

# FACTORS DETERMINING PROFITABILITY OF SMALL AND MEDIUM ENTERPRISES IN SELECTED INDUSTRY OF MECHANICAL ENGINEERING IN THE SLOVAK REPUBLIC – THE EMPIRICAL STUDY

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## Introduction

Mechanical engineering belongs to the key industries in Slovakia. In terms of achieved sales and the rate of employment, it ranks among the largest manufacturing industries. The industry currently employs 12 per cent of the population and accounts for up to 42 per cent of total output of the Slovak Republic. Many of the enterprises operating in this industry are small or medium-sized. This industry apparently plays an essential role in the global economy, it is a source of entrepreneurship, innovations and new jobs. These are some of the reasons for which SMEs' profitability and ways of its improvement should draw particular attention. It is therefore obvious that the issues of the financial analysis in SMEs are receiving constant attention. Since SMEs are the backbone of the Slovak economy and mechanical engineering is one of its key industries, our intention in this article is to focus attention on profitability and factors influencing it in SMEs active in the mechanical engineering industry.

## 1. Theoretical Background

All decisions made within a business will be influenced in some way by the current financial situation or by the impact of the decision on future financial performance. And every decision in a business will eventually be reflected in the financial indicators of the business (Vinczeová & Krištofik, 2013). Whether the decision be to invest in new capital equipment, automate a production line, increase staffing levels or launch a new product, financial data will form an integral part of the decision-making process.

A thorough financial analysis identifying the causes of deviations and discrepancies

establishing causal relationships is one of the most important tasks of financial management. It is able to identify critical aspects endangering firm's future and, on the other hand, it also may reveal strengths which can, when maintained and boosted, help a company become more sustainable and competitive (Hiadlovský et al., 2016). Hereby, to take right decisions, managers need to analyse their financial situation, especially in respect to firm's profitability and the factors influencing it (Emery et al., 2007; Atrill, 2006; Hanousek et al., 2015; Zalai et al., 2016; Park & Youngtae, 2017; Beyer & Hinke, 2018). As profit maximisation is generally one of the most significant financial objectives, managers try to take decisions supporting its achievement. It should, however, be borne in mind that decisions that increase profitability tend to increase risk, and conversely, decisions that focus on risk reduction will tend to reduce potential profitability (Singh & Kumar, 2017; Král et al., 2007). Therefore, the profitability analysis revealing factors influencing profitability becomes a very helpful tool providing guidelines for managers in their short-term as well as strategic decision-making process.

Specialised literature offers various definitions of profitability. Sedláček (2011) defines profitability as a relationship between the obtained effect and the resources used to achieve it. It is a financial category characterizing revenues related to business for a certain period as a relationship between profit and (most often) capital (Zalai et al., 2016).

We generally understand profitability as a relative relationship between profit/loss and a certain base. Profitability expresses the rate of efficiency of the business activity; hence, it is a result of firm's efforts (Lesáková et al., 2015).

Measurement of profitability is most frequently based on the construction of profitability indicators, which take the form of ratios. One can say that the profitability ratios show efficiency of the overall business activity (Higgins, 2003; Gibson, 2012; Cumming & Groh, 2018). With the help of them, the intensity of the use, reproduction and recovery of capital invested in the firm are expressed (Maynard, 2013). What the profitability indicators have in common is that they generally confront the net result of the business activity with the base expressed as the amount of the invested capital or the volume of business activity. As Pavelková (2010) claims, the base for the calculation of a profitability ratio can be different and, accordingly, the name of the individual indicator is derived.

Various authors (Holečková, 2008; Knápková & Pavelková, 2010; Kislíngrová, 2006; Zalai et al., 2016) use a different number of profitability ratios with different names in their scientific works. It is obligatory to calculate and analyse not only return on sales but (since the company's profit is to a large extent dependent on the efficient usage of assets and equity) also return on assets (assets profitability) and return on equity (equity profitability).

After calculating various profitability ratios, it is crucial to evaluate their values properly and indicate the main factors determining them (Gibson, 2012; Higgins, 2003; Maynard, 2013; Zalai et al., 2016). For the companies, the most proper option would be to compare the ratios with those for previous few years and with the mean values of the industry's ratios (Revsine et al., 2015; Pavelková, 2010). A lot of useful information is obtained when comparing the profitability ratios of the current financial year with those for the previous financial years and with mean rates of industries' profitability.

Various internal (companies' managers, employees) and external (investors, customers, suppliers, banks, society) information users are interested in profitability ratios in order to achieve certain goals or interests. Managers of companies are interested in profitability of assets mainly to manage assets more efficiently and evaluate company's activity more objectively, whereas investors are more interested in profitability of equity because it shows the profitability of their investments. Those taking part in marketing activities are interested in profitability of sales because it

shows the profitability of the sales process (Tamulevičiene, 2016). The values of financial indicators are also significant to assess the firm's future prosperity and profitability.

The growth of firm's profitability over time is a positive sign of its success. It is relatively difficult to increase profitability, but there are several possible ways to do it. In order to affect its profitability, the firm has to identify factors which influence it (Yazdanfar, 2013). Apart from factors whose influence can be easily calculated by Du Pont pyramidal analysis, the profitability analysis is also influenced by various internal or external factors which can be calculated only approximately or it can even be not possible to calculate them, yet their influence cannot be denied. These factors are also attributed to the most important factors influencing firm profitability (Šimberová et al., 2015; Tamulevičiene, 2016; Yazdanfar, 2013; Higgins, 2003).

The investigation of factors that may have an impact on the firm's profitability can be very helpful. Their identification has been one of the concerns of researchers, however, previous studies have shown inconsistent findings (Alarussi & Alhaderi, 2018; Nanda & Panda, 2018). There is rather large number of studies investigating key factors determining profitability in the banking sector. Previous studies identify factors which determine bank profitability defining them as internal and external. One type of these studies is based on cross-country evidence (i.e., Claessens, Coleman, & Donnelly, 2018; Adelopo, Lloydking, & Tauringana, 2018; Menicucci & Paolucci, 2016; Bolt, de Haan, Hoeberichts, van Oordt, & Swank, 2012; Beckmann, 2007; Staikouras & Wood, 2004; Demirgüç-Kunt & Huizinga, 2016; 1999), another large group of studies investigates bank profitability in individual countries (i.e., Garcia & Guerreiro, 2016; Tan, 2016; Titko, Skvarciany, & Jurevičiene, 2015; Dietrich & Wanzenried, 2011).

Studies attempting to determine factors affecting profitability in non-financial organizations vary according to the period range of the research, its main focus (identifying external or internal factors), some of them examine inter-industry specific factors, other focus on profitability in different countries. Let us now examine some of the results achieved in several European countries. Burja (2011) conducted a study in Romanian companies

operating in the chemical industry. The results show a strong dependent relationship between firm's profitability and management of available resources. ROA was affected by efficient current assets management and financial leverage in a positive way. On the other hand, investments in fixed assets reported a negative effect on ROA. The study investigating determinants of profitability of Croatian manufacturing companies (Škuflić, Mlinarić, & Družić, 2016) presents the positive impact of the market concentration and the total productivity factor on profitability. The study also shows a significant negative relationship between profitability on the one hand and leverage and current ratio on the other hand. In non-financial Greek companies listed in Athens Exchange, profitability was positively affected by the firm's size, sales growth and investment and negatively by leverage and current assets. The finding reveals a negative impact of Greece's joining the EMU and the adoption of the euro (Asimakopoulou, Samitas, & Papadogonas, 2009).

For a firm, profit can be considered as an oxygen (Maynard, 2013). If a company is profitable enough, then it can invest, expand its activities and thus maintain a stable position in the market (Stejskal et al., 2016; Kubičková & Procházková, 2014; Lesáková, 2014). Hence, it is crucial for every company to perform the profitability analysis. The profitability analysis allows for more precise knowledge of qualitative results that change in the business transformation process in accordance with managed inputs and outputs and their mutual relationships, which is reflected in the efficiency of the business reproduction process.

## 2. Aim, Material and Methodology of Research

The aim of the article is to analyse and evaluate the development of profitability in small and medium-sized enterprises in the Slovak Republic in one industry of mechanical engineering (SK NACE rev. 2 28xxx – Manufacture of machinery and equipment not elsewhere classified) during the period 2008-2015 and identify key external and internal factors influencing profitability of small and medium-sized enterprises (SMEs) in the industry over the period. The choice of the time period was affected by the effort to include the years before the economic crisis (2008), years

of the economic crisis (2009 and 2010) and the period of the recovery and subsequent growth (particularly years 2014 and 2015).

In light of the scientific objective, we formulated three hypotheses of the scientific research:

*H1: We assume that more than 60 per cent of SMEs in the Slovak Republic in the industry of "Manufacture of machinery and equipment not elsewhere classified" experienced growth of profitability in 2015 compared to 2008.*

*H2: We assume that SMEs in the analysed industry consider "demand for products" to be a crucial external factor affecting profitability.*

*H3: We assume that SMEs in the analysed industry consider "profit margin" to be a crucial internal factor affecting their profitability (ROE).*

When writing the article, we used several sources of information.

The first group of information involved specialised literature concerning the financial analysis, analysis of factors affecting profitability development and business environment. The second group of information included secondary data obtained from statistical surveys and publications of the Slovak Business Agency, the Business Alliance of Slovakia and data provided by the Statistical Office of the Slovak Republic. A valuable source of secondary information were final accounts of businesses, which enabled in-depth analysis of profitability development in the analysed industry, secondary data obtained from the yearbooks "Stredné hodnoty finančných ukazovateľov ekonomických činností v Slovenskej republike" (publishing mean values of financial ratios of companies applying double-entry method of bookkeeping in the Slovak Republic). We used data for the period 2008 to 2015 which are also available in an electronic form at [www.cribis.sk](http://www.cribis.sk).

Data obtained by means of a questionnaire survey carried out in Slovak SMEs in the selected industry was the third source of information.

The parent population represents all small and medium-sized enterprises established in the Slovak Republic active in the industry of "Manufacture of machinery and equipment not elsewhere classified". Based on the data of the Statistical Office of the Slovak Republic, we found the following numbers in individual groups of enterprises (Tab. 1).

To determine a sample of enterprises, we chose the number of employees as a criterion.

**Tab. 1: Structure of enterprises in the Slovak Republic in 2015  
(Manufacture of machinery and equipment not elsewhere classified)**

Structure of enterprises		The Slovak Republic	
		Number	Percentage
Size of enterprises	micro (0-9 employees)	467	64.15
	small (10-49 employees)	160	21.98
	medium-sized (50-249 employees)	101	13.87
TOTAL		728	100.00

Source: processing based on [www.statistics.sk](http://www.statistics.sk).

In order to verify representativeness of the sample we used a non-parametric chi-square goodness of fit test ( $\chi^2$  distribution test) considering the firm's size as a main sign of sample representativeness.

Based on the questionnaire survey results, we evaluated the obtained data by means of the statistical analysis. The formulated hypotheses were tested on the significance level of  $\alpha = 0.05$ . From the available methods of the statistical analysis, we particularly used descriptive statistics, frequency tables and different non-parametric tests (the Friedman and Wilcoxon tests). The survey was carried out from March to June 2016.

To achieve the objective of the article, several scientific research methods were used, namely the analysis, synthesis, induction, deduction, abstraction and mathematical-statistical methods.

### 3. Results and Discussion

In accordance with the SK NACE classification, the mechanical engineering industry comprises four industrial divisions – 25, 28, 29 and 30. One of them, according to SK NACE, is the division 28 – Manufacture of machinery and equipment not elsewhere classified. The Division 28 includes the manufacture of machinery and equipment operating independently of materials either mechanically or thermally, or treating materials (i.e., treatment, spraying, weighing, or packaging), including their mechanical parts producing and using power, and all specially produced primary parts. It contains fixed and mobile or manual devices, irrespective of whether they are manufactured for mechanical or building engineering, agricultural or domestic use. The production of special equipment for passenger

or freight transport beyond determined borders also belongs to this division.

The parent population contains 728 small and medium-sized enterprises in the industry of "Manufacture of machinery and equipment not elsewhere classified". The questionnaire survey was carried out on a sample of SMEs in the specified industry. The basic data on firm profitability and factors determining it were collected by means of the structured questionnaire. It consisted of the closed and semi-open questions. The attention was focused on the analysis of factors determining firm profitability. Clarity of questions in the questionnaire and relevance of received responses were verified by the pre-research. The questionnaire introduction contained the explanation of the research purpose. The introductory section consisted of five identification questions, the research one contained seven questions. The questions were formulated to enable verification of the established hypotheses. We distributed 516 questionnaires and received back 136 correctly filled questionnaires (representing the response rate of 26.3 per cent). The sample contained 111 SMEs set up before 2008. In terms of the size (i.e., in terms of the number of employees), the sample contained 69 micro-enterprises, 24 small enterprises and 18 medium-sized enterprises.

The following table contains the numbers of small and medium-sized enterprises in the parent population and in the sample.

Sample representativeness was tested on the basis of the main sign – the firm's size. We used the statistical program SPSS for testing, namely the non-parametric chi-square test. Based on the p-value (0.918) we can state that, on the 5-per cent significance level, the sample

**Tab. 2: Structure of enterprises in the industry of “Manufacture of machinery and equipment not elsewhere classified” in Slovakia in the parent population and in the research sample**

Size of enterprise	Parent population	Percentage	Sample	Percentage
Micro-enterprises	467	64.15	69	62.16
Small enterprises	160	21.98	24	21.62
Medium-sized enterprises	101	13.87	18	16.22
TOTAL	728	100.00	111	100.00

Source: own processing

is representative in accordance with the sign of the firm’s size.

**3.1 Analysis of Profitability Development in Small and Medium-Sized Enterprises in the Slovak Republic in the Industry of “Manufacture of Machinery and Equipment Not Elsewhere Classified” for the Period 2008-2015**

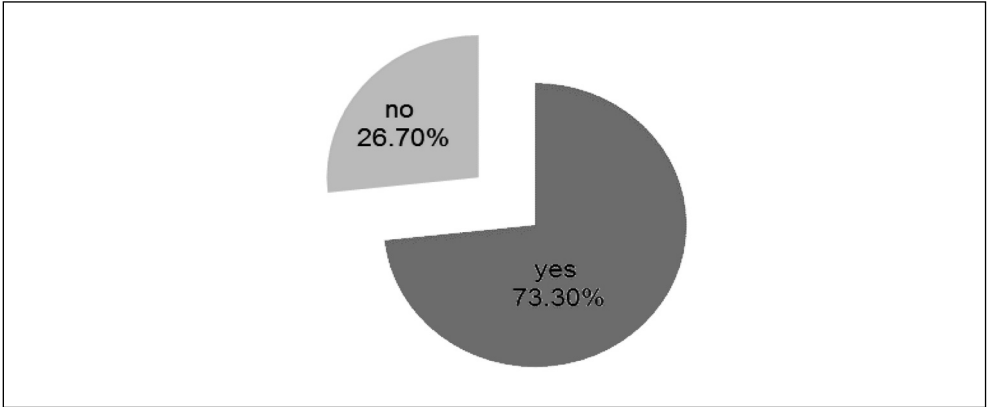
In the first part of the questionnaire survey, we checked whether SMEs in the industry of “Manufacture of machinery and equipment not elsewhere classified” carried out the profitability analysis and we identified key profitability ratios analysed by them. Subsequently, we analysed the development of main profitability ratios:

*return on assets (ROA), return on equity (ROE) and return on sales (ROS)* for the period 2008-2015. This part of research also included the comparison of evaluated profitability ratios with mean ratio values in the industry for 2008-2015.

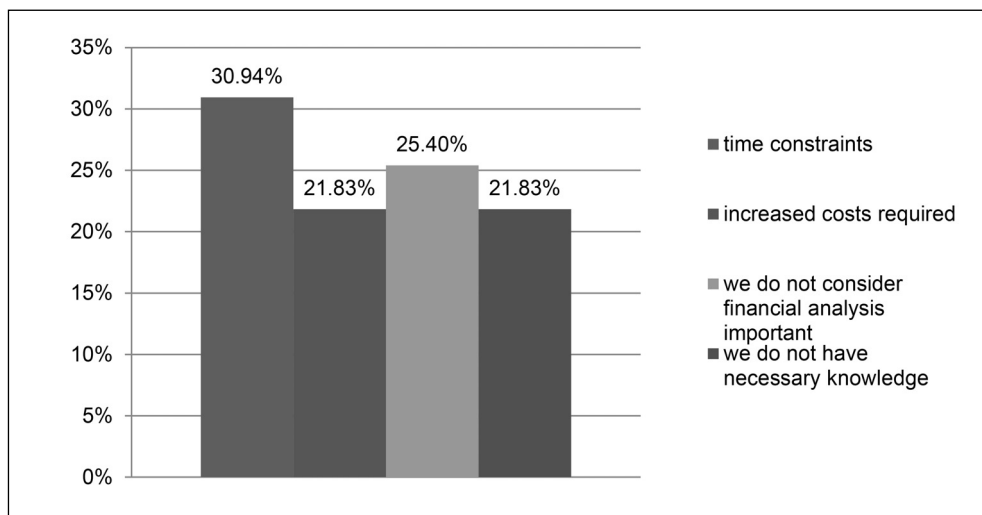
The first part of research aimed to establish whether enterprises carried out the profitability analysis and which ratios they used to do so. For the businesses which did not carry out the profitability analysis, we identified the causes. The results are presented in Fig. 1

As shown in Fig. 1, more than 73 per cent of Slovak SMEs active in the industry of “Manufacture of machinery and equipment not elsewhere classified” analyse their profitability, while approximately 27 per cent of SMEs do not do so by means of profitability ratios. Businesses which carried out the profitability analysis were requested to choose the most applied profitability ratios from seven offered

**Fig. 1: Shares of SMEs carrying out the profitability analysis**



Source: own processing on the basis of the results of the questionnaire research

**Fig. 2: Causes of not carrying out the profitability analysis (shares of SMEs)**

Source: own processing on the basis of the results of the questionnaire research

options. For businesses which carried out the profitability analysis, we identified ratios they had used. The research findings show that SMEs mostly use *return on sales* – ROS (83 per cent of SMEs) and *return on equity* – ROE (62 per cent of SMEs).

Where the business stated that they had not carried out the profitability analysis, we identified the causes. The results are shown in Fig. 2.

Up to 30.94 per cent of SMEs stated time constraints as the main cause of absence of the profitability analysis. More than 25 per cent of enterprises do not consider the financial analysis as important (the profit indicator is key for them), almost 22 per cent do not analyse profitability because of additional costs and approximately 22 per cent of enterprises stated that they did not have the necessary knowledge.

The essential phase of the first part of the research was the analysis of the profitability development. In the following part of the article, we present the development of the selected profitability ratios in the analysed enterprises (111 SMEs) for the period of 2008-2015. We will focus on return on assets (ROA), return on equity (ROE) and return on sales (ROS). We will compare the calculated values for the

analysed 111 enterprises with the mean values in the industry for the period 2008-2015.

### Return on Assets (ROA)

Return on assets is a term that characterises the production power and measures profitability in relation to total assets employed in business (regardless of sources financing them) (Kislingerová, 2006). How efficiently the business is able to use its assets base is important. The higher the value of return on assets, the more positive the evaluation is. It should however be borne in mind that the economic result (the numerator of the indicator) can also be influenced, besides firm's performance, by many external factors (mainly through the financial economic result), occasional transactions (i.e., profit or loss resulting from sales of unnecessary assets), as well as by variety of the accounting policies adopted by a firm (applied techniques of assets valuation, provisioning and value adjustments), etc. (Šnircová, 2017).

Based on the calculated ROE values, it can be concluded that the development of return on assets was variable in the analysed SMEs. Return on assets (ROA) increased in 2015 compared to 2008 in 72 analysed SMEs and



declined in 39 enterprises. This means that almost 65 per cent of SMEs in the analysed industry experienced the growth of return on assets in 2015 compared to 2008. The highest ROA values were achieved in 2015, the lowest ones in 2009. Since 2010, the situation in enterprises slowly started to improve and in 2015, the value of the indicator almost doubled compared to 2008.

Subsequently, we compared the calculated ROA values of the analysed SMEs in the sample with the mean values of return on assets in the industry of "Manufacture of machinery and equipment not elsewhere classified". In accordance with the calculation algorithm of the published ratios, ROA is calculated as a percentage of profit before taxes of the amount of assets.

**Tab. 3: Mean values of return on assets in the industry of "Manufacture of machinery and equipment not elsewhere classified" (percentage)**

Ratio		2008	2009	2010	2011	2012	2013	2014	2015
ROA (in %)	Frist quartile	-2.85	-7.47	-3.31	-3.10	-3.24	-2.94	-2.49	-1.17
	Median	2.48	0.44	1.95	2.42	1.72	1.43	3.70	4.72
	Third quartile	14.04	6.88	10.99	12.43	11.30	10.08	14.68	16.32

Source: processing based on [www.cribis.sk](http://www.cribis.sk)

As is apparent from the mean values of ROA and also confirmed by the results of the analysis carried out in 111 SMEs in the industry, SMEs reported a significant increase in return on assets in 2015 compared to 2008. If we compare ROA in 2015 with that one in 2008, we note that the value of the median almost doubled (190 per cent). The development of ROA over the analysed period mainly reflected the cyclical economic development (the impacts of the economic and financial crisis in 2009 and 2010), subsequent recovery of the global economy after 2011 and the growth of the industrial production in all industries in the Slovak Republic after 2012, but also the changes and amendments of several acts (particularly in taxation), which had a major impact on the development of profitability in the industry.

A high value of the third quartile in the last two years is a result of several positively performing factors in the industry of mechanical engineering and reflects the efficient use of the assets base in enterprises. In particular, the increased demand for the products of the industry in the domestic market, as well as increased exports (the entry into foreign markets) acted in a positive way. Financial injections provided by the European structural funds also helped the engineering enterprises and triggered the implementation of new restructuring projects (Antonová & Zapletalová, 2014).

We consequently applied the DuPont analysis of profitability ratios to identify the key partial indicators affecting the synthetic profitability ratios. We undertook the analysis in all analysed enterprises and, subsequently, also based it on the mean values (the median) in the analysed segment of SMEs. We assessed the 2015 ratios by comparing them with those of 2008.

The decomposition of ROA into the return on sales and total assets turnover was based on the following calculation:

$$\text{Return on Assets} = \text{Return on Sales} \times \text{Total Assets Turnover} \quad (1)$$

On the basis of the results of the pyramidal decomposition of ROA in all analysed enterprises, we can state that in most enterprises (61 per cent) the total assets turnover has the most significant effect on changes of ROA.

The decomposition of ROA into partial indicators was also carried out through the mean values of indicators in the analysed industry. After having analysed the results of the pyramidal decomposition of ROA and assessed the effect of individual analytical indicators on ROA as a synthetic indicator, one can conclude that the increase in the total assets turnover (approximately by 40 per cent) was most responsible for the increase of ROA in 2015 compared to 2008 (by 90 per cent).

The increased value of the total assets turnover was mainly caused by the growing demand for mechanical products (which was subsequently reflected in the growth of sales), efficient use of assets and optimisation of the stock level. The development of the return on sales was also positive (increased by 35 per cent). The increase of the return on sales can be attributed to the sales growth as well as to the efficient use of resources including capital.

### Return on Equity (ROE)

Return on equity (ROE) informs about the volume of profit generated by equity. The development of return on equity is variable in the analysed sample of SMEs. It increased in 2015 compared to 2008 in 69 analysed enterprises (i.e., 62.2 per cent). Its value dropped in 42 enterprises (i.e., 37.8 per cent). The worst results were recorded in 2009, when ROE achieved significantly negative values. Also here, the year 2015, when ROE substantially increased (approximately by 30-40 per cent), may be perceived as positive.

As Pavelková (2010) suggests, the problem of the ROE evaluation can be that if we calculate the ratio of net profit to firm's equity based on the data at a certain date (mostly used in practice), we can make a mistake and underestimate real firm's profitability. The root of the problem is that profit is being generated gradually throughout the year, therefore not all its volume is available as a source of finance. Thus, we make calculations using a higher denominator than really available, and the resulting profit is therefore lower. Sedláček (2011) notes that return on equity does not include information concerning risk of equity return. Paradoxically, high leverage (a low share of equity) generally tends to improve the indicator's value. The calculation of the indicator does not take inflation and cost of equity into account and therefore should be adjusted by claims against the owners (reduced by any liabilities) which

are long-term. When evaluating the indicator, account should be taken of these facts.

On the basis of the results of the pyramidal decomposition of ROE into partial indicators (1st, 2nd and 3rd level of decomposition) in the analysed 111 SMEs active in the analysed industry in 2015 compared to 2008, it may be stated that the profit margin had a major impact on the synthetic ROE indicator. The profit margin influenced ROE in a significant way in 76.9 per cent of the analysed SMEs. An increase in the profit margin positively affects ROE. In general, the higher the profit margin, the more positive the evaluation is.

Based on a comparison of ROE of the analysed enterprises with the mean values of ROE in the analysed industry, the identical development should be noted. The published mean ROE values result from the calculation algorithm of ROE as a ratio of net profit and equity (expressed as a percentage).

As with return on assets, the value of the median of return on equity also plummeted in 2009 compared to 2008. Subsequently, it started to grow gradually until 2011. In 2012, the values of return on equity fell (as a result of the decrease of profit and high share of equity). Then, the increase could be seen until 2015. More than 30 per cent of SMEs in our sample reported the indicator's value ranging from 11.22 to 35.20 per cent in 2015. One can say that the calculated ROE values in all analysed years replicate the mean values of the indicator.

The cyclical economic development, as noted with the ROA indicator, reflected in the ROE values. The ROE development is also affected by the economic result (i.e., the interest rates, exchange rate, bank fees, etc.) and the state tax policy as the business success is measured by the taxed profit.

The fall of the indicator is apparent in 2009. A significant improvement was recorded in 2014 and 2015, resulting from a modest decline of the tax rate from 23 per cent in 2013 to 22 per

**Tab. 4:** Mean values of return on assets in the industry of "Manufacture of machinery and equipment not elsewhere classified" (percentage)

Ratio		2008	2009	2010	2011	2012	2013	2014	2015
ROE (in %)	First quartile	-14.29	-37.86	-13.25	-10.02	-17.62	-9.31	-19.23	-10.50
	Median	7.26	0.78	4.81	7.18	4.34	4.89	8.62	11.65
	Third quartile	36.89	18.05	30.03	33.53	28.93	26.69	34.26	35.40

Source: own processing based on [www.cribis.sk](http://www.cribis.sk)



cent in 2014, as well as from the introduction of the minimal corporate income tax – the so called “tax licence”, first effective in the tax period of 2014 (it should be noted that some companies may have tried to apply some forced interventions to reduce their tax base by means of underestimation of revenues or overestimation of costs).

It is good to know that in 2015, the situation improved and the value exceeded the base year (2008) level. The growth of ROE measured by the median recorded 54 per cent in 2015 compared to 2008. The value of the first quartile of the indicator is, however, negative in all years revealing that more than a quarter of Slovak engineering enterprises did not make a profit.

The DuPont decomposition of ROE into the return on assets and equity multiplier was based on the formula:

$$\begin{aligned} \text{Return on Shareholder's Equity} &= \\ &= \text{Return on Sales} \times \text{Total Assets Turnover} \times \\ &\times \text{Equity Multiplier} = \\ &= \text{Return on Assets} \times \text{Equity Multiplier} \end{aligned} \quad (2)$$

On the basis of the results of the pyramidal decomposition of ROE in all analysed enterprises, we can state that in most enterprises (92.3 per cent), ROA is most responsible for changes in ROE. In 7.69 per cent of SMEs, the effect of equity multiplier was more significant.

The decomposition of ROE into partial ratios was also carried out using the mean values of ratios in the analysed industry. Also on the ground of the DuPont analysis of the median values in the industry, it can be confirmed that the return on assets as a partial ratio is more responsible for changes in ROE.

Consequently (in the second step of the decomposition), we assessed the effect of changes in the return on sales and total assets turnover on the changes of ROE as a synthetic

indicator for the analysed period (in 2015 compared to 2008). Based on the findings, one may conclude that the return on sales is more responsible for changes in ROE (reported by 73.1 per cent of SMEs). The third step of the decomposition focused on the effect of changes in the analytical indicators including the profit margin, interest burden and tax burden. On the basis of the results of the pyramidal decomposition of ROE, one can state that the profit margin most significantly affects changes in ROE. The profit margin indicator was most responsible for changes in ROE in 76.9 per cent of SMEs.

## Return on Sales (ROS)

Return on sales is an indicator informing about the euro sum attributable to one-euro sales. There are two alternatives of its construction – in the numerator there is EBIT or EAT alternatively. The alternative containing EBIT is appropriate to compare enterprises with variable conditions. If earnings after tax are used in the numerator, we talk about the so-called profit margin (Kislingerová, 2006). To calculate ROS, we used the operational profit in order to ensure comparability with the mean values in the industry.

The results of the empirical research show that 69 SMEs (62 per cent) in our sample of 111 SMEs reported increased return on sales in 2015 compared to 2008. On the other hand, the decline was experienced by 42 SMEs (approximately 38 per cent).

The highest values of return on sales in our sample of SMEs were achieved in 2015, 2014 and 2008. In 2009, 25 per cent of enterprises achieved the greatest negative values of ROS.

Consequently, we compared the calculated ROS values of our sample of SMEs with the mean values of ROS in the analysed industry. The published mean ROS values are calculated as a percentage of operating profit and sales.

**Tab. 5: Mean values of return on assets in the industry of “Manufacture of machinery and equipment not elsewhere classified” (percentage)**

Ratio		2008	2009	2010	2011	2012	2013	2014	2015
ROS (in %)	First quartile	-3.68	-13.15	-5.12	-2.49	-4.33	-3.86	-2.75	-0.80
	Median	2.95	1.48	2.70	2.77	2.44	2.21	3.56	4.04
	Third quartile	10.90	6.40	9.04	9.50	8.14	8.57	10.56	12.20

Source: own processing based on [www.cribis.sk](http://www.cribis.sk)

By analogy with ROA and ROE, the values of ROS also declined in 2009 compared to 2008. Over the period of 2010-2013, the development of the mean values of the indicator was stable and the mean values were rather similar. In 2014 and 2015, an increase of the mean values of ROS was recorded; its value expressed in terms of the median grew by 35 per cent in 2015 compared to 2008. The comparison of the development of the ROS values in the analysed enterprises with their mean values in the industry confirms that, during the period considered, the values of ROS exceeded the third quartile in 25 per cent of the analysed SMEs (the indicator grew by 12 per cent in 2015 compared to 2008) and its values were below the first quartile in 25 per cent of SMEs for the whole period considered (the indicator improved by 23 per cent).

As findings of the analysis showing the development of the profitability ratios (ROA, ROE and ROS) in the industry "Manufacture of machinery and equipment not elsewhere classified" demonstrate, 63.06 per cent of SMEs reported the growth of profitability in 2015 compared to 2008 (ROA 64.86 per cent, ROE 62.16 per cent, ROS 62.16 per cent of SMEs). Based on the findings, Hypothesis 1 can be confirmed.

### 3.2 Results of the Questionnaire Survey on the Identification of Factors Affecting Profitability of SMEs in the Slovak Republic in the Industry "Manufacture of Machinery and Equipment Not Elsewhere Classified"

Apart from these factors, whose influence is easy to determine, profitability of companies is also influenced by various internal and external factors, which could be only approximated or it could even be impossible to determine them, yet their influence cannot be denied (Šimberová et al., 2015).

The following part of the article presents the results of the questionnaire survey on the identification of factors affecting profitability of SMEs in the industry "Manufacture of machinery and equipment not elsewhere classified".

#### a) External factors affecting profitability of Slovak SMEs in the analysed industry

On the basis of the results of the questionnaire survey, in the second phase of the research, we identified the main factors affecting profitability of SMEs in the analysed industry. The factors were divided into two groups – external and

Tab. 6:

**External factors affecting profitability in Slovak SMEs active in the industry "Manufacture of machinery and equipment not elsewhere classified" – the Friedman test**

External factors affecting profitability of SMEs in the Slovak Republic	Value according to Friedman test
Increased demand	8.46
Sufficient appropriate suppliers	8.19
Market share	7.54
Available sources of finance	7.01
Integration into the EU	6.69
Cost of capital – interest rates	6.53
Transport infrastructure	6.08
Growth of competitive environment	5.49
Frequent changes of laws related to entrepreneurship	3.39
Insolvency of customers	3.34
Tax wedge of labour	3.28

Source: processing based on the results of the questionnaire survey

internal ones. To evaluate the answers in questionnaires, we applied the Friedman and Wilcoxon tests. By means of the Friedman test, we determined the order of individual factors according to their values assigned by enterprises; by means of the Wilcoxon test, we then found the significance of the order of factors affecting profitability of SMEs in the industry. The results of the Friedman test are shown in Tab. 6.

By means of the Friedman test, we found that SMEs in the analysed industry considered *the increased demand* (value 8.46 according to the Friedman test), *sufficient appropriate suppliers* (8.19) and *market share* (7.54) the key external factors **positively** affecting profitability. They identified *the tax wedge of labour* (value 3.28 according to the Friedman test), *insolvency of customers* (3.34) and *frequent changes of laws related to entrepreneurship* (3.39) as external factors **negatively** affecting profitability.

Thereafter, we found the order significance of the external factors affecting profitability in Slovak SMEs in the analysed industry by means of the Wilcoxon test. Tab. 7 shows the results.

One of the key factors influencing profitability in the industry is the increased demand for products. The demand for machines and equipment is currently growing mainly through constantly evolving technologies, automation and innovations. There is also a rise of the demand owing to openness of the economy and it depends only on SMEs whether they are able to turn it into an opportunity (Zapletalová, 2012). The growing demand also relates to the growing automotive industry in the Slovak Republic. In respect of demand growth, there are also other factors identified by SMEs as significant and affecting profitability – sufficient

suitable suppliers (with regard to the quality, quantity, time and price of the delivery) and the increasing market share.

SMEs view the tax wedge of labour as a significant factor having a negative impact on profitability. Recently, a number of changes in the tax area have occurred, which has had a significant influence on SMEs’ profitability. In 2008-2015, several changes of corporate income tax rate were adopted. While in 2008-2012 the corporate income tax rate was 19 per cent, in 2013, it was 23 per cent, which meant a high increase and had a significant impact on SMEs’ profitability. In 2014, the rate declined to 22 per cent remaining the same in 2015.

Since 1 January 2014, several amendments have been adopted. The tax licence was imposed on legal entities. If a taxpayer’s liability was lower than the applicable tax licence, or, if a taxpayer recognised a tax loss for the tax period, they had to pay a minimum tax of 480 euros (with an annual turnover not exceeding 500,000 euros, not registered for VAT purposes); 960 euros (with an annual turnover not exceeding 500,000 euros, registered for VAT purposes); or 2,880 euros (an annual turnover exceeding 500,000 euros). However, the tax licences were revoked with effect from 1 January 2018.

The amendment of the income tax act limited the possibility to amortize tax losses equally to no more than four consecutive years. This means that a business (a taxpayer) does not determine the amount of tax loss deduction, however, tax losses will be amortized equally, by the amount of one quarter starting as from the next accounting year.

Since 2015, other significant changes made in legislation have affected SMEs’ profitability in the analysed industry. There were introduced

Tab. 7: External factors affecting profitability in Slovak SMEs active in the industry “Manufacture of machinery and equipment not elsewhere classified”	
Order	External factors affecting profitability in Slovak SMEs – positive impact
1.	<ul style="list-style-type: none"><li>■ increased demand (8.46)</li><li>■ sufficient appropriate suppliers (8.19)</li><li>■ market share (7.54)</li></ul>
Order	External factors affecting profitability in Slovak SMEs – negative impact
1.	<ul style="list-style-type: none"><li>■ tax wedge of labour (3.28)</li><li>■ insolvency of customers (3.34)</li><li>■ frequent changes of laws related to entrepreneurship (3.39)</li></ul>

Source: own processing based on the results of the questionnaire survey

Tab. 8:

**Internal factors affecting profitability in Slovak SMEs active in the industry  
“Manufacture of machinery and equipment not elsewhere classified”  
– the Friedman test**

Internal factors affecting profitability in Slovak SMEs	Value according to the Friedman test
Profit margin	11.51
Output price	10.05
Production flexibility in terms of customers' requirements	9.28
Quality of products and services	8.86
Management style	8.85
Use of production capacity	8.68
Firm's liquidity	8.27
Firm's leverage	8.12
Organizational structure	8.07
Firm's image, goodwill	7.78
Labour productivity	7.77
Clearly defined business strategy and objectives	7.19
Effectiveness of advertising or sales promotion activities	5.43
Level of stock management	5.23
Input costs	4.89

Source: processing based on the results of the questionnaire survey

changes in assets depreciation categories and techniques. One of the most notable was the increase in the number of depreciation categories and the limited application of the accelerated depreciation, which is now possible only in two depreciation categories.

There was a change in the depreciation technique regarding the assets acquired by means of a lease. Before 2015, the assets were depreciated according to the number of months for which a lease contract was concluded and since 2015, such assets must be depreciated according to the depreciation category to which they belong. In many cases, the depreciation period has been extended, which has an effect on the amount of depreciation in a particular year.

SMEs indicated insolvency of customers as one of the major factors affecting their profitability. It is caused by customers' failure to meet the payment deadlines as well as by the underestimation of the financial risk of potential future trading partner's insolvency. The failure to pay the invoice on the due date has a large influence on firm's cash flows often resulting in secondary insolvency.

Following the findings of the empirical research and evaluation of answers in the questionnaire by means of the Friedman and Wilcoxon tests, one may conclude that the demand for the products of the analysed industry proved to be the most significant external factor affecting profitability in the industry (Hypothesis 2 was therefore confirmed).

#### **b) Internal factors affecting profitability of Slovak SMEs in the analysed industry**

The results of the questionnaire survey enabled to identify key internal factors affecting profitability of SMEs in the analysed industry. The results of the Friedman test are shown in Tab. 8.

Using the Friedman test, we found that Slovak SMEs, operating in the analysed industry “Manufacture of machinery and equipment not elsewhere classified”, considered *the profit margin* (value 11.51 according to the Friedman test), *output price* (10.05) and production flexibility in terms of customers' requirements (9.28) as key internal factors, **positively** affecting profitability. Respondents see *input costs* (value 4.89 according to the Friedman

**Tab. 9: Internal factors affecting profitability of Slovak SMEs in the industry “Manufacture of machinery and equipment not elsewhere classified”**

Order	Internal factors affecting profitability of Slovak SMEs – positive impact
1.	<ul style="list-style-type: none"> <li>profit margin (11.51)</li> <li>output price (10.05)</li> <li>production flexibility in terms of customers’ requirements (9.28)</li> </ul>
Order	Internal factors affecting profitability of Slovak SMEs – negative impact
1.	<ul style="list-style-type: none"> <li>input costs (4.89)</li> <li>level of stock management (5.23)</li> </ul>

Source: own processing based on the results of the questionnaire survey

test) and *the level of stock management* (5.23) as crucial internal factors, **negatively** influencing profitability.

Using the Wilcoxon test, we can determine the order significance of internal factors affecting profitability of Slovak SMEs in the analysed industry. Tab. 9 summarizes the results of the test.

The profit margin is viewed by respondents as the most important internal factor affecting profitability in a positive way. Apparently, in the future, businesses in the industry will have to intensify their focus on higher value-added products and challenges brought about by the fourth industrial revolution. Respondents identified paying greater attention to innovations and faster implementation of technological development into production as essential. Innovations have increasingly been regarded as a necessary condition to remain in the market and increase the market share.

SMEs also consider input costs an important internal factor affecting their profitability. Input costs of the production process in the industry particularly include material, energy, salary costs and costs of services related to the production process. The amount of input costs consequently influences the output price considered by SMEs as one of other important internal factors affecting profitability.

Material is closely related to the level of stock management also seen by SMEs as an important internal factor affecting profitability. Stock management involves planning, the analysis and control of individual stock items as well as stock as a whole. The aim of stock management is to maintain its optimal level. Stocks are a part of current assets, they tie-up capital and influence SMEs’ profitability.

On the ground of the findings of the empirical research and evaluation of answers

in questionnaires by means of the Friedman and Wilcoxon tests, we can state that the profit margin appears the most significant internal factor affecting profitability in the industry (the hypothesis 3 was therefore confirmed).

## Conclusions

The evaluation of business performance by means of profitability ratios belongs to the main activities performed by analysts involved in financial management and decision-making.

The aim of the article was to analyse and evaluate the development of profitability in Slovak small and medium-sized enterprises in the industry of mechanical engineering (SK NACE rev. 2 28xxx – Manufacture of machinery and equipment not elsewhere classified) during the period 2008-2015 and identify key external and internal factors influencing profitability of SMEs in the analysed industry over that period. The presented research results are original and unique. Any similar research focused on SMEs in the analysed industry has not been conducted in Slovakia yet.

The analysis of the selected indicators (ROA, ROE, ROS) revealed that the development of SMEs’ profitability in the industry of “Manufacture of machinery and equipment not elsewhere classified” varied over the period of 2008-2015. On the basis of the findings we can state that 63 per cent of SMEs experienced profitability growth in 2015 compared to 2008. The fact that the value of ROA almost doubled (reported 90 per cent increase) over the analysed period 2008 to 2015 (caused mainly by the 40 per cent increase in the total assets turnover) can be judged positive. The value of ROE grew by 60.4 per cent over the period considered. The findings of the pyramidal decomposition of ROE reveal that the return on assets had the most

significant effect on the changes in ROE in most enterprises (92.3 per cent of SMEs).

Years 2009 to 2010 represented a turning point when the values of profitability ratios sharply fell. This decline was also reported in the development of the mean values of the analysed ratios in the industry. It is obvious that the development of profitability ratios over the analysed period also reflected the cyclical development of the economy (impacts of the economic and financial crises in 2009 and 2010), the gradual recovery of the global economy after 2011 and recovery of industrial production in the Slovak Republic after 2012, as well as changes and a number of legislation amendments with a major impact on the profitability development in the industry. The growth of profitability in 2014 and 2015 resulted from several factors having a positive effect on the industry of mechanical engineering. The increasing demand for the products in the industry in the domestic market as well as growing exports and the entry into new markets had a primary impact. Financial injections provided by the European structural funds also helped engineering enterprises and boosted the implementation of new restructuring projects.

Applying the Friedman and Wilcoxon tests, we discovered that Slovak SMEs in the industry of "Manufacture of machinery and equipment not elsewhere classified" considered the increased demand, sufficient suitable suppliers (able to provide them with inevitable inputs in the required quantity, quality, time and price) and the growing market share the crucial external factors positively affecting their profitability. They included the tax wedge of labour, insolvency of customers and frequent changes of laws related to entrepreneurship among the key external factors negatively affecting profitability.

Based on the results of the Friedman and Wilcoxon tests, we found that Slovak SMEs, active in the industry of "Manufacture of machinery and equipment not elsewhere classified", considered the input costs and level of stock management to be key internal factors, having a negative effect on profitability; and, the profit margin, output price and production flexibility in terms of customers' requirements to be key internal factors positively influencing profitability.

A thorough analysis and knowledge of factors affecting the status quo are essential for

an adoption of qualified measures focused on the SMEs' profitability growth. The profitability analysis is an integral part of the business financial analysis. By means of it, a firm is able to reveal strengths and weaknesses of its activities. The findings of the analysis allow businesses to take measures that can help eliminate adverse developments and support processes increasing profitability and efficiency. The knowledge of factors affecting business profitability can help firms in the industry of mechanical engineering adopt efficient measures aimed at the profitability growth, increase of competitiveness and the market share.

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## Abstract

**FACTORS DETERMINING PROFITABILITY OF SMALL AND MEDIUM ENTERPRISES IN SELECTED INDUSTRY OF MECHANICAL ENGINEERING IN THE SLOVAK REPUBLIC – THE EMPIRICAL STUDY****Ľubica Lesáková, Andrea Ondrušová, Miroslava Vinczeová**

*The profitability analysis revealing factors influencing profitability becomes a very helpful tool providing guidelines for managers in their short-term as well as strategic decision-making process. To take right decisions, managers need to analyse their financial situation, especially in respect to firm's profitability and the factors influencing it. Mechanical engineering industry belongs to key industries in Slovakia. It apparently plays an essential role in the global economy, it is a source of entrepreneurship, innovations and new jobs. Many of enterprises operating in this industry are small or medium-sized. These are some of the reasons for which SMEs' profitability and ways of its improvement should draw particular attention. The paper presents results of research carried out in the selected industry of mechanical engineering of SMEs in Slovakia (SK NACE rev. 2 28xxx – Manufacture of machinery and equipment not elsewhere classified). The aim of the research is to analyse and evaluate the development of profitability in this industry during the period 2008-2015 and to identify key external and internal factors influencing profitability of SMEs over that period. In order to determine the influence of basic indicators, the DuPont pyramidal analysis was performed. Data obtained by means of the questionnaire survey enabled to identify the factors affecting profitability whose influence is impossible to calculate. The Friedman and Wilcoxon tests were used to evaluate the answers in questionnaires. Results are connected with the evaluation of three hypotheses defined in regard of the established goal of the paper.*

**Key Words:** Profitability analysis, factors determining profitability, machinery industry, small and medium enterprises, Slovak Republic.

**JEL Classification:** G30, L64, M10.

**DOI:** 10.15240/tul/001/2019-2-010