

# The impact of sales growth on manufacturing companies' profitability in the Republic of Serbia – panel data analysis

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### Abstract

**Background:** Sales growth is one of the key factors for achieving a target high profitability rate. Sales growth provides more comprehensive use of companies' capacities, thereby allocating fixed costs to higher value of revenue resulting in higher profitability rate.

**Purpose:** The aim of this paper is to examine the impact of sales growth on manufacturing companies' profitability in the Republic of Serbia during 2018-2021.

**Study design/methodology/approach:** The profitability as a dependent variable was measured as return on assets, while the size of the company, current ratio, leverage, sales growth, and inventory ratio were set as independent variables. The research was based on a sample of 200 observations of large and medium size manufacturing companies and panel regression models were used.

**Findings:** The results indicate that there is a positive and significant impact of inventory ratio and sales growth on the return on assets. The profitability of manufacturing enterprises increases with the increase in sales. The results of this paper are expected to be used by the management of manufacturing companies to be more careful to achieve stable business and development.

**Limitations/future research:** Recommendations, limitations, and future research are given in the conclusions.

### Keywords

sales growth, profitability, panel data analysis, ROA, fixed-effects panel model.

### Introduction

The Republic of Serbia as a middle-income country had GDP per capita of 9,393.6 US dollars in 2022 (The World Bank, 2023). Although the

level of GDP per capita has recorded constant growth in recent years, the country should accelerate it to achieve the levels in the European Union. As well as in the majority of developed and developing countries, a decreasing share of

manufacturing in the GDP is characteristic of this national economy. In 2020 this share was 13.3%, a decline by 1.9 p.p. in comparison to 15.2% in 2011 (Kovačević et al., 2021).

Despite this, manufacturing is of immense importance for the country's economy. There were 32,384 business entities in 2021, achieving a turnover of 4,274,255 million RSD and an output value of 3,836,922 million RSD. In the same year, 498,372 people were employed in manufacturing industries, with total personnel costs of 544,520 million RSD, of which gross salaries and wages amounted to 474,040 million RSD (Statistical Office of the Republic of Serbia, 2023a).

Valorization of the output value is on the market, so the main goals of manufacturing companies are to satisfy consumers' needs while achieving the highest possible levels of profitability. In order to reach them, one of the basic available instruments is sales, as an intangible activity that adds value to products after tangible production (de Borja Reis et al., 2020). Efficient coordination of sales with other internal activities, contributes to companies' "enhanced ability to learn via knowledge transfers, desirable customer responses, and improved business performance" (Peterson et al., 2021, p. 542).

Although sales on local markets are important, for small markets such as Serbian, it is not sufficient because manufacturing capacities cannot be fully utilized. Therefore, most of the manufacturing companies should be oriented towards foreign markets. In addition to better manufacturing capacity utilization, export orientation would also increase the country's national income and inflow of foreign currency. Higher efficiency or productivity gains known as "learning by exporting" could be expected as well (Erbahar, 2020, p. 314).

Manufacturing companies' primary focus should be countries with which Serbia has signed free trade agreements. Due to these agreements, domestic manufacturing companies can export most of their key industrial products in a customs-free regime, with exceptions and annual quotas for a limited number of goods (Development Agency of Serbia, 2020). Lowering levels of protectionism through free trade agreements generally leads to a reduction in costs of entering and doing business in foreign markets, and to an improvement in companies' and countries' export performance and sustainability (Turkcan et al., 2022).

The European Union is the most important trade partner and investor, with a share of over 60%

of the total Serbian foreign trade. In 2022 the Republic of Serbia recorded exports of 17,690 million EUR to the European Union, which represented 64.1% of its total world exports. In the same year, the country's imports from the European Union amounted to 21,450 million EUR or 54.9% of its total world imports (European Commission, 2023). Although the volume of trade is continuously growing, there is a long-term deficit for Serbia. Manufacturers participate in the country's exports with a value of 16,398 million EUR or 67.0% of the total products, while their share in the country's imports is 12,451 or 68.5% (European Commission, 2023).

The CEFTA countries, as a regional market of Southeast European countries with around 20 million inhabitants, features as the second most important trade partner for Serbia. As the value of exports reached 4,387.5 million EUR in 2022, and the value of imports 2,026.5 million EUR, Serbia recorded a surplus of 2,361 million EUR in 2022 (Statistical Office of the Republic of Serbia, 2023b). In addition to the above, the markets of China, Russia, and Turkey are also of special importance for Serbia's foreign trade exchange.

## 1. Literature review

Sales growth can be defined as a change in companies' sales over a period. Sales growth is one of the key factors for achieving a high profitability rate. Companies can achieve sales growth of existing products or services, or based on diversification and sales of new products and services (Vuković et al., 2022). Increasing direct sales of products and services will lead to more revenue (Bhandari et al, 2024). According to Iskandar (2021), high level of sales growth will increase income, which would provide increase in dividend payments. Companies with a higher amount of income could increase profit and retain earnings. Sam and Hoshino (2013) in their research conclude that sales growth provides more comprehensive use of capacity, which allocates fixed costs over higher revenue resulting in higher profitability rate.

Many authors analyzed the impact of sales growth on the companies' profitability. Among the research methods and results, there are differences between the method used and the conclusions. Some authors have based research only on the variable from the financial statements, while other authors used other non-financial information. Hollas et al. (2021) argue that among numerous specific factors and non-financial factors of

agritourism, sales have significant impact on profitability of tourism sector. Regardless of the methods and different indicators, the performance of the company's business should be continuously measured and analyzed. In this way, management can react in time to solve problems or take advantage of opportunities for business improvement (Hornungova, 2022).

Determinants of profitability of food industry in India were examined during the period 1998-2009 by Azhagaiah and Deepa (2012). The research was based on multiple regression models. The results show that growth is one of the major factors in determining profitability in small-size and medium-size companies.

The impact of sales growth on the firm performance of 194 companies from manufacturing sector listed on the Indonesia Stock Exchange in 2010-2016 was examined by regression model. The research results show that the sales growth has a positive and significant influence on firm performance (Ghozali et al., 2018). Furthermore, the authors conclude that firms with a higher rate of sales growth will achieve future profits. Also, sales growth is one of the important factors in achieving a better position against competitors.

The relationship between sales growth and profitability of Spanish manufacturing companies during the period 2000 – 2014 was analyzed by using regression models OLS, GLS, and GMM (Fuertes-Callen, Cuellar-Fernandez, 2019). Profitability as a dependent variable was measured by ROA, while the following variables were defined as independent: sales growth, employment growth, size, liquidity, debt, innovation, export. The results showed that sales growth has a positive impact on profits in the short-term. Furthermore, the results indicate that the impact of exports on profitability in the period of economic crisis is indirectly achieved through growth in sales.

Dakić and Mijić (2020) analyzed the impact of internal factors of meat processing companies on return on assets. The authors used the panel analysis for 24 companies in Serbia during the period 2007 – 2016. The following variables were set as the internal factors: company size, age, leverage, quick ratio, inventory, sales growth, and capital turnover ratio. The research results indicate that age, leverage, quick ratio, sales growth, and capital turnover ratio have a significant influence on profitability measured by return on assets. The impact of sales growth on the return of assets is positively related.

Nadia et al. (2021) analyzed the effect of sales growth on the financial performance of manufacturing enterprises listed on the Indonesia Stock Exchange. The research sample consisted of 59 companies during the period 2018-2020. Return on assets was set as a measure of financial performance. Besides sales growth, the following independent variables were set: independent commissioners, corporate social responsibility, firm size, and shareholder's equity. Besides variables from financial statements this study includes variables from non-financial reports. The results of regression analysis indicate that higher sales lead to higher financial performance.

Indiansyah et al. (2022) analyzed the influence of sales and other independent determinants on changes in profits. The research was based on enterprises listed on the Indonesia Stock Exchange during the period 2014-2021. The authors used a multiple linear regression model. The research results show that sales growth has a positive effect on profit changes. According to this, it can be concluded that if the following year sales growth increases, the net profit will increase from the previous year.

The effect of macro and micro variables, as independent variables, on financial performance of companies in Turkey and South Korea was analyzed by Kilic et al. (2022). Among the results, they emphasize that sales growth has a significant and positive effect on return on assets as financial performance. Regardless of the level of development between the two countries, sales growth is a key factor of financial performance.

Asadifard et al. (2023) investigated the effect of sales growth rate, inventory turnover ratio, and growth opportunities on company profitability. Profitability was measured by return on assets, net profit margin, and return on equity. The research sample consisted of 171 companies listed on the Tehran Stock Exchange over the period 2014-2022. Among the results of multiple regression analysis, the author indicates that sales growth rate has a positive and significant relationship with the profitability of companies.

Marella et al. (2023) analyzed the impact of sales growth and leverage on the profitability measured as return on assets. The sample consisted of 11 infrastructure companies listed on the IDX in 2020-2022. The data was analyzed by panel data regression. The results indicated that sales growth doesn't have a significant impact on return on assets. On the other side, leverage has a significant negative influence on return on assets.

## 2. Methodology

The aim of this research was to investigate the impact of sales growth on the profitability of enterprises from the manufacturing sector in Serbia. In order to realize the research, besides sales growth, the following independent variables were selected: inventory ratio, size, current ratio as liquidity ratio, and debt to assets as leverage ratio. The study covers a period of 4 years (2018-2021) and encompasses 50 large and medium-sized companies in sector C (manufacturing). The sample consists of 200 observation units. The data were collected from the financial statement publicly available by the Serbian Business Registers Agency (2023).

Taking into account the set goal and the subject of the research, we defined the following hypothesis:

*H<sub>1</sub>*: Sales growth of manufacturing companies in Serbia significantly impacts the ROA of selected companies in Serbia.

Statistical models based on combining data with real cross-sectional values and time series are gaining more and more importance in economic research recently. The reason for this popularity is the fact that the panel data set offers certain advantages over the traditional pure time series or pure cross-sectional data sets. According to (Szwacka-Mokrzycka, 2020) “panel studies provide the opportunity to increase the data set and thus expand the analysis. They make it possible to identify the causes of the phenomena examined in the study, observe the dynamics of these phenomena, as well as control unobservable individual effects in regression models“. “The virtues of panel data are well known and include enabling controls for unobserved heterogeneity and intertemporal development” (Kenneth et al., 2024). Panel data models are suitable for solving problems that cannot be solved by using cross-sectional data or time series data. (Biorn, 2016). “In contrast to individual time series, the regression panel better observes and measures the effects and enriches the empirical analysis“(Bosna, 2022). This is exactly why we opted for panel regression analysis in this study. More about the benefits of panel data can be found in the book by Chang Hsiao (see more: Ai-bing Ji et al., 2022).

In the observed period from 2018 to 2021, there were no missing observations. Since that there is the same number of time series observations for each comparative unit, and the balanced panel data was the most suitable for use in the research.

A panel data set is a two-dimensional data set that consists of cross-sectional elements and time-series elements. This means that panel data models at each of T time periods ( $t = 1 \dots T$ ) have n cross-sectional units ( $i = 1, \dots, N$ ) (Hsiao, 2014).

Return on assets (ROA) was set as a measure of profitability. On the other side, based on available data from financial statements, the explanatory variables are defined as growth, inventory ratio, company size, current ratio, and leverage. A list of dependent and explanatory variables used in panel models is presented in Table 1.

**Table 1** List of variables used in panel analysis.

Variable name	Code	Type of variable: dependent or explanatory	Definition	Explanation
ROA (Return on asset)	Y	Depend.	Ability of company to generate earnings from its assets.	Net income / Total Assets
Size	X <sub>1</sub>	Explan.	Size of Company	Natural logarithm of the total assets
Current ratio	X <sub>2</sub>	Explan.	Ability to pay short term debt on time	Current assets / Short term debt
Leverage	X <sub>3</sub>	Explan.	The structure of funding sources	Total debts / Total assets
Growth	X <sub>4</sub>	Explan.	Firm growth during 2018-2021	(Sales <sub>t</sub> - Sales <sub>t-1</sub> ) / Sales <sub>t-1</sub>
Inventory ratio	X <sub>5</sub>	Explan.	The size of inventory	Inventory / Current assets

Source: the authors' based on Helfert, 2001; Asadifard, 2023

## 3. Results and discussions

Table 2 presents the results of descriptive statistics analysis of the variables used in the panel models. According to the results given in Table 2, it can be concluded that manufacturing enterprises have an average positive ROA rate of 2.84%. This means that an average manufacturing company achieves 28.4 of RSD on 1,000 RSD engaged total assets. Even though the average rate of ROA is positive, the rate of ROA is not at referent value of 10% (see more: Rodić et al., 2017). The descriptive statistical analysis of leverage indicates that manufacturing companies used twice as much debt for financing business activities. Even though there

is more debt in the structure of capital, liquidity is above the referent value (more than 2). The growth rate indicates that sales increased by 5.2%. Inventory ratios indicate that there is almost half inventory in the structure of current assets.

**Table 2** Descriptive statistics

Variable name	Mean	Median	Min.	Max.
ROA (Return on asset)	0.0284	0.0292	-0.4990	0.2767
Size	14.3511	14.8632	9.060	17.8821
Current ratio	2.7322	1.5420	0.3302	17.9813
Leverage	2.0010	0.5869	0.0349	42.7411
Growth	1.0520	1.0021	0.4465	4.4170
Inventory ratio	0.4726	0.4519	0.06284	0.9770

Source: the authors' calculations

The presence of multicollinearity is considered problematic if the correlation between variables is higher than 0.8 (Field, 2005). In order to identify the problem of multicollinearity, the correlation of independent variables was done (see table 3).

**Table 3** Pearson correlation coefficient

Y	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	Y
1	0.2957	0.1228	-0.1082	0.2523	-0.0404	Y
	1	-0.0595	0.0230	0.0089	-0.1830	X <sub>1</sub>
		1	-0.2055	-0.1042	0.3231	X <sub>2</sub>
			1	0.1412	-0.1191	X <sub>3</sub>
				1	-0.1129	X <sub>4</sub>
					1	X <sub>5</sub>

Source: the authors' calculations

According to the results given in Table 3, we can make a conclusion that there is no multicollinearity problem because all correlations are less than 0.8.

“Before starting a regression analysis, it is important to investigate whether there are outliers and/or collinearity problems in the data” (Ekiz, 2023). The variance inflation factor (VIF) is one of the most powerful tests of multicollinearity. VIF gives us an answer to the question of how much the variance of a coefficient is inflated due to linear dependence on other independent variables. The VIF reference value is 10 (Marquardt, 1970). All VIF values not greater than 10 are good. If the multicollinearity between the independent variables is smaller, the VIF will also be smaller. As we can see in Table 4, all scores are less than 10, so we can conclude that there is no multicollinearity problem.

**Table 4** Result of multicollinearity test

Variable	VIF (Variance Inflation Factor)	1/VIF
Size	1.035	0.97
Current ratio	1.156	0.87
Leverage	1.063	0.94
Growth	1.033	0.97
Inventory ratio	1.162	0.86

Source: the authors' calculations

There are several different models in panel data analysis. The pooled regression model, the fixed effect model, and the random effect model are most often used in practice and mentioned in the literature.

According to Greene (2018, p.780), “the basic linear panel models can be described through the restrictions of the following general model:

$$Y_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}; \tag{1}$$

$$i = 1, \dots, N; t = 1, \dots, T;$$

where  $Y_{it}$  is the dependent variable,  $X_{it}$  is a  $K$  dimensional vector of explanatory variables without a constant term,  $\alpha$  is the intercept (i.e. the heterogeneity and or individual effects),  $\beta$  is a  $(K \times 1)$  vector of unknown coefficients (i.e. the slopes), and  $\varepsilon_{it}$  is iid error terms, where  $\varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$ .

The fixed effects model and random effects model are the most used regression models in panel analysis. The reason for that is the fact that the pool model has more limitations compared to them. All three models are represented in Table 5.

**Table 5** Panel models

Explan. variables	Coefficient		
	Model 1	Model 2	Model 3
Const	-0.246279	-0.338125	-0.260602
	(0.001)***	(0.5245)	(0.0003)***
X <sub>1</sub>	0.0136267	0.00891044	0.0143710
	(0.001)***	(0.8107)	(0.0010)***
X <sub>2</sub>	0.00427177	0.00213010	0.00318894
	(0.0324)**	(0.5982)	(0.2032)
X <sub>3</sub>	-0.0026813	-0.001673	-0.002563
	(0.0595)*	(0.3683)	(0.0929)*
X <sub>4</sub>	0.0725010	0.0485842	0.0615967
	(0.001)***	(0.0015)***	(0.001)***
X <sub>5</sub>	-0.0071564	0.391739	0.0305743
	(0.8103)	(0.0006)***	(0.4610)

Source: the authors' calculations

Note:

- Model 1: Pooled OLS; Model 2: Fix-effects model; Model 3: Random-effects; (GLS).
- \*, \*\*, \*\*\* indicate statistical significance at the 90% and 95%, and 99% levels of confidence.

Formal recommendations on the suitability of individual panel models are given by panel diagnostics tests. “The output of the tests is a comprehensive report that provides recommendations on the suitability of individual panel models“(Linhartová et al., 2022).

Table 6 presents the results of the panel model diagnostic to choose an adequate model. Based on the panel model diagnostic results, the fixed-effects model is adequate.

**Table 6** Panel model diagnostic

Diagnos-tics	Null hypo-thesis	Altern-ative hypo-thesis	p-value	Decision
Joint signifi-cance of differ-ing group means:	The pooled OLS model is adequate	The fixed effects model is adequate	$F(49, 145) = 3,49327$ with p-value 0,0001	A p-value is less than 5% (0.05). That means the null hypothesis is rejected and the fixed effects model is adequate.
Breusch-Pagan test statistic	The pooled OLS model is adequate	The random effects model is adequate	$LM = 32,3559$ with p-value = $\text{prob}(\text{chi-square}(1) > 32,3559) = 0,0001$	A p-value is less than 5% (0.05). That means the null hypothesis is rejected and the random effects model is adequate.
Hausman test statistic	The random effects model is adequate	The fixed effects model is adequate	$H = 14,9987$ with p-value = $\text{prob}(\text{chi-square}(5) > 14,9987) = 0,010368$	A p-value is less than 5% (0.05). That means the null hypothesis is rejected and the fixed effects model is adequate.

Source: the authors' calculations

The following table presents the results of the fixed-effects model.

**Table 7** Fixed-effect model

	Coefficient	Std. Error	t-ratio	p-value
const	-0.338125	0.530059	-0.6379	0.5245
X <sub>1</sub>	0.00891044	0.0371248	0.2400	0.8107
X <sub>2</sub>	0.00213010	0.00403275	0.5282	0.5982
X <sub>3</sub>	-0.00167352	0.00185447	-0.9024	0.3683
X <sub>4</sub>	0.0485842	0.0150478	3.229	<b>0.0015</b>
X <sub>5</sub>	0.391739	0.111930	3.500	<b>0.0006</b>

Source: the authors' calculations

The research results indicate that two independent variables have a significant influence on the return on assets of manufacturing

enterprises in Serbia during the period 2018-2021 (p-value is less than 0.05). Inventory ratio and sales growth have a significant positive impact on return on assets. Manufacturing companies with a higher rate of inventory in the structure of current assets achieve a higher rate of return on assets.

Furthermore, according to the research findings, it can be concluded that an increase in sales growth rate has a positive impact on the return on assets as a profitability determinant. This finding is in accordance the previous research results which confirm the positive relationship between sales growth and profitability (Azhagaiah, Deepa, 2012; Dakić & Mijić, 2020; Asadifard et al. 2023; Marella, 2023). For a stable business, it is not enough just to assess profitability rate, but also to analyze the factors that affect profitability (Tekić et al., 2023).

The research results indicate that the research hypothesis is confirmed. These findings are also consistent with the previous research, which indicates that a company can obtain the maximum profit through sales growth (Nadia et al., 2021). ). The achieved performance of growth and sustainability in the previous period affects the future profitability of the company (Lu et al., 2022).

## Conclusion

Sales growth represents one of the key factors influencing the profitability of manufacturing enterprises in Serbia. To increase the rate of sales growth, manufacturing companies should focus on satisfying customers' needs. They should try to differentiate themselves more successfully from the competition by providing unique products that have value for customers beyond low prices. In addition to sales growth, differentiation on the market enables premium prices and higher levels of customer loyalty, especially during periods of crisis (Porter, 2007).

Some of the competitive advantages for the manufacturing companies in Serbia include the possibility of duty-free exports to a market of more than 1.3 billion inhabitants, the country's geographical location, the fact that it is the largest country in the Western Balkan region, etc. Certainly, it is very encouraging that the country attracted more than half of the total foreign direct investments to the Western Balkan region in 2018-2022 (National Bank of Serbia, 2023).

Manufactured goods have the largest share in the total exports of Serbia. However, the negative fact is that they dominantly consist of medium-

level skills and technology. Considering this, improving the market position of manufacturing companies on a global scale could be one of the major export and economic growth drivers, but only if companies improve their levels of skills and implement highly sophisticated technology. Superior and highly competitive products generating high levels of real income are of crucial importance for economy's global competitiveness (Matkovski et al., 2022).

Some other issues that should be addressed are lack of financial resources, undeveloped transport and logistics infrastructure, deficient intellectual property rights, insufficiently qualified labor, high manufacturing costs, etc. To improve these issues and to manufacture high-value-added goods, continuous organized support from the national government and its institutions is necessary. Export assistance programs especially designed for small and medium enterprises to help them face trade barriers on the international markets are of a particular importance because of their limited financial, management, marketing or information resources (Njegić et al., 2020).

The limitation of this study can be explained by the fact that the sales were analyzed by the overall sales of companies. Future studies should divide domestic sales and exports to identify the impact of a specific type of sales on the profitability ratio.

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