.1	0.30
Low level of automatization	1	0.025	0.025
Lack of qualified working power in some professions	4	0.15	0.60
Apprenticeship, stagnant behind present trends and demands of private sector	2	0.03	0.06
Weak innovation ability	5	0.17	0.85
Growing influence of automotive industry, narrow sector specialization	7	0.145	1.16
Absenting regional innovation and development strategies with regard to the potential of engineering	6	0.18	1.08
Uncompleted infrastructure in some regions	8	0.20	1.40

Opportunities:		1.0	
Existence of new, eastern markets, potential of existing markets from surrounding countries	6	0.25	1.25
Broader connection of Slovakian science and research	3	0.22	0.66
International applying of supply base of automotive industry	5	0.15	0.90
Increasing of technological demanding production and research and development boom	4	0.23	0.92
Involvement of local research capacities, including universities	1	0.05	0.05
Development of human sources as assumption for more sophisticated activities development	2	0.10	0.20
Threats:		1.0	
Loss of competitiveness, transition of production, orientated to cost to cheaper destinations	3	0.20	0.60
Growth of world steel prices, energy prices and wages in economy	4	0.60	2.40
Lack of qualified working power, fluctuation	2	0.15	0.30
Not sufficient and delayed development of education system, stagnant behind present needs in individual sectors	1	0.05	0.05
		1.0	

Fig.1 Sectors SWOT analysis of automotive industry in Slovakia

Source: own processing according [5]

1.2 Innovative approaches in automotive industry

Automotive enterprises are ranked to the leading innovative leader of world industry. Present automobiles dispense yet with sophisticated technologies and components, tailored to clients' needs. Mutual cooperation of automotive enterprises supports process of modernization in connection with demand yet in first phases of production planning. Using of high-tech materials and development of high-tech processes support total innovation development. Feasibility and testing of projects is supporting by virtual reality using. Qualitative human capital, disposing with adequate abilities, enabling realization of innovation projects, presents a conditionally factor of success. Worldwide in area of automotive there is investing more than 100 billion dollars to area of research and development. Present technologies in area of automotive enables yet to see, what is around. Such supporting tool of the future should enable to decrease collision in several following years and to support fluency of rides. Such "electronic assistants" built in automobile systems, should fill three functions, according Auto Alliance (2014) mainly following:

1. warning function – by using of visual, vibration and audible elements,
2. information function – implementation of camera ready system with night view,
3. supporting function – by building of ultra-fine sensors with high frequency for measurement of distances between elements.

Combination of camera ready and sensor system could in the future enable 3D picture representation, warning to elements in the surrounding of the car. Communication by using of Wi-Fi connection and websites without necessity to answer mobile phone is the next interest on the market. Interesting is also building of information system to system of light communication at the crossroads. These would be able by this way to inform drivers of cars directly about changes in lights. By this way effectiveness of transport could be increased. Moreover in case detection system would be installed in light tags, it will be able to identify number of automobiles on the roads, it could enable also with reduced traffic (mainly during the night) to change light tag directly by drivers. Present trend is also using of nan-cellulose for production of components, since this material is cheaper, easier and stronger in comparing with carbon fibers [7].

Next hit in present time is also using of such carbon fibers that are three times stronger and four times easier in comparing with steel. Hit is also using of aerogel, developed in NASA and used in past time during space suit production. Such material is considered as one of the easiest material, used in present automotive enterprises for absorption. The material is able to be burdened by 2000 times' higher burden in comparing with its own weight, while it absorbs properly vibration and noise. The next material is glass, used presently in electro-technic industry, known as "Gorilla Glass". The glass can sustain approximately half the load in comparing with conventional laminated glass.

2 CONCLUSIONS

Automotive enterprises present important part of Slovakian industry. Trend analysis and innovation approaches in this area means an inherent part of continual improving, demanding permanent analysis of world industry. Sector benefits from the development in the oil price and it can benefit from a rebound in traffic volume. But transport infrastructures are still underdeveloped, which influence further development of the sector. Interesting of the automotive sector is also acceptance of new innovation technologies from different sectors, which means deepening of knowledge base. Important part of new trends implementation is also cooperation among enterprises and universities with aim to solve common projects. Such cooperation could contribute to the creation of potential human capital that presents future opportunity for development of Slovakian industry.

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References

- [1] AutoAliance. (2014). How Automakers are Driving Innovation. (DrivingInnovation, Ed.) Innovation Report, 1-8. Available at: <file:///C:/Users/Lenka/Desktop/NEMAZAT%20-%20LIT.%20A%20DIZA/WoS/2014InnovationReport.pdf>
- [2] European Innovation Scoreboard 2017. Available at: https://www.rvo.nl/sites/default/files/2017/06/European_Innovation_Scoreboard_2017.pdf
- [3] Jiang, H., Han, L., Ding, Y., He, Y., 2018, "Operating efficiency evaluation of China listed automotive firms: 2012-2016," Sustainability (Switzerland), 10(1), Article number 184.
- [4] Jiao, L., Liu, P., 2015, "A study on the policy framework of market cultivation in the new energy automobile industry in China," 15 International Conference on Logistics, Informatics and Service Science, Article number

- [5] Kalafusová, L., Demečko, M., Koblunický, J., 2014, "Ekonomické aspekty vývoja automotive spoločností na Slovensku," Vedecký seminár doktorandov 2014, ES AMS FBERG, pp. 26-30.
- [6] Khosroshahi, P.A., Beese, J., Aier, S., 2016, "What drives application portfolio complexity? An empirical analysis of application portfolio cost drivers at a global automotive company," Proceedings - CBI 2016: 18th IEEE Conference on Business Informatics, 9(1) pp. 282-28918.
- [7] Long, R.S., Boettcher, E., Crawford, D., 2017, "Current and future uses of aluminum in the automotive industry," JOM 69(12), pp. 2635-2639.
- [8] Machado, J.J.M., Gamarra, P.M.-R., Marques, E.A.S., da Silva, L.F.M., 2018, "Improvement in impact strength of composite joints for the automotive industry," Composites Part B: Engineering, 138(1), pp. 243-255.
- [9] Malindžáková, M., Caganová, D., Rosová, A., Malindžák, D., 2016, "Risk analysis causing downtimes in production process of hot rolling mill," Smart City 360 2016 - 2nd EAI International Summit, 2016; Bratislava; Slovakia. Code 130980.
- [10] Nižníková, Z., 2016, "Performance evaluation of Qalt, Ltd.," Zlepšovanie procesov pomocou štatistických metód. Medzinárodná vedecká Konferencia, Bratislava: Vydavateľstvo Ekonóm, p.23.
- [11] OICA Production Statistics. 2016, Available at: <http://www.oica.net/category/production-statistics/2016-statistics/>
- [12] SARIO. 2018. Automobilový priemysel na Slovensku, December 2017. Available at: <http://www.sario.sk/sites/default/files/data/sario-automotive-sector-in-slovakia-2018-02-01.pdf>
- [13] Simonidesová, J., Manová, E., Stašková, S., 2015, "Societas Europaea as a new form of enhancement the quality of business from the perspective of the application of tax optimization," Investment management and financial innovations: international research journal, Ukraine: Business Perspectives, 12(4), pp. 171-175.
- [14] Šaderová, J., Tokarčík, M., 2015, "Returnable containers used in the automotive industry," The International Journal Transport & LOGISTICS, 15(27), pp. 1-7.