

Influence of sales and value added on earnings in the transport and warehousing sectors

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Abstract. Within the paper submitted, the author seeks the perspective for an investor, entrepreneur or anybody who does or plans to do business in the sector of transportation and warehousing and might need a method to determine the impact of sales and value added on earnings. The data are classified according to the CZ NACE coding for the transport and warehousing sectors. The complete data from the accounting records in the given field for the years 2016-2020 are selected. The mutual relationship of both parameters is determined using correlation. According to the results, in individual years, the correlation of both parameters and earnings differs, with each parameter showing a different impact on earnings in terms of individual years, type of company or region in which a given company operates. Overall, however, the research can be influenced by the given data, which need to be processed in more detail for possible further investigation of the given issue. The data were divided into parameters of individual years, regions, and the type of legal person.

Key words: Correlation, relevance, impact, field, data, transport, warehousing

1 Introduction

Transportation and warehousing play an irreplaceable role in the current world where goods and products are transported between different countries and even continents. There are many companies dealing with the issues of transportation and warehousing. Currently, these issues are referred to as logistics [1].

In recent years, there has been a very strong competitive pressure, with increasing customer demands for improved quality of services, speed of transport, and price. On the other hand, there are many factors that represent obstacles for logistic companies, including the receding Covid-19 pandemic, lack of qualified workforce, pressure to digitize and automate various processes, as well as the enormous increase in basic inputs. All these external factors have a significant impact on the earnings of companies. More than ever, these companies need to focus on their competitiveness, the ability to improve their performance and efficiency.

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To answer these questions, senior managers need to be able to measure and compare results from various periods to track the achievement of business and economic goals. In evaluating the results, transportation and warehousing companies in general focus on using common financial analysis ratios, including profitability, debt, liquidity and the total assets, which express the earnings of a given company but primarily from a managerial and economic perspective. Accounting income and the derived indicators of classical financial performance may not be dependent on the creation of value for owners and investors. One of the main goals of companies in general is increasing the market value of the company over a longer period. This growth or decline can be measured using a number of methods where one of the most suitable ones is monitoring the so-called value added. Profitability analysis is an integral part of financial analysis of a company. Profit is one of the most commonly used indicators of business performance and is used to evaluate its historical performance. Due to their importance, it examines how the available information on company's profit can be used to increase profitability [2].

Given that especially in the transportation and warehousing sectors, the monitoring of value added could be neglected due to the monitoring of traditional accounting indicators, this paper focuses on analysing the impact of sales and value added on earnings.

This paper analyses the relationship between sales and earnings as well as the relationship between value added and earnings. These relationships are analysed for the current financial year in the transportation and warehousing sectors. The goal of the paper is thus to determine the appropriate profitability of the above ratios.

To achieve the goal of the paper, the following two research questions need to be answered:

- How do sales influence earnings in the transportation and warehousing sectors in the years 2016-2020?
- How does added value influence earnings in the transportation and warehousing sectors in the years 2016-2020?

2 Literature research

The evaluation of the success rate of companies in the selected sectors in the Czech Republic is closely related to the impact of the global financial and economic crisis which has also significantly affected the competitiveness of Czech companies [3]. Business success and value are complex concepts and the determination of the value of a business is conditioned by many internal and external factors that need to be considered in the evaluation [4]. One of the basic indicators is the earnings for a monitored period. Earnings are affected by a number of indicators that can be found in the financial statements, with the basic ones being sales and costs, which are further divided into other categories and sub-levels [5].

One of the fundamental sub-levels are sales. Sales refer to the basic information necessary for the calculation of profit or loss of a given accounting unit [6]. From an accounting perspective, sales are classified clearly. In some cases, problems may arise in the identification of sales and income from ordinary activities. This is one of the basic problems of financial accounting, as sales and income from ordinary activities determine earnings [7]. Sales determine revenues and represent one of the basic financial resources, which are then used to cover the expenditures and taxes of a given company. Especially in the industry, transport or trade sectors, sales are one of the main components of profit. Sales are determined by many internal and external factors, including e.g., the structure of the product mix in trading companies, production capacity in manufacturing companies, labour force capacity, or changes in the exchange rates in transport companies [8].

Earnings are also influenced by value added. There is a difference between so-called economic value added and book value added. One of the modern tools for evaluating business

performance that has been recently paid great attention to is economic value added - EVA. The reported profit of any business has a very strong impact on the various business activities and decisions that the management of the company must make. The objective of earnings management is to report earnings in the amount required by the management of the company. Earnings management uses some creative accounting techniques [9]. EVA Equity is a difference between the return on equity and the opportunity costs of equity multiplied by the value of equity. This indicator is not only used to evaluate the company's ability to generate value for shareholders, but also to measure its success in the market, especially in global capital markets [10].

In contrast, book value added represents the difference between the value of a product and sales and the consumption within the production. In other words, the so-called book value added refers to the estimated difference between the production costs and output [11].

The amount of added value is a very important factor that predetermines the amount of net profit of a given company. The value added generated by a given company is used to cover wages, depreciation, repayment of loans and interest on these loans. The remaining amount then represents the net profit. Its amount is an important factor that influences profit or loss in earnings [12].

For manufacturing companies, it is important to maximize the use of production resources and optimize the production process in terms of production costs and time. Transportation plays an increasingly important role in the integrated logistics management of semi-finished products and component flows [13]. Sustainable transport management monitors two aspects of the issue – direct energy consumption of means of transport and indirect costs of resources. The issue of sustainable transport is considered a logical continuation of the sustainable development initiated by the UN General Assembly [14]. The problem may have risen in recent years, e.g., in public transport where transport authorities all over the world have reported about 95% decrease in the number of public transport users during the peak of the COVID-19 pandemic, along with a decrease in the revenues from fare boxes and additional costs of disinfection and implementation of the measures concerning physical distance [15].

Freight transport is showing a very clear shift towards eco-friendly means of transport [16]. In the long run, the development and modernization of various means of transport should not harm the environment [17], which has an impact on the costs of transport companies. There is still a characteristic dilemma between the economic efficiency of transport and transport services on the one side and political objectives on the other side [18].

Warehousing plays an important role in logistics and supply chain, with the operating costs accounting for more than 20 % of the overall costs of companies, which leads to the need for optimizing warehousing in order to reduce costs and increase profit. The objective of the transportation and logistics sectors is to reduce the costs associated with the distribution network. Often, there is also the need for determining the optimal ratio of warehouse location and connection to the transportation network [19].

It is thus necessary to look in more detail at the quality of sales and costs and analyse their mutual relationship to be able to predict future earnings [20].

A commonly used tool of financial analysis is ratio analysis, which provides a quick overview of the basic situation of a company in terms of its finances without complex and costly calculations. This analysis is based on mutual comparison and monitoring of individual components of the basic accounting statements. Commonly used financial statements include the balance sheet, profit and loss account, and/or cash flow statement. A large number of ratios can be mutually compared and compiled [21]. The economic situation of the company needs to be analysed in order to identify the need for change and to predict the future development of such a company. Financial analysis can be performed using a number of

methods, with artificial neural networks being considered a very interesting and effective tool [22]. Financial ratios play an important role in determining corporate financial health, which helps to maintain the competitive position of an enterprise, with the achievement of stable development contributing to the elimination of potential financial risks [23].

Most studies are currently dealing with the ratios using the so-called Pearson correlation coefficient including sales and revenues. However, this can lead to neglecting some other indicators that generate positive earnings (profit) [24]. A study published in 2015 focused on analysing companies listed on the Stock Exchange in the period 2002-2011. The goal of the study was to examine the relationship between value added and accounting variables (net profit, operating profit) using Pearson correlation coefficient and the method of panel data regression.

The evaluation of business performance is an important aspect of nearly all economic decisions at the macroeconomic and microeconomic levels in the long and short term. The data concerning the attitude of partners towards the business and their interest in appreciation of investments can be interpreted using various indicators. It is important to understand the relationship between business performance and the amount of equity, while negative equity can be considered critical information threatening the existence of the company. The purpose of the quantitative research is to identify the relationship between the reported negative equity and business performance on a complete sample of financial data obtained from companies operating in the transportation and warehousing sectors in Slovakia with negative equity in the period 2014-2018. Business performance with negative equity is evaluated using Altman Z-score and the IN05 index, which enables classification of companies into zones – bankruptcy, prosperity, and grey zone. Pearson correlation analysis of the negative equity and the result of Altman Z-score confirm the existence of a strong direct relationship between negative equity and bankruptcy, weaker indirect relationship between negative equity and grey zone, and almost no relationship between negative equity and prosperity. As for the IN05 index, there is a low correlation between negative equity and all three zones. Companies with negative equity are in the zone of bankruptcy but do not have to necessarily cease their activities; they need to improve resource management, in particular to increase the amount of equity e.g., by generating profits from higher sales and good financial management [25].

Kaba and Svatosova [26] describe the procedures and methods for working with multivariate statistical datasets using the method of regression analysis. This analysis enables examining and describing the relationship and its form and express the identified dependence or dependencies by means of a mathematical function. This allows identifying a possible causal relationship between the variables and predicting the development of this relationship using the selected mathematical function when the acting of one variable enables determining the values of unknown variables [26]. In regression analysis, it is important to decide which regression functions to choose in order to identify the dependencies of the variables. The basic step is thus always the analysis of economic criteria and indicators [27].

For example, Svabova et al. [28] analyse the dependence of profit measures for the Visegrad Group using the methods of correlation analysis based on the data obtained from nearly 300,000 companies from the Amadeus database in the years 2013-2017. The authors performed a comparative analysis that identifies possible disproportions in the results identified for each of the analysed countries.

3 Data and methods

The data for the analysis will be obtained from the CRIBIS database of the company CRIF – Czech Credit Bureau. It is a database of companies operating in the transportation and processing sectors according to the classification CZ NACE. NACE is an abbreviation for

the classification of economic activities established by the European Commission. It is the abbreviation of French Nomenclature statistique des activités économiques dans la Communauté européenne established in 1970 on the basis of international classification. For the purposes of this paper, section H – Transportation and warehousing according to the CZ NACE will be used, which includes freight and passenger transport, scheduled and non-scheduled transport, rail and road transport, transport by pipeline, water or air, and associated activities such as the activities of terminals, parking and warehousing facilities, transshipment points, etc. This section includes also renting means of transport with drivers or operators, as well as courier and postal activities.

The dataset includes complete information from financial statements between 2016 and 2020.

- 1) Companies in liquidation that are not so active will be excluded from the dataset.
- 2) There will be removed the columns that are not necessary for the calculations.
- 3) Value added will be calculated as follows:

$$\text{Trading margin} + \text{Outputs} - \text{Production consumption} \quad (1)$$

Based on the profit and loss account, it is possible to determine:

- a. Trading margin, which represents the difference between the selling and purchase price expressed in absolute numbers or as a percentage. The costs incurred for the sale of goods will be deducted from the sales of goods.
 - b. Outputs – this refers to the sum of sales of own goods and services, change in the status of in-house stocks of own production and capitalization
 - c. Production consumption – the sum of services and consumption of material and energy.
 - d. Data in the section “value added” with no values recorded are removed.
- 4) To find the answers to the research questions, it is necessary to determine the relationship between sales and earnings as well as the relationship between value added and earnings. The selected statistical method for determining these relationships is correlation analysis, which expresses the relationship between two variables using the correlation coefficient r . The given coefficient takes the values $[-1;1]$. The value of the absolute linear dependence is $(+1)$ and (-1) , while the value 0 expresses the absolute linear independence. If the coefficient has a value of -1 , it is indirect dependence, while the value of $+1$ indicates direct dependence [29]. This method enables determining the dependence of earnings on sales and/or value added.
- 5) The results were further classified as follows:
- a) SALES
 - i. By individual years
 - ii. By regions within the CR
 - iii. By the legal forms of individual companies
 - b) VALUE ADDED
 - i. By individual years
 - ii. By regions within the CR
 - iii. By the legal forms of individual companies

4 Results

4.1 Influence of value added on earnings

Table 1. The dependence by individual years.

| Row labels | Correlation coefficient |
|------------|-------------------------|
| 2016 | 0.80 |
| 2017 | 0.79 |
| 2018 | 0.81 |
| 2019 | 0.49 |
| 2020 | 0.61 |

Source: Authors.

When analysing the individual years, it can be seen that the highest correlation between value added and earnings reaches the highest values in 2018, while the lowest values are reached in 2019. However, the correlation between value added and sales was confirmed.

Table 2. The influence by individual regions.

| Row labels | Correlation coefficient |
|--------------------------|-------------------------|
| City of Prague | 0.66 |
| South Bohemian region | 0.42 |
| South Moravian region | 0.44 |
| Karlovarský region | 0.35 |
| Královéhradecký region | 0.62 |
| Liberecký region | 0.53 |
| Moravian-Silesian region | 0.61 |
| Olomoucký region | 0.54 |
| Pardubický region | 0.19 |
| Plzeňský region | 0.19 |
| Central Bohemian region | 0.55 |
| Ústecký region | 0.88 |
| Vysočina | 0.73 |
| Zlínský region | 0.72 |

Source: Authors.

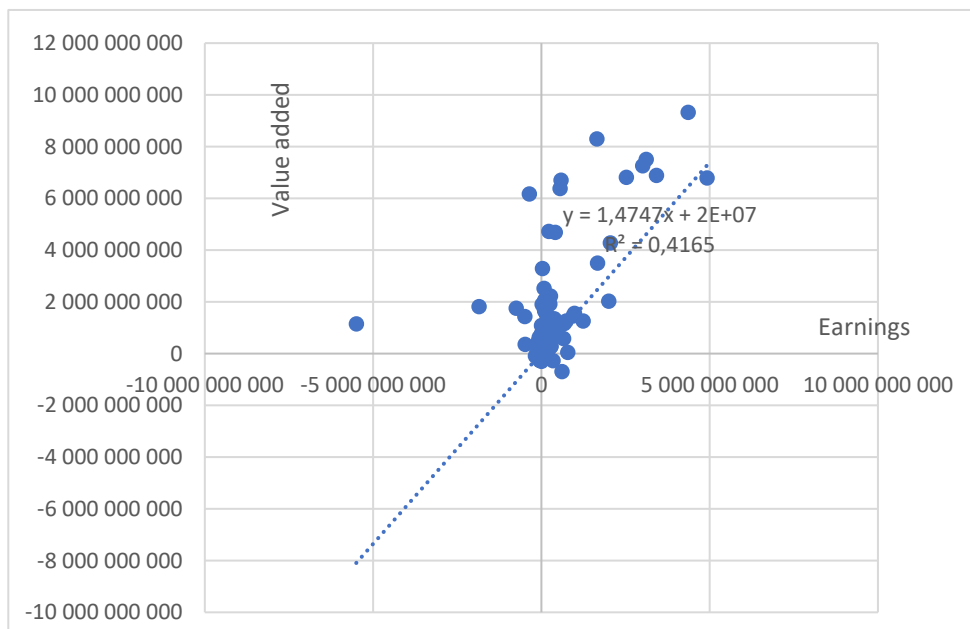
It follows from Table 2 that the lowest correlation is recorded in the Pardubický and Plzeňský regions, while the highest correlation is in the Ústecký region.

Table 3. The influence by legal form of companies.

| Row labels | Correlation coefficient |
|--|-------------------------|
| Joint-stock company | 0.64 |
| Cooperative | 0.82 |
| European company | 0.84 |
| Spin-off company of a foreign legal person | 0.96 |
| Limited partnership | 0.00 |
| Limited liability company | 0.67 |
| State-owned enterprise | 0.86 |
| General partnership | 0.45 |

Source: Authors.

The table of the influence by legal person shows the highest correlation between value added and earnings in the case of a spin-off company owned by a foreign legal person, while the lowest correlation is recorded in the case of general partnership.



Graph 1. The influence of value added on earnings.

Source: Authors.

The resulting graph shows a linear trend, with the largest share of companies up to 2,000,000 in value added and 2,000,000 in terms of earnings.

4.2 Influence of sales on earnings

Table 4. The influence of sales by individual years.

| Row labels | Correlation coefficient |
|------------|-------------------------|
| 2016 | 0.36 |
| 2017 | 0.14 |
| 2018 | 0.33 |
| 2019 | 0.18 |
| 2020 | 0.15 |

Source: Authors.

Sales and earnings show a relatively high volatility of correlation in individual years, and in principle, they do not correlate in any of the monitored years. The lowest correlation is recorded in the years 2017 and 2020. No direct influence on the specific market situation has been confirmed.

Table 5. The influence by individual regions.

| Row labels | Correlation coefficient |
|--------------------------|-------------------------|
| City of Prague | 0.33 |
| South Bohemian region | 0.37 |
| South Moravian region | 0.40 |
| Karlovarský region | 0.26 |
| Královéhradecký region | 0.49 |
| Liberecký region | 0.46 |
| Moravian-Silesian region | 0.68 |
| Olomoucký region | 0.56 |
| Pardubický region | 0.88 |
| Plzeňský region | 0.29 |
| Central Bohemian region | 0.67 |
| Ústecký region | 0.64 |
| Vysočina | 0.89 |
| Zlínský region | 0.65 |

Source: Authors.

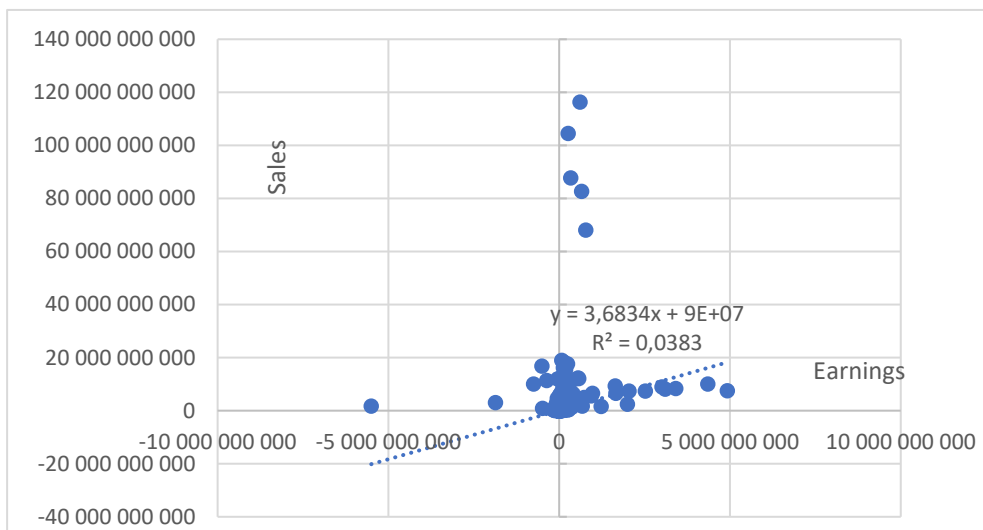
In contrast, there is a higher correlation between sales and earnings in individual regions. The highest influence of sales on earnings can be seen in the Vysočina region, while the lowest one in the Karlovarský region.

Table 6. The influence by legal forms of companies.

| Row labels | Correlation coefficient |
|--|-------------------------|
| Joint-stock company | 0.29 |
| Cooperative | 0.69 |
| European company | 0.85 |
| Spin-off company of a foreign legal person | 0.65 |
| Limited partnership | 0.05 |
| Limited liability company | 0.19 |
| State-owned enterprise | 0.55 |

Source: Authors.

In terms of the influence of the legal form, there is almost no influence of sales on earnings in the case of limited liability companies and joint-stock companies. The highest influence of sales on earnings can be seen in the case of cooperative, European company, and spin-off companies owned by a foreign legal person.



Graph 2. The influence of sales on earnings.

Source: Authors.

5 Discussion

The results of this paper were expected to provide answers to the formulated research questions:

- How do sales influence earnings in the transportation and warehousing sectors in the years 2016-2020?
- How does added value influence earnings in the transportation and warehousing sectors in the years 2016-2020?

The obtained and processed data show that in the transportation and warehousing sectors, a higher influence and correlation can be seen between value added and earnings rather than between sales and earnings. This trend is even more pronounced in the case of monitoring the influence by individual years.

In the context of monitoring the impact of sales by individual years, the biggest difference can be seen in the years 2017 and 2020 where almost no influence of sales on earnings is recorded. As for the year 2020, this could be due to the COVID-19 pandemic; however, given the situation in the year 2017 when the impact was even a tenth lower, this statement cannot be fully confirmed. On the contrary, data from publicly available sources and legislative changes do not show the reason for this increase compared to other years. Of course, this can be caused by some error in the data but the monitored sample was so broad that there would have to be several significant fluctuations in a given year, which is highly improbable. The most likely reason is that there was an error in the data; however, this cannot be verified in a completely relevant way.

Very interesting results were obtained in terms of analysing the impact of value added and sales on earnings by the type of company where limited liability companies and joint-stock companies were identified as the companies with the largest representation within CZ NACE classification. However, the highest correlation was identified in the case of spin-offs with a participation of a foreign legal person and European companies. In contrast, limited liability companies and joint-stock companies show the lowest correlation.

6 Conclusion

The aim of the paper was to analyse the relationship between sales and earnings as well as value added and earnings. These relationships were analysed in the transportation and warehousing sectors for a current financial year. The goal of the paper was thus to determine the optimal profitability for given indicators.

It can thus be stated that the goal of the paper was achieved. The benefits of this paper include the information for investors in the transportation and warehousing sectors on which type of companies and in which regions sales and value added can influence earnings most. From the perspective of individual years, this view is not completely relevant, because it considers past years and the data are available only up to the year 2020 when the COVID-19 pandemic started, which might have significantly influenced the results. This cannot be fully confirmed as globally, there is no historical experience of a similar situation.

Nevertheless, the results obtained can be used as a background for further research in the given sector. There is a lot of space for further research that could analyse the obtained data in more detail, specifically in terms of the fluctuations observed in individual years. A limitation of the research could be the analysed data, which may have not been correctly recorded during their collection. Also, the crucial year 2021 was not included, which is the year of the experience with the COVID-19 pandemic. This could have significantly affected the results obtained.

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