The effect of enterprise size on the profitability of sales: Evidence from the manufacturing industry in the Czech Republic

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Abstract

Competition in the manufacturing industry is of great importance; in other words. Customers have a lot to choose from. Businesses must pay more attention to the sustainability of the environment because this is currently important in the ranking of values, especially for the young generation. Of course, this is not the only thing that affects business plants, as businesses must constantly cope with the consequences of the Covid-19 pandemic or the rising prices of input materials for production. Several strategic studies have already investigated the reasons for the survival and disappearance of some companies. One of the reasons for survival is how a business can adapt to environmental changes. In the case of a slow response to the changing environment, a company in a widely represented industry can lose its competitiveness. All this has an impact on the profitability of sales of business plants. Therefore, the company asks whether the size of the company affects the profitability of the company. The contribution deals with the company's size and effect on sales profitability. The article will aim to compile a model of how much the size of the enterprise contributed to the profitability of sales in the years 2016-2020 for the manufacturing industry in the Czech Republic. The data is taken from the CRIBIS database of CRIF – Czech Credit Bureau from 2016 to 2020. Data from the manufacturing industry from active and, at the same time, profitable enterprises are selected for the paper. For the industry analysis, an empirical approach is used using an analysis of the industry structure, analysis of sales profitability and tracking the development of average profitability for the monitored period 2016-2020. It is essential to find out the structure of companies in the industry and the average profitability of sales in individual groups. The most significant representation is among small businesses with up to 25 employees, and here the average profitability for the monitored period shows the most significant fluctuations. Big enterprises with more than 500 employees are the most stable. The obtained data using correlation establishes that the size of enterprises, in terms of the number of employees, does not affect sales profitability.

Keywords: enterprise structure, profitability, profitability development, time lines, correlation

Introduction

The impact of company size on the profitability of sales in the manufacturing industry in the Czech Republic (CR) can be significant and depends on several factors. Profitability of sales, which is a measure of the profitability of an enterprise, can be affected by many different factors, including the size of the enterprise. The societal demand for answers continues to grow. The representation of business companies in the processing industry in the Czech Republic is wide, with different sizes of companies according to the number of employees (Vochozka, Krulický, 2018).

Competition in the given sector is of great importance; in other words: "customers have a lot to choose from." Businesses must pay more and more attention to environmental sustainability, as this is currently important in ranking values, especially for the young generation (Horák et al., 2022). Of course, this is only one thing that affects business plants, as businesses must constantly cope with the consequences of the Covid-19 pandemic or the rising prices of input materials for production (Kuděj, Gavurová & Rowland, 2021). Several strategic studies have already investigated the reasons for the survival and disappearance of some companies. One of the reasons for survival is how a business can adapt to environmental changes. In the case of a slow response to the changing environment, enterprise in a widely represented industry may lose its competitiveness (Paliokaitė, Pačėsa, 2015). All this has an impact on the profitability of sales of business plants, and therefore the enterprise asks whether the size of the enterprise affects the profitability of the enterprise (Psárska, Hašková & Machová, 2019). The concept of firm size is a significant topic in marketing and strategic management, as it provides information about the variety and size of a company's production capacity and skills or the number and variety of goods and services it can provide to customers. At the same time, it is also a variable that helps to classify companies and can be measured mainly from the number of employees or the company's turnover (Decouré et al., 2020). Shaheen, Malik (2012) state that an increase in firm size can improve performance. The company's equity shows whether the business is large or small. Companies with significant total assets will use available resources to the maximum extent to achieve maximum business profit, and small businesses will, of course, generate profits as well, but by their resources (Hirdinis, 2019). When analyzing the company's financial situation, it is worth following indicators of profitability of sales. When managers know their results, they get information on whether the sale is profitable and to what extent the realized margin covers fixed and variable costs. Business managers are looking for solutions that will help increase sales and sales revenue and reduce costs. One of the popular methods to achieve such results is a joint procedure within the group purchasing organization (Zimon, 2019).

Factors that affect firm value include firm size, capital structure, profitability, sales, and liquidity, while equity value represents firm value. Using a quantitative method, Nguyen, Tan & Nguyen (2021) first found that firm size has the most tremendous significance for firm value. This refers to the fact that the value of a large firm has a higher rank than that of a small firm. On the other hand, the capital structure hurts the firm's value.

Furthermore, Nguyen, Tan & Nguyen (2021) found that the other independent variables (profitability, sales and liquidity) were statistically insignificant in the regression model. This means that these mentioned factors do not affect the company's value. Nguyen, Tan & Nguyen (2021) also suggest that firm size and capital structure determine firm value. Signalling theory deals with the investigation of the value of the company and the factors affecting it. These factors are debt policy, asset structure, firm size, and profitability. In the studies conducted, the authors came up with different findings. Lusy et al. (2018) found that capital structure positively affects profitability. Hossain (2016) found that firm size does not affect profitability. Chen, Chen (2011) found that capital structure negatively affects firm value from the perspective of managerial ownership, firm size, and profitability. In many countries, several researches dealing with the influence of the capital structure on the profitability of companies have already been carried out, which brought different findings. The culprits in the different results can be found in the samples used, namely different countries, sectors, companies or periods, nevertheless also in the profitability measures used, such as ROA, ROE, ROI and others (Hossain, 2016). Nguyen Nguyen (2020) found that the determinants include firm size, liquidity, solvency, financial leverage and financial adequacy, while financial performance is assessed using three different indicators: return on assets (ROA), return on equity (ROE) and return on sales (ROS). Nguyen, Nguyen (2020) found that (1) firm size has a positive effect on both ROA and ROS, especially on ROA, but has an opposite effect on ROE, (2) the adequacy ratio has a positive effect on ROA and ROS, but a negative effect on ROE, (3) financial leverage has a significantly negative effect on ROE and ROS, but positive on ROA, (4) liquidity has a positive effect on both ROA and ROE, but negative on ROS, and (5) solvency has a positive effect on ROA and ROS, but negative on ROE. Milenkovic et al. also agree with this. (2020) investigated how internal factors such as firm size, sales growth, financial leverage, proportion of fixed assets, lagged profitability, and inventory level affect the analysed firms' return on assets (ROA) over a given period. The methodological framework includes diagnostic tests to eliminate the potential problem of multicollinearity, heteroskedasticity, and autocorrelation, as well as model specification and validation. Using an OLS model, we show that these factors significantly affect profitability, except for sales growth. Milenkovic et al. (2020) revealed that company size and lagged profitability positively affect ROA, while sales growth, financial leverage, fixed assets ratio, inventory level, and a dummy variable hurt profitability in the observed period.

The size of a business can be understood as the number of assets it owns. Companies considered significant try to acquire, develop, use, maintain and disclose strategic resources to the maximum extent. The firm's size is represented by its total assets, amount of sales, average total sales, average total assets and others (Budisaptorini, Chandrarin & Asih, 2019).

In this article, an analysis of enterprise in the active and profitable processing industry in the Czech Republic will be carried out for the observed period 2016-2020, where the size of the enterprises from the point of view of the number of employees and the profitability of sales will be monitored. The article will aim to compile a model of how much the size of the enterprise contributed to the profitability of sales in the years 2016-2020 for the

manufacturing industry in the Czech Republic. One research question is defined to fulfil the stated objective:

• How does enterprise size affect the profitability of sales in the manufacturing industry in the Czech Republic in 2016-2020?

The article is divided into the following parts: the literature review, which contains references to research by prominent experts on the topic. The methodology, which is in the methods and data section, describes the data and methods used, in this paper, the profitability of sales and the corelation analysis will be used, which will then be evaluated using Excel. In the results section, the achieved results calculated using the mentioned methods will be presented. The discussion of the results, which is in the discussion section, will in turn answer the research question and also compare the results with other authors and finally summarize the findings (in conclusion section) and if necessary, write various recommendations.

Literature review

Firm size can be understood as a measure or variable that describes the size of enterprise based on factors. These factors are total assets, market value, total sales, total income, total capital, etc. The enterprise's size is the average total net sales for a year to several years (Zuntová, Kučera, 2020). The size of the enterprise can also affect its performance. This is mainly because large companies have broader views and can use their resources, allowing them to better adapt to the environment. Therefore, large companies also have more significant opportunities to generate profits than small ones (Sudiyatno, 2020). Due to unstable micro- and macro-economic conditions and increasing competition, companies need help achieving the required profitability (Korneta, 2019). Hardiness (2019) showed that the capital structure does not affect the company's profitability but has a positive effect on the firm's value, which is positively influenced by the company's size. The results were achieved thanks to the significance test of individual parameters and the individual significance test (Hirdinis, 2019). Wang, Johnson & Wang (2018) found strong evidence that a firm's location affects its capital structure. Sikveland, Zhang (2020), in turn, say that capital structure is represented by long-term and short-term debt, total debt and liquidity. The optimal capital structure that maximizes enterprise value is determined by a trade-off between high operating efficiency and low cost of capital (Vo, 2021). Other authors also dealt with the relationship between company size, profitability, and value. Using multiple regression and correlation methods, Niresh, Velnampy (2014) concluded that the positive relationship between size indicators and profitability in a sample of manufacturing firms is weak. Manoppo, Arie (2016) concluded that for the studied companies in the automotive industry, firm size positively affects firm value. A company's profitability is the ability to generate profit and thus measure the operational efficiency of assets. It is also one factor that affects the company's value. The measure of profitability in (Sacuahi et al., 2016) is the return on equity (ROE), through which, using e Tomin's Q, they concluded that profitability has a significant positive effect on firm value.

Determinants of profitability are addressed by empirical research focusing on different industries, regions and periods. According to this research, profitable firms can be considered the engine of any economy's healthy growth (Kumar et al., 2022). In emerging markets, for-profit firms have a significant role, depending on stakeholders and firm performance (Cheong et al., 2020). Devi, Devi (2014) identified determinants of corporate profitability in Pakistan. At the same time, the results showed a positive correlation between firm size and profitability and a negative correlation between capital structure and profitability. Working capital management (WCM) is one of the most critical issues in financial management and plays an essential role in increasing the profitability of a business. Liu, Xu (2019) revealed that after controlling for company characteristics and macroeconomic conditions, the maturity deferral cycle positively impacts firm profitability as measured by return on assets (ROA). Liu, Xu (2019) further confirm the convex quadratic relationship between the receivables collection cycle and ROA. Furthermore, they found a positive relationship between firm size and sales growth and ROA and a negative relationship between firm leverage and ROA. This article determines the requirements for an effective WCM to maximise the analysed enterprises' profitability.

In their paper, Fuertes-Callen, Cuellar-Fernandez (2019) found that in the short run, growth positively impacts profits, with the effect of profits on growth depending on the growth rate used. Thus, employee growth requires prior profit, but profit does not play a significant role as a determinant of sales growth. The rate of profit persists in the short run. In contrast, the reversibility of the employee turnover rate and growth rate is observed. The moderation analysis used shows that the strategy that has enabled firms to grow is exporting. In addition, the effect of export intensity on profitability during the economic crisis is obtained indirectly through the growth of sales and employees. Contrary to expectations, innovation effort does not moderate the relationship between profitability and firm growth. In an analysis using empirical research, it has been found for manufacturing firms in Belgium, France and others that size and leverage have an inverse relationship with profitability. In contrast, market share and liquidity positive have an impact (Goddard et al., 2006). Qureshi, Youssaf (2014) concluded that leverage was inversely associated with size and that liquidity, growth and capital intensity were positively associated with profitability. Investigating the determinants of profitability in Turkish firms found that leverage is inversely related, while profitability is positively related to liquidity and size (Akben-Selcuk, 2016). In addition to the relationship between growth and size, the relationship between growth and profitability is also examined. The relationship between growth and profitability is positive if the business environment has the potential for investment and growth. If this potential exists, the relationship between growth and profitability could be more robust (Suntraruk et al., 2018). Nakano, Kim (2011) found that current profits significantly determine future growth in Japanese manufacturing companies. Coad (2007) revealed a link between corporate growth and profitability in French manufacturing firms. Gibrat's Law contrasts with empirical studies and states that the growth rate of companies is independent of their size. This claim is supported by Geroski et al. (2002), who investigated the relationship between growth and

size over a significant period. At the same time, he states that this Law tended to apply to large British companies. Gibrat's Law is also confirmed by the study of Liñares-Zegarra, Wilson (2018), who revealed an insignificant relationship between growth and company size for large microfinance institutions from 120 countries. On the other hand, Olivier, Fortunato (2006) argued against Gibrat's Law, as they found an inverse relationship between growth and size in Portuguese manufacturing companies. Distante et al. (2018) also disagreed with Gibrat's Law. Using quantile regression analysis, they concluded that smaller firms grow faster than larger ones. One of the most modern techniques, the panel data technique, can also help to determine the effect of company size on profitability. Through this method, Kartikasari, Merianti (2016) found that leverage and firm size significantly affect profitability simultaneously for manufacturing companies in Indonesia. Akinyomi, Olagunju (2013) found that in Nigerian manufacturing firms using panel data, firm size, as expressed by total assets, positively affects profitability.

The side effect is the negative relationship between firm size and expected returns. New research debates whether the size effect still exists today (Li et al., 2021). Schwert (2003) reports that the effect of size and value disappeared after the publication of studies investigating them. Ciliberti et al. (2017) further state that the size effect is still significant in the case of quality control. Hou, van Dijk (2019) found that the size effect existed significantly in advanced Europe before the 1980s and disappeared. They further report that although the size effect has disappeared from (ex-post) realized returns, it is still robust to (ex-ante) expected returns. On the contrary, Camska, Klecka & Scholleova (2022) verified the industry's sensitivity to changes in production volume (sales). Confirmation of sensitivity is not based on data describing an economic downturn but on persistent internal industry factors. Internal factors consider the dependence of costs on changes in the amount of production produced. An ex-ante analysis would reveal why some sectors are more vulnerable than others to a significant disruption to the economy. This has a severe impact on the performance of the industry and the competitiveness of businesses. The investigated sensitivity will be expressed by the degree of operating lever (DOL) indicator. The assumption being tested should classify neutral industries as low-sensitivity industries and cyclical industries as high-sensitivity industries. The research is based on data from more than 1,000 companies belonging to four industries. Cyclical industries are represented by CZ-NACE 29, which manufactures motor vehicles, trailers and semi-trailers and CZ-NACE H Transport and Storage. Neutral sectors are symbolized by CZ-NACE 10 Production of food products CZ-NACE 20 Production of chemical substances and preparations. The conclusions of the research are not conclusive, as the original assumptions were not confirmed and, using the DOL, significant differences between cyclical and neutral industries were not unexpectedly found. Camska, Klecka, and Scholleova (2022) show that the investigated issue is more complex and that the observed economic environment remains unstable even during macroeconomic stability. Kučera, Tichá (2022) analyzed how Czech car manufacturers dealt with the COVID-19 pandemic. Included are data on manufacturing companies taken from the Cribis database of CRIF - Czech Credit Bureau a.s., specifically data on ŠKODA AUTO a.s., Hyundai Motor Manufacturing Czech s.r.o. and Toyota Motor Manufacturing Czech Republic s.r.o.

Subsequently, the research includes economic results, ROS (return on sales) and indebtedness calculated about the above companies for 2019-2020. Kučera and Tichá (2022) found that car manufacturers had more significant losses during the COVID-19 pandemic than in the previous year. In addition, they took on more debt in 2020 and had a lower return on sales than in 2019.

In his article, Zimon (2019) analyzes the profitability of sales on the example of 31 business enterprises operating in industry group purchasing organizations and 19 enterprises operating independently on the market. The research period they have included the years 2013-2015. Selected indicators of the ratio analysis and information from the preliminary analysis were used for the research. Zimon (2019) found that operating within industry group purchasing organizations allows businesses to achieve a positive economic outcome. In the case of companies operating on the market independently, a large part of them suffered a loss. The profitability of sales in the investigated groups is influenced by the size of the company, its location and the share of fixed costs. When analyzing the results, companies operating in groups achieved higher results than independent entities. Small units operating in groups with an annual turnover of PLN 15-20 million (USD 3.6-4.8 million) achieve the best results. Parsa (2020), on the other hand, used a panel analysis to examine the effect of receivables, inventories, liabilities, company size, sales growth, GDP growth and inflation rate on the profitability of Croatian manufacturing SMEs in six years (2010-2015). The model confirmed the effect of inventory, payables and sales growth on the company's profitability level. In contrast, the effect of receivables and company size on the company's profitability was not confirmed, thus partially confirming the primary working hypothesis. The control variables, GDP and inflation, were not statistically significant. Parsa (2020) found that manufacturing businesses can increase profitability by avoiding late payments to suppliers and increasing inventory turnover, i.e. holding inventory for as short as possible. In addition, businesses can increase their profitability by increasing sales growth.

Methods and Data

The input data required for the analysis will be taken from the CRIBIS database of CRIF – Czech Credit Bureau. This database contains data of individual companies of the given industry: complete financial statements, e.g., balance sheet or profit and loss statement, and other financial data. The database also contains non-financial data about companies, such as the number of employees or turnover, identification number, VAT number, and place of business. The data needed for the analysis will be from active and, at the same time, profitable companies operating in the manufacturing industry. According to the CZ NACE classification of economic activities, this is section "C" (manufacturing industry). The data used will be for the period 2016-2020.

In the legal phase of the work, I will modify the relevant table in Excel for my needs. So, first, I will clear the lines in which the companies are already inactive or in liquidation. In

the next step, the table will be cleaned of companies that report zero profits or losses and companies whose financial result line is empty. Only necessary columns will be left in the table, namely: Company ID number, name of the enterprise, category of employees, year and return on sales (ROS). ROS is a helpful tool for measuring, analyzing and planning the financial performance of a business, especially in terms of its ability to generate profit relative to its sales. The table modified this way will be copied, and the resulting sheets will only have values for one observed year. The created sheets will therefore read SHEET 1 – 2016, SHEET 2 – 2017, SHEET 3 – 2018, SHEET 4 – 2019, and SHEET 5 – 2020.

Subsequently, the rows of the individual sheets will be cleaned by rows where data is missing in the number of employees column or the return on sales (ROS) column. Table 1 below reflects the subsequent division of companies into groups according to the number of employees I will base my work on. Small-sized enterprises has less than 25 employees. Middle-sized enterprises have from 25 to 499 employees and other side Big-sized enterprises has 500 and more employees.

After evaluating the representation of business plants in individual categories for 2016-2020, the data presented in table 2 will be displayed for all years. This will also be shown below in graph 1.

An analysis of the profitability of sales will be carried out in the relevant groups. The average sales profitability for each year in each group of business plants will be determined. Furthermore, the profitability of the maximum and minimum sales will be determined in a given year and group of companies. Excel's average, min and max functions will also be helpful for this. The determined average, minimum and maximum values will be presented in clear tables divided by monitored groups and years 2016-2020.

By analysing the time series, we will determine the profitability of the average sales in individual groups for the monitored period 2016-2020. This will then be shown in a graph for a better overview.

Correlation analysis will determine how the enterprise's size and the sales' profitability influence each other. To determine the individual correlation coefficients for groups of companies for the monitored years, the CORREL function in Excel will be used. A correlation function is a statistical concept that measures the degree of correlation between two variables. This method allows us to express whether and how strongly two variables are related. The correlation function is essential in data analysis, whether scientific research, economic analysis, or social studies because it helps us understand patterns and relationships between different variables. Separate groups of enterprises will be assigned the values in the table's newly created column, shown in the following table 2.

After assigning individual values, a correlation analysis will be performed. For matrix one, the size of enterprises will be used in different years, and for matrix two, the sales profitability values will be used. The detected data will be shown in a table.

Results

The number of companies in the manufacturing industry for the particular periods from 2016 to 2020 was determined from the data set using the above criteria. The number function was used to determine the number of companies in a given year with the help of Excel software from Microsoft. Subsequently, using a filter, the companies were divided into individual groups according to size, into small, medium and large. Table 3 reflects the total number of enterprises included in the analysis and the division of these enterprises in individual years into groups by size.

Table 1: Distribution of enterprises by size

Year	Total number of businesses	Groups	Number of business in a group
2016	10 520	Small-sized	6 638
		Middle-sized	3 603
		Large-sized	279
2017	11 090	Small-sized	6 930
		Middle-sized	3 817
		Large-sized	343
2018	11 213	Small-sized	7 066
		Middle-sized	3 827
		Large-sized	320
2019	10 316	Small-sized	6 422
		Middle-sized	3 584
		Large-sized	310
2020	7 821	Small-sized	4 505
		Middle-sized	3 067
		Large-sized	249

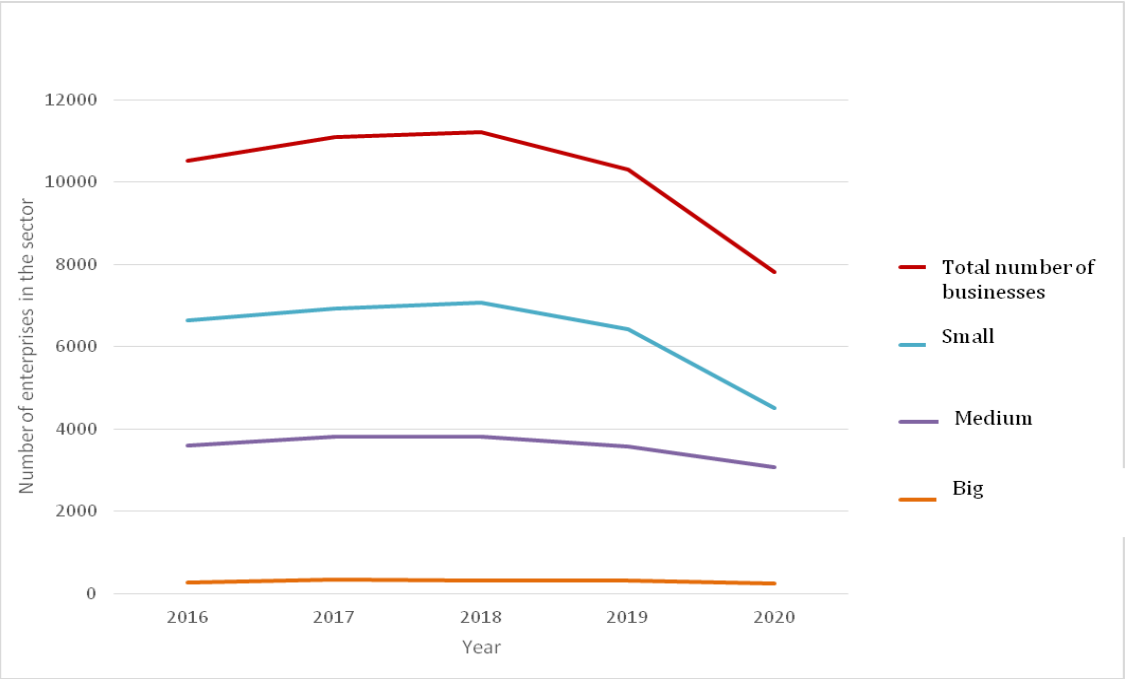
Source: Own processing based on data from the CRIBIS database.

The table shows an increase in the total number of enterprises in the given sector. Towards the end of the monitored period, i.e. in 2019 and 2020, these numbers began to decrease. The highest number of enterprises meeting the required criteria for inclusion in the analysis was in 2018 when the total number of enterprises in the sector was 11,213.

The time series analysis concluded that small businesses are the most represented in the manufacturing industry, i.e., businesses with a maximum number of employees of up to 24 people. On the contrary, big enterprises are the least represented group in the sector, with employees exceeding 500 people.

In figure 1, we can observe the development trend of the total number of enterprises. In addition to the total number of enterprises in the sector, the graph also shows individual groups of enterprises.

Figure 1: The development trend of the number of enterprises in the sector



Source: Own processing based on data from the CRIBIS database.

The next step was determining the profitability of the average, minimum and maximum sales for individual groups for the monitored years 2016-2020. A function in the Excel software was used to determine the necessary average values, namely the average for all enterprises in a given group and year. To determine the minimum and maximum value of sales profitability, functions were also used in Excel, namely min and max. The values for 2016 for individual groups are shown in Table 2.

Table 2: Return of Sales in 2016

Enterprise size	Average Return of Sales	Minimal Return of Sales	Maximal Return of Sales
Small-sized enterprise	0,49	-2,79	2191,20
Middle-sized enterprise	0,09	-0,08	8,95
Big-sized enterprise	0,10	-0,003	3,49

Source: Own processing based on data from the CRIBIS database.

The average sales profitability in 2016 was the largest for small businesses when it reached a value of 0.49. The same was the case with the minimum and maximum profitability of sales. The lowest average profitability was for medium-sized enterprises when the value was 0.09. For big enterprises, the value was only one-hundredth higher, i.e. 0.1.

Table 3 shows the determined values of the average profitability of sales, the minimum profitability of sales and the maximum profitability of sales for the year 2017 for individual groups of enterprises according to size in terms of the number of employees.

Table 3: Return of Sales in 2017

Enterprise size	Average Return of Sales	Minimal Return of Sales	Maximal Return of Sales
Small-sized enterprise	0,19	-24,31	208,00
Middle-sized enterprise	0,09	-0,41	22,64
Big-sized enterprise	0,07	-0,10	0,48

Source: Own processing based on data from the CRIBIS database.

As in the previous year, average profitability for 2017 was highest among small businesses. Here the differences are no longer so significant, as the value was 0.09 for medium-sized enterprises and 0.07 for big enterprises.

Table 4 reflects the established average, minimum and maximum sales profitability for groups of companies for 2018.

Table 4: Return of Sales in 2018

Enterprise size	Average Return of Sales	Minimal Return of Sales	Maximal Return of Sales
Small-sized enterprise	0,33	-5	777
Middle-sized enterprise	0,20	-0,15	458,34
Big-sized enterprise	0,07	-0,01	0,46

Source: own processing based on data from the CRIBIS database.

Even in 2018, small businesses hold the highest rank in the form of average profitability; here, the average value is 0.33. Big enterprises are again characterised by the lowest average return on sales, where the average value remains the same as in the previous year, i.e. 0.07.

The values of average profitability of sales, minimum profitability and maximum profitability for 2019 are shown in Table 5 below.

Table 5: Return of Sales in 2019

Enterprise size	Average Return of Sales	Minimal Return of Sales	Maximal Return of Sales
Small-sized enterprise	0,50	-10,57	1033
Middle-sized enterprise	0,08	-0,43	0,82
Big-sized enterprise	0,07	-0,02	1,14

Source: Own processing based on data from the CRIBIS database.

2019 the highest difference between the values can be seen in the average profitability. Here, too, small businesses have the highest average return on sales, with a value of 0.5. Big enterprises achieve the lowest average return on sales, by only one-hundredth of the

value compared to medium-sized enterprises. Large businesses show an average return on sales of 0.07.

The average, minimum and maximum sales profitability values for the last monitored year are shown in Table 6.

Table 6: Return of Sales in 2020

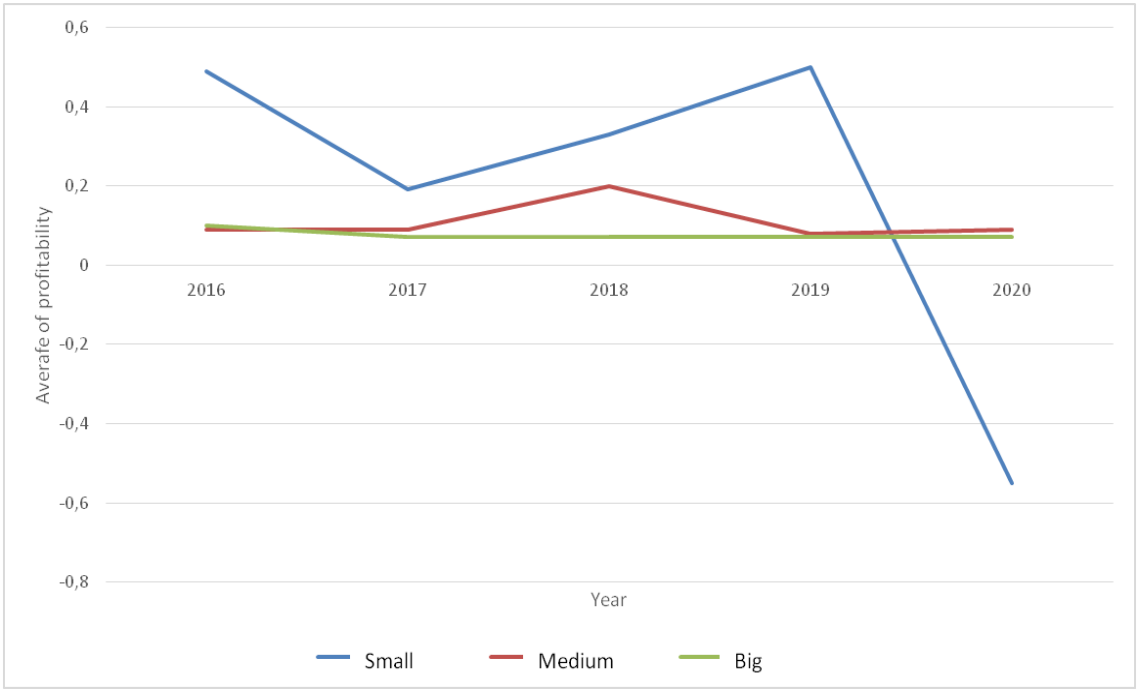
Enterprise size	Average Return of Sales	Minimal Return of Sales	Maximal Return of Sales
Small-sized enterprise	-0,55	-3 248,32	95,55
Middle-sized enterprise	0,09	-0,41	5,84
Big-sized enterprise	0,07	-0,004	0,43

Source: Own processing based on data from the CRIBIS database.

In the last monitored year, i.e. 2020, the average profitability reached the most significant difference. Small businesses show a negative average profitability value of -0.55. On the contrary, medium-sized enterprises in 2020 showed the highest average return on sales, with a value of 0.09.

Figure 2 clearly shows the development of the profitability of the average sales for individual groups of companies for the entire monitored period 2016-2020.

Figure 2: Development of average profitability



Source: Own processing based on data from the CRIBIS database.

By analysing the time series of average profitability for individual groups of companies, we obtained its clear development, shown in figure 2. Large companies maintained a

constant level of average sales profitability throughout the monitored period. Conversely, small businesses are characterised by the highest value fluctuations.

The next step was the processing of the correlation analysis. In 2016-2019, the correlation coefficient values range slightly below zero, i.e. up to a maximum of -0.02. Only in 2020 did the value of the correlation coefficient rise very slightly above 0, i.e. to a value of 0.01. Based on the above, the enterprise's size does not affect the profitability of the sales of the monitored manufacturing industry companies in the period 2016-2020. In correlation analysis, a value of -0.01 indicates almost no linear correlation between two variables, while a value of -0.02 needs to be revised. A value of 0.01 is also almost zero correlation but positive. All these values indicate no solid linear relationship between the variables. When correlation coefficient values are close to zero (either positive or negative), it means that changes in one variable are not linearly related to changes in the other variable. This does not mean there is no relationship between them, but that relationship is beyond the reach of linear correlation and may be more complex or non-linear. If the correlation coefficient is near zero (not values close to -1 or +1), no significant linear relationship is observed between the variables. This means that changes in one variable are not predictable or correlated with changes in the other variable based on a linear model.

Discussion

The thesis aimed to compile a model of how much the company's size contributed to the profitability of sales in the years 2016-2020 for the manufacturing industry in the Czech Republic.

The input data needed for the analysis was taken from the CRIBIS database of CRIF – Czech Credit Bureau. This database contains data of individual companies of the given industry: complete financial statements, e.g., balance sheet or profit and loss statement, and other financial data. First, the table in the Excel file was edited, where the rows containing inactive or liquidation companies were cleaned. In the next step, the table was cleaned of companies that reported zero profits or losses and companies whose financial result line was empty. The resulting table was copied, and the values for only one observed year were left on the resulting sheets. So the created sheets were: SHEET 1-2016; LETTER 2-2017; LETTER 3-2018; LETTER 4-2019; and LETTER 5-2020. Subsequently, the rows of the individual sheets were cleaned for rows where data was missing in the number of employees column or the profitability of sales (ROS) column. Then, the representation of business plants in individual categories was evaluated for the monitored years 2016-2020.

An analysis of sales profitability was then carried out in the relevant groups, where the average profitability of sales for each year in each group of business plants was determined. The maximum and minimum profitability of sales in a given year and group of companies was also determined. The average, min and max functions in Excel were also used for these purposes. Time series analysis was used to determine the development of

the average sales profitability in individual groups for the monitored period 2016-2020. Correlation analysis was used for these purposes. After assigning individual values, a correlation analysis was performed. For matrix one, the size of enterprises was used in individual years; for matrix two, the sales profitability values were used.

One research question was defined to fulfil the stated objective:

RQ1: How does enterprise size affect the profitability of sales in the manufacturing industry in the Czech Republic in 2016-2020?

Based on the sales profitability analysis, it was found that small businesses are characterised by the most significant fluctuations in sales profitability. On the contrary, big enterprises show a constant level of sales profitability for the entire monitored period. Medium-sized enterprises showed a change in the profitability of the average sales only in 2018. Otherwise, they also more or less maintained their level.

Based on the performed correlation analysis, when the values of the correlation coefficient first moved slightly below zero, and in the last monitored year very slightly above the value of 0, it can be stated that the size of the companies included in the analysis does not affect the profitability of sales.

The company's size can affect the profitability of sales in the manufacturing industry in the Czech Republic. However, it should be noted that many factors, such as industry, competitive environment, business strategy, etc., can influence the effect of business size on profitability. Overall, the effect of business size on sales profitability is complex and depends on many factors. Some large firms may have high profitability due to economies of scale, while smaller firms may achieve high profitability due to specialization and innovation. Different businesses may have different strategies, costs, market positions, and external influences that can influence how size affects their profitability. The effect of company size on the profitability of sales in the manufacturing industry in the Czech Republic depends on the interaction of these factors and specific circumstances. Each business may have specific strategies, competitive advantages, and production practices that will determine how size affects its profitability.

Several authors, such as Hossain, Imran (2016), Chen, Chen (2011) and Hirdinis (2019), investigated the size of the enterprise depending on the overall profitability. In contrast to them, this paper was focused directly on the profitability of sales. Devi, Devi (2014) proved that there is a positive correlation between firm size and profitability for Pakistani firms. This paper is more inclined to the opinion of Niresh, Aloy & Velnampy (2014), who, using correlation analysis, concluded that the relationship between size and profitability in manufacturing firms is very weak.

Conclusion

The enterprise wants answers to the questions: What is the structure of enterprises in the processing industry in the Czech Republic? Does the size of the business affect the profitability of the enterprise? This work showed that the manufacturing industry

between 2016-2020 was made up mainly of small and medium-sized enterprises in terms of the number of employees. On the contrary, big enterprises make up only a tiny percentage, whereas a large enterprise is defined as an enterprise with 500 or more employees. Based on the analysis of the average profitability of sales and correlation analysis, it was found that the size of the enterprise in terms of the number of employees does not affect the profitability of sales. Small businesses show large fluctuations in the average profitability of sales; however, large companies are constant throughout. This also shows that small businesses are very susceptible to change. Large companies, on the other hand, are more flexible in the face of changes, such as the coronavirus pandemic or rising prices.

This work will benefit new entrants to the manufacturing industry in the Czech Republic, as it will provide them with information on the total number of companies in the industry and the structure of the companies. It will also provide information on the average profitability in individual groups from the point of view of sales profitability. It will also benefit already existing business plants in the processing industry, as it provides them with just how much competition there is in their category regarding the number of employees. The thesis aimed to compile a model of how much the company's size contributed to the profitability of sales in the years 2016-2020 for the manufacturing industry in the Czech Republic. To meet the set goal, two research questions were defined: How large was the representation of companies in groups according to the number of employees in the manufacturing industry in the Czech Republic in the years 2016-2020? How did the size of the company affect the profitability of sales in the processing industry in the Czech Republic in 2016-2020? In the results chapter, individual groups of enterprises were analyzed in 2016-2020, whose development was also demonstrated by the created graph. The most significant representation is among small businesses with up to 25 employees. Furthermore, the profitability of the average sales was calculated in individual years, and the profitability of the minimum and maximum sales for individual groups was determined. The average profitability of small businesses was the most fluctuating. On the contrary, the most stable average profitability was for large enterprises. The last step was determining whether the business plant's size affects sales profitability. Based on the achieved values, the company's size in terms of the number of employees does not affect the sales profitability.

The benefit of the work is found mainly for new companies entering the industry in the Czech Republic, as this contribution provides information about the structure of companies. Furthermore, it is also for companies already operating in the sector, which provides a basic overview of the number of competitors in the processing industry. The limit of work is found in the missing data for many enterprises, which had to be excluded from the analysis as a result. In this work, business plants in the manufacturing industry were analyzed as a whole; further, the work could only deal with one of the groups according to the NACE code in the manufacturing industry or deal with the division of companies by region in the Czech Republic, which would provide a more specific overview of the competition and the development of profitability in a specific location.

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