The Impact of Working Capital Management on Corporate Performance in Small–Medium Enterprises in the Visegrad Group

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Abstract: Working capital management is a crucial pillar in corporate finance. The performance of transport companies can be improved by efficient working capital management through cash management, inventory management, and receivables management. This approach aims at sustainable growth of transport companies in international competition. The main aim of the article is to identify statistically significant variables from working capital management describing liquidity and activity, with a focus on corporate performance in the Visegrad Group countries. We designed models for small and medium-sized enterprises for each member state of the Visegrad Group and a universal model for the entire region. We applied a comprehensive model design process using multi-criteria linear regression, mainly on indicators from the Amadea financial statements in IBM SPSS 25. We described the overall sample using descriptive statistics, identify outliers, identify multicollinearity, and design models, and compared with other models describing return on assets. The added value is the explanation of the impact of working capital management on the performance of small and medium-sized transport companies in the Visegrad Group, which make up most companies in this sector. These findings help identify key aspects of working capital management that contribute to business performance. The paper presents a detailed output for future research into the role of working capital in corporate management.

Keywords: company; corporate performance; transport sector; working capital management

1. Introduction

Transport is extremely important for citizens and the economy. Citizens use transport daily to go to work or school, travel, go shopping, etc. The transport sector is one of the most important industries of the European Union (EU) members. According to Eurostat (2018) [1], transportation and storage services represented 5.3% of the total number of enterprises in the EU in 2018. Moreover, Statista (2022) [2] demonstrates that the annual turnover of the transportation and storage industry in EU 28 increased from 2011 to 2018. The sector produced a turnover of more than 1.6 trillion euros. As one of the areas of corporate finance, we believe that working capital management is extremely important in improving the performance of transport companies in Central Europe. Working capital management is a crucial pillar in corporate finance. The main idea of this special management is the ability to satisfy the short-term debt and operational expenses. The paper aims to model the profitability of transport companies in the Visegrad Group (V4), based on selected variables of working capital management and using multiple regression analysis in IBM SPSS 25.

We find a scientific gap in examining the impact of working capital management on the business performance of transport companies, in contrast to previous studies on the tourism, manufacturing, automotive, and other industries, with relatively low adjusted R^2, probably as a result of the wrong combination of independent factors but also other aspects of working capital management itself. We set a scientific question "*Which working capital management variables affect business performance in the transport sector in Central Europe?*", on

which the hypotheses on the statistical significance of selected indicators of working capital management are based. One of the key motives is the creation of a statistically significant model composed of significant variables for modeling profitability for transport companies in Central Europe, especially for increasing the efficiency of working capital management in companies operating or entering this region. In other words, we analyze various kinds of financial and non-financial variables of working capital management with profitability in Central Europe.

The article is divided into five main parts: the introduction, literature review, research methodology, results, discussion, and conclusion. First, the literature review summarizes current theoretical and empirical knowledge about working capital management in the Visegrad Group. We primarily focus on identifying potential variables describing working capital management with a potentially significant impact on the performance of transport companies. These findings are applied to designing the research methodology. Second, the methodology describes the sample, variable identification based on previous research, and professional experience in corporate governance. Finally, we explain the complex procedure for designing a multicriteria linear model in IBM SPSS 25. Third, the results show models for each member state in the V4 and a universal model for the entire region. Fourth, we compare the proposed model with other regional models for modeling business performance based on indicators from working capital management in the discussion. Fifth, the conclusion briefly summarizes important findings for academics and practitioners.

Our study contributes to the existing scientific research in three ways. First, we summarize a wide range of theoretical and empirical findings from previous research that represent the basic pillar for modeling return on assets for the Visegrad Group member states. Second, we present five models with statistically significant variables modeling return on assets using indicators from working capital management for small and medium-sized transport enterprises. These models show specific aspects of working capital management in selected countries. Third, we compare our universal model for the Visegrad Group with other models describing corporate performance. Finally, we highlight key findings for academics and practitioners.

The added value of the paper is a comprehensive assessment of the impact of working capital management on business performance for a specific sector in Central Europe. These results present the application of different ways of managing current assets. We find that the gap in the scientific research is in industries such as transport. These findings provide a motive for research in this area. We offer models based on a comprehensive procedure for all countries, including a universal model for all countries of the Visegrad Group. These results point to a suitable way of managing short-term assets in this region, especially for international companies entering the region. Transport companies are an important pillar for the whole European area, with low costs compared to Western countries. Some models can explain almost 50% of variability according to adjusted R^2 compared to other existing models but in different areas. Interestingly, we find that liquidity does not affect corporate performance in Polish transport companies, unlike others. In addition, small transport companies are at a disadvantage compared to medium-sized companies in the Czech and Slovak Republics. In conclusion, the universal model shows that medium-sized transport companies from Slovakia have a higher corporate performance than other companies. These findings may affect the choice of effective working capital management strategies for Central Europe.

2. Literature Review

We focused on key aspects, namely the relevance of modeling business performance using selected indicators of working capital management. We found that the issue of working capital management is underdeveloped in Central European countries compared to other European and non-European countries. The literature review summarized current knowledge on working capital management for business performance in various industries, focusing on methods and results. Mielcarz et al. (2018) [3] demonstrate that working

capital management is very important in optimizing corporate profitability. Karabay (2013) [4] argues that working capital management plays an important role, mainly in the performance of manufacturing companies. The correlation and regression analysis were applied based on financial indicators from the Turkish Central Bank from 1996 to 2011. The results show that companies must shorten the days payable outstanding and cash conversion cycle to create a balance between liquidity and profitability to survive and increase profits. Likewise, Khan (2017) [5] claims that working capital management is a very important part of corporate finance, especially in the manufacturing sector, due to its direct impact on the company's liquidity and profitability. Moreover, Venkatachalam (2017) [6] argues that large working capital can lead to increased costs and reduced profits. Their paper examines the relationship between profitability and various components of current assets based on the Pearson correlation. Shajar and Farooqi (2016) [7] demonstrate that effective working capital management is the most important factor in maintaining a company's survival, liquidity, solvency, and profitability. Optimal working capital management contributes positively to the company's value. Prsa (2020) [8] explains that working capital management has an impact on a company's wealth. Businesses investing more in working capital can expect lower business risk but adverse effects on profitability and vice versa. However, Akbulut (2011) [9] explains the relationship between working capital management and the profitability of manufacturing companies listed on the Istanbul Stock Exchange from 2000 to 2008. According to the results, there is a negative relationship between working capital management as a cash conversion cycle and the company's profitability. In addition, the ANOVA shows that there is a statistically significant difference between the cash conversion cycle and the subsectors of the manufacturing industry.

Prasad et al. (2019) [10] present the working capital efficiency multiplier (WCEM) as a direct profitability measurement in working capital management. WCEM represents financial performance variables such as return on assets, invested capital, equity return, gross operating income, and net operating income. WCEM reflects the part of WACC that the company invests in working capital management. As mentioned above, the lower WCEM indicates higher efficiency of working capital. Similarly, Zabolotnyy and Sipiläinen (2020) [11] expand current knowledge on working capital management. These authors evaluate the working capital management strategies of 12 Northern European food companies using fuzzy logic from 2005 to 2015. Their purpose is to propose an aggregate indicator based on a set of financial indicators, reflecting the relationships between the structure of current assets and liabilities in the company. This indicator identifies four types of working capital management strategies based on several independent variables according to risk preference and return. Individual variables include current assets to total assets, inventories to current assets, receivables to current assets, cash and cash equivalents to current liabilities, current liabilities to current liabilities, and current liabilities to equity. The results show that some companies focus on liquidity within working capital management strategies. Most companies have a passive working capital management policy. Rasyid (2017) [12] examines the impact of an aggressive working capital management policy on the profitability and non-financial company value on the stock exchange based on 393 Indonesian listed companies in 2014. Rasyid (2017) [12] determines the return on assets and the company's value as dependent variables. Independent variables include an aggressive working capital management policy in the form of an aggressive investment policy and an aggressive financing policy, as well as control variables such as the debt ratio and the size of the company. The aggressive working capital management policy has a significant impact on the company's profitability. However, this policy does not affect the company's market value when using linear regression analysis. The results show that an aggressive investment policy has a positive relationship with profitability, while an aggressive financing policy harms the return on assets or Tobin's Q.

Naumoski (2019) [13] analyzed the impact of effective working capital management on corporate profitability. The total sample consists of 720 companies from south-eastern Europe, such as Bosnia and Herzegovina, Bulgaria, Montenegro, Croatia, Northern Mace-

donia, Romania, Slovenia, Serbia, and Turkey. Naumoski (2019) [13] defines the dependent variable as the operating profit ratio. Independent variables include inventory turnover, days receivable outstanding, days payable outstanding, and cash conversion cycle as the most comprehensive indicators in working capital management, as well as other control variables. The results show that the days payable outstanding and the cash conversion cycle have a statistically significant negative impact on the company's profitability. On the other hand, the days receivable outstanding has a statistically significant positive impact on profitability. The results of the research show that south-eastern companies increase operating profitability by shortening days receivable outstanding and the cash conversion cycle, but also by delaying days payable outstanding in good business relations. Korent and Orsag (2018) [14] examine the impact of working capital management on profitability in Croatian software companies using descriptive statistics, correlation, and regression analysis. The results suggest that there is a nonlinear concave relationship between net working capital and return on assets. These results indicate that there is an optimal level of net working capital. According to Vuković and Jakšić (2019) [15], working capital management is one of the key areas in financial management. Vuković and Jakšić (2019) [15] apply multiple regression analysis to determine the impact of independent variables such as current ratio, current liabilities/total assets, and total liabilities/total capital on return on assets in the food industry in the Republic of Serbia in 2014. The results show that most of the analyzed variables significantly affect profitability. Agha (2014) [16] determines how the return on assets is affected by receivable turnover, creditor turnover, inventory turnover, and the current ratio in working capital management. The results reveal that working capital management has a significant impact on corporate profitability. Agha (2014) [16] recommends minimizing inventory turnover, the account receivables ratio, and creditor turnover, but current liquidity does not have a statistically significant impact on profitability. This study is beneficial for pharmaceutical companies in the field of working capital management. Vuković and Jakšić (2019) [15] expand previous research on working capital management. Their research examines how working capital management affected the profitability of 9883 companies in the food industry in Southeast Europe in 2010–2014 using probit regression analysis. The dependent variable is the return on assets. Independent variables include current liquidity, current assets to total assets, current liabilities to total assets, indebtedness, and the size of the enterprise. The empirical results show that all independent variables except the debt ratio have an impact on profitability.

Seth et al. (2021) [17] determine how working capital management affects the performance of 212 Indian manufacturing companies in 2008–2019 using data envelope analysis and a structural equation model. Independent variables include human capital, structural capital, external financing costs, interest coverage, leverage, the share of net working capital in total assets, asset turnover, and productivity. The results show that the average Indian manufacturing company achieves approximately 60% of efficiency in working capital management. These findings indicate significant problems in the working capital management of Indian manufacturing companies. Independent variables such as interest coverage, leverage, the ratio of net non-current assets to total assets, and asset turnover have a direct impact on the working capital management, but also an indirect impact on corporate performance. On the other hand, external financing costs have a direct impact on working capital management. Seth et al. (2021) [17] argue that human capital, structural capital, and productivity do not affect the efficiency of working capital management and business performance. These findings contribute to effective solutions in working capital management. Seth et al. (2020) [18] examined the relationship between working capital management and the exogenous variables of the Indian manufacturing sector. The total sample consisted of 563 Indian manufacturing companies from 2008 to 2018. Seth et al. (2020) [18] examined how the cash conversion cycle is dependent on independent variables. Independent variables included debt ratio, the share of net non-current assets in total assets, size of enterprise, profitability, age of enterprise, the growth rate of total assets, the growth rate of sales, interest rate, productivity, and exports. The results show that the leverage

effect, the net share of non-current assets, profitability, asset turnover, the growth rate of total assets, and productivity have a significant impact on the cash conversion cycle.

3. Research Methodology

The methodology explains the total sample, dependent and independent variables, and methods. The article aims to determine the impact of working capital management on the performance of transport companies in the Visegrad Group. We focus specifically on selected independent variables, describing working capital management as indicators of liquidity and activity ratios. First, we determine the association between independent variables and the business performance in the Czech Republic, Hungary, Slovakia, Poland, and the Visegrad Group. Second, we compare significant variables based on selected indicators of working capital management according to theoretical and empirical findings from relevant authors from previous research around the world and statistical metrics of all models using multiple linear regression.

The overall process includes identifying independent variables based on theoretical and empirical knowledge from previous research as well as professional experience, describing the initial sample using descriptive statistics, analyzing the correlation among independent variables using correlation analysis, removing outliers, and modeling business performance based on independent variables using multiple linear regression (see Figure A1 in Appendix A). These models are proposed based on complex processes in IBM SPSS 25. We identify a model consisting of statistically significant quantitative and qualitative variables. In addition, we focus on the R square, which measures the proportion of the variability in the dependent variable about the origin explained by the regression.

The total sample consists of 3828 transport companies in the Visegrad Group in 2019. Table 1 shows the initial sample broken down by country and enterprise size according to the European classification. As can be seen, more than 75% of the enterprises are small and medium-sized enterprises, and the sample consists of mainly Hungarian and Polish enterprises. These data are drawn from a comprehensive database of European companies from the Bureau van Dijk—A Moody's Analytics Company [19].

Table 1. Total sample.

		Type		Total
		Small	**Medium-Sized**	
Country	CZ	138	432	570
	HU	228	1022	1250
	PL	85	1222	1307
	SK	143	558	701
Total		594	3234	3828

Table 2 shows companies classified by the three criteria of sales, total assets, and the number of employees.

Table 2. The classification of enterprises.

	Sales [Mil. €]	Total Assets [Mil. €]	Employees
Small company	[0, 1)	[0, 2)	[0, 15)
Medium-sized company	[1, 10)	[2, 20)	[15, 150)

Source: author according to Bureau van Dijk/Moody's Analytics (2021) [19].

The dependent variable is the return on assets of earnings before interest, tax, depreciation, and amortization (EBITDA), calculated by EBITDA to total assets as a performance indicator according to Arnaldi et al. (2021) [20]. We set the scientific question "*Which working capital management variables affect business performance in the transport sector in Central*

Europe?", on which the hypotheses on the statistical significance of selected indicators of working capital management are based. Table 3 reveals 14 financial indicators in working capital management, such as liquidity ratios and activity ratios. Moreover, independent variables include two qualitative variables: country and company type. The country indicator includes four countries of the Visegrad Group, namely the Czech Republic, Hungary, Poland, and Slovakia. The company type indicator divides enterprises by size into small and medium companies according to the classification in Table 2. These indicators are selected based on a wide range of theoretical and empirical findings from previous research on the impact of working capital management on business performance, regardless of industry and country, from leading authors such as, Arnaldi et al. (2021) [20], Yousaf and Bris (2021) [21], Yousaf et al. (2021) [22], Zimon and Tarighi (2021) [23], Anton and Afloarei Nucu (2020) [24], Golas (2020b) [25], Golas (2020a) [26], Heryán (2020) [27], Vuković and Jakšić (2019) [15], Otola and Grabowska [28], Ren et al. (2019) [29], Goncalves et al. (2018) [30], Botoc and Anton (2017) [31], Okyere-Kwakye et al. (2015) [32], Madhou et al. (2015) [33], and Bieniasz and Golas (2011) [34], but also our professional experience in corporate finance. Table 3 reveals the formula for calculating independent variables with expected impact on corporate performance. We expect that liquidity ratios, such as cash ratio, quick ratio, and current ratio, should harm the return on assets compared to the operating cash flow ratio. We assume that the operating cash flow ratio has a positive impact on corporate performance, because cash flow is calculated as the sum of profit after tax and depreciation. In addition, we believe that turnover indicators such as inventory turnover, accounts receivable turnover, and current liabilities turnover increase the return on assets. Furthermore, we expect asset indicators describing period turnover to reduce corporate profitability, including the conversation cycle and the cash conversion cycle. However, we think that the indicator expressing the share of current assets in total assets will have a positive impact on increasing profitability because a higher share of current assets in total assets should have a significant impact on corporate governance. Dummy variables such as country and enterprise size cannot be accurately estimated based on previous research experience, as country as a dummy variable has not been used in any of the previous research. In addition, the size of the Amadeus classification was not used in another research. The size of the business is determined in different ways by the natural logarithm of the total assets according to Anton and Afloarei Nucu (2020) [24], Ren et al. (2019) [29], Okyere-Kwakye et al. (2015) [32], and Madhou et al. (2015) [33]. On the other hand, Yousaf and Bris (2021) [21], Yousaf et al. (2021) [22], and Högerle et al. (2020) [35] use the logarithm of operating revenues. Vuković and Jakšić (2019) [15] classify companies by size according to the number of employees, assets, and income. We describe the sector of transport companies using descriptive statistics. Descriptive statistics make up mean, median, standard deviation, skewness, kurtosis, minimum, maximum, and percentiles for selected variables of working capital management (see Table 4).

Table 3. Independent variables.

No.	Independent Variable	Acronym	Formula	Expected Impact	Source
1.	operating cash-flow ratio	OPF	cash-flow/current liabilities	+	
2.	cash ratio	CAR	(cash and cash equivalent)/current liabilities	−	
3.	quick ratio	QUR	(current assets—stock)/current liabilities	−	Zimon and Tarighi (2021) [23] Otola & Grabowska (2020) [28] Heryán (2020) [27] Bieniasz and Gołaś (2011) [34]

Table 3. *Cont.*

No.	Independent Variable	Acronym	Formula	Expected Impact	Source
4.	current ratio	CUR	current assets/current liabilities	−	Yousaf et al. (2021) [22] Yousaf and Bris (2021) [21] Otola & Grabowska (2020) [28] Gołaś (2020b) [25] Gołaś (2020a) [26] Vuković and Jakšić (2019) [15] Gonçalves et al. (2018) [30] Madhou et al. (2015) [33] Bieniasz and Gołaś (2011) [34]
5.	inventory turnover	INT	sales/stock	+	
6.	accounts receivable turnover	ART	sales/receivables	+	
7.	current liabilities turnover	CLT	sales/current liabilities	+	
8.	days inventory outstanding	DIO	(stock/sales) × 365	−	Zimon and Tarighi (2021) [23] Arnaldi et al. (2021) [20] Bieniasz and Gołaś (2011) [34]
9.	days current assets outstanding	DCA	(current assets/sales) × 365	−	
10.	days receivable outstanding	DRO	(receivables/sales) × 365	−	Zimon and Tarighi (2021) [23] Arnaldi et al. (2021) [20] Gołaś (2020a) [25] Gołaś (2020b) [26] Gonçalves et al. (2018) [30] Bieniasz and Gołaś (2011) [34]
11.	days payable outstanding	DPO	(current liabilities/sales) × 365	−	Zimon and Tarighi (2021) [23]
12.	conversation cycle	COC	DIO + DRO	−	
13.	cash conversion cycle	CCC	COC − DPO	−	Zimon and Tarighi (2021) [23] Arnaldi et al. (2021) [20] Gołaś (2020b) [25] Gołaś (2020a) [26] Ren et al. (2019) [29] Bieniasz and Gołaś (2011) [34] Okyere-Kwakye et al. (2015) [32]
14.	current assets on total assets	CATA	current assets/total assets	+	
15.	country	COU	Czech Republic, Hungary, Slovakia, Poland	+/−	
16.	company size	COM	small and medium-sized company	+/−	

We set a scientific question "*Which working capital management variables affect business performance in the transport sector in Central Europe?*", on which the hypotheses on the statistical significance of selected indicators of working capital management are based.

Table 4. Descriptive statistics.

	N		Mean	S. E. of Mean	Median	S. D.	Skewness	Kurtosis	Minimum	Maximum	Percentiles		
	Valid	Missing									25	50	75
ROA	3518	310	0.14	0.00	0.12	0.17	−4.13	159.90	−4.40	2.21	0.05	0.12	0.21
OPF	3239	589	1.01	0.19	0.38	10.67	52.94	2943.59	−57.25	594.00	0.14	0.38	0.88
CAR	3480	348	3.05	0.97	0.24	57.14	49.96	2699.06	−5.49	3159.00	0.06	0.24	0.89
QUR	3036	792	5.00	1.13	1.39	62.36	44.67	2196.54	−5.71	3164.00	0.82	1.39	2.63
CUR	3544	284	7.44	2.17	1.47	129.02	45.83	2289.44	−5.71	6814.00	0.91	1.47	2.82
INT	2209	1619	1334.25	180.76	109.81	8495.83	13.77	236.01	−100.42	203,883.31	33.80	109.81	338.21
ART	2385	1443	31.11	11.98	5.81	585.05	35.85	1405.77	0.00	24,687.23	4.10	5.81	8.73
CLT	3522	306	8.86	1.95	4.80	115.91	57.92	3404.93	−0.02	6827.50	2.63	4.80	7.83
DIO	2925	903	51.33	27.52	1.48	1488.27	49.99	2600.66	−4.97	78,142.37	0.00	1.48	6.27
DCA	3425	403	1171.41	328.88	113.69	19,247.44	33.30	1309.01	1.39	863,042.50	82.36	113.69	189.72
DRO	2447	1381	606.60	284.91	60.26	14,093.93	34.82	1260.98	0.00	554,435.00	38.12	60.26	84.53
DPO	3415	413	3831.48	2132.38	73.84	124,612.23	50.81	2767.10	−20,338.45	6,903,883.75	45.51	73.84	128.88
COC	3427	401	476.94	204.90	49.46	11,995.01	40.47	1720.71	0.00	554,708.75	5.49	49.46	80.16
CCC	3415	413	−3479.60	1976.61	−30.08	115,509.38	−49.88	2685.00	−6,349,175.00	48,494.66	−81.99	−30.08	11.07
CATA	3823	5	0.52	0.00	0.51	0.31	−0.02	−1.06	0.00	1.48	0.28	0.51	0.78

Table 4 shows the descriptive statistics of the total sample, consisting of transport companies in the Visegrad Group. We find that average European companies from Central Europe can pay their short-term liabilities according to the operating cash flow ratio (OPF). In particular, the average business has sufficient cash flow to cover short-term liabilities. Although this indicator ranges widely from (−) 57.25 to 594. However, the median shows that many transport companies cannot pay their short-term liabilities on time. On the other hand, the solvency of companies in the transport sector is better based on the cash ratio (CAR), according to which the company has three times more cash and its equivalents than current liabilities. As can be seen, there is a significant difference between the mean and the median. The median shows that many transportation companies are insolvent to pay their trade payables. CAR, quick ratio (QUR), and current ratio (CUR) are traditional liquidity ratios. These indicators vary depending on the selected items of current assets. The results show that the average enterprise has more inventory and receivables as cash and cash equivalents. Although the average values of liquidity ratios are relatively favorable, transport companies most often achieve less favorable solvency ratios. Other relevant indicators describing working capital management include turnover indicators such as inventory turnover (INT), accounts receivable turnover (ART), and current liabilities turnover (CLT). According to descriptive statistics, enterprises achieve a rapid INT and ART, as opposed to CLT, due to high sales and low volumes of inventories and receivables. In addition, we focus on days inventory outstanding (DIO), days current assets outstanding (DCA), days receivable outstanding (DRO), days payable outstanding (DPO), conversation cycle (COC), and cash conversion cycle (CCC). The company primarily compares DRO and DPO for solvency. The results show that the median of DRO is lower than the median of DPO by more than 13 days. The company can settle its liabilities by collecting trade receivables. COC is the sum of inventory and receivables turnover, with a median of almost 50 days. Furthermore, the median of CCC is more than (−) 30 days. In other words, the period of payment of liabilities is longer than the period from storage to collection of trade receivables. In conclusion, we find that companies in the transport sector achieve a very low average profitability (0.14), with a range from (−) 4.40 to 2.21. Up to 75% of companies achieve profitability of less than 0.21. We find that most indicators reach a positive skewness, except for ROA, CCC, and CATA. These results show that the sample is not symmetrically distributed, depending on the selected indicators, because the median, mean, and mode are not equal to 0. In addition, the descriptive statistics show that the kurtosis of most indicators is more than 1000 compared to ROA, INT, and CATA. In other words, we find that the sample has a leptokurtic distribution for most working capital management indicators, except for the platykurtic distribution for the shares of current assets in total assets. Table 4 shows a detailed overview of all important indicators of descriptive statistics to achieve an overall overview of the transport sector in the V4 member countries. In addition, we find that the initial sample contains potential outliers based on many indicators' descriptive statistics. Based on these results, we exclude outliers

to create a regression model describing the company's performance in the V4 countries using the working capital management indicator. We remove outliers using Cook's distance. We arrange observations according to Cook's distance from the highest to the lowest value. Those observations reaching a Cook distance of more than 1 are excluded from the sample in IBM SPSS 25.

Table 5 shows the final sample for all regression models in selected countries. Some data were used to examine the impact of working capital on the business performance of transport companies. The final sample is divided into three parts, namely the number of observations, the number of extreme values, and the number of incomplete data. The sum of these three components represents the initial sample. We excluded three to eight outliers, depending on the sample, such as companies in the Czech Republic, Hungary, Poland, Slovak Republic, and V4, because they were identified as extreme values based on Cook's distance. However, most observations were excluded for incomplete data on independent variables. Regression analysis requires that observations take on values for all independent variables.

Table 5. Final sample.

	CZ	HU	PL	SK	V4
Number of observations	207	124	633	437	1394
Number of outliers	3	3	5	6	8
Number of incomplete data	360	1123	669	258	2426
Total	570	1250	1307	701	3828

Table 6 demonstrates the correlation among the independent variables for the transport companies in the Visegrad Group. The results show that liquidity ratios such as CAR, QUR, and CUR are significantly correlated with each other, including OPF. The correlation between liquidity ratios is more than 0.9, except for CAR and CUR. For turnover indicators, we find that CLT is significantly correlated with all liquidity indicators and inventory turnover. However, a strong correlation is identified for OPF, QUR, and CUR. The correlation between INT and CLT is statistically significant, but this correlation is very weak. In addition, the correlation matrix reveals that among DIO, DCA, DRO, DPO, COC, and CCC, there are significant correlation statistics, except for DIO and DRO. As can be seen, CCC is negatively statistically significantly correlated. Finally, CATA is statistically significantly correlated with several independent variables, such as INT, CLT, DCA, and COC. The correlation between CATA and selected variables is very low. Very high correlation and high correlation are highlighted in red and orange in Table 6.

Table 6. Correlation matrix.

	OPF	CAR	QUR	CUR	INT	ART	CLT	DIO	DCA	DRO	DPO	COC	CCC	CATA
OPF	1	0.968 **	0.966 **	0.951 **	−0.020	0.010	0.859 **	−0.003	−0.003	−0.002	−0.003	−0.002	0.003	−0.016
CAR		1	0.990 **	0.665 **	−0.008	0.003	0.371 **	−0.001	0.003	−0.001	−0.002	−0.001	0.002	0.012
QUR			1	1.000 **	−0.005	0.003	0.746 **	−0.002	0.007	0.006	−0.002	0.006	0.003	0.012
CUR				1	−0.007	0.000	0.926 **	−0.001	0.003	0.002	−0.002	0.002	0.002	0.032
INT					1	−0.006	0.043 *	−0.006	−0.007	−0.004	−0.005	−0.005	0.005	0.088 **
ART						1	0.000	−0.002	−0.003	−0.002	−0.002	−0.002	0.002	0.005
CLT							1	−0.012	−0.003	−0.002	−0.002	−0.002	0.002	0.036 *
DIO								1	0.216 **	0.118 **	0.045 *	−0.037 *	0.027
DCA									1	0.880 **	0.897 **	0.879 **	−0.894 **	0.043 *
DRO										1	0.940 **	1.000 **	−0.930 **	0.038
DPO											1	0.936 **	−1.000 **	0.020
COC												1	−0.925 **	0.039 *
CCC													1	−0.018
CATA														1

** Correlation is significant at the 0.01 level (two-tailed). * Correlation is significant at the 0.05 level (two-tailed).

For the successful selection of independent variables, we use the VIF and collinearity index to eliminate multicollinearity between predictors. We calculate the collinearity index

and VIF for all samples. We exclude mainly liquidity indicators; QUR is excluded from all samples together with the current ratio, except for Czech companies.

We propose a comprehensive model for assessing the return on assets using selected indicators of working capital management in individual samples. We estimate a regression equation to examine the association between corporate performance and working capital management using a multiple regression model. The regression model is a statistical model that estimates the relationship between one dependent variable and one or more independent variables. We apply the stepwise method to select statistically significant indicators in a regression model to create the best model as opposed to the forward method.

$$\text{ROA} = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 \beta_i x_i \tag{1}$$

where

ROA dependent variable,
α intercept,
β_i coefficients of the independent variables,
x_i independent variable.

The linear regression model is based on a linear relationship between the dependency and the independent variables. One of the important statistical metrics is the coefficient of determination (R-squared), measuring how much of the variation in the outcome can be explained by the variation in the independent variables. On the other hand, we prefer adjusted R-squared, which compares the explanatory power of regression models containing different numbers of predictors. Before applying multiple regression analysis, we remove outliers using Cook's distance.

$$D_i = \frac{\sum_{j'=1}^{n} \left(\hat{Y}_j - \hat{Y}_{j(i)} \right)^2}{(p+1)\,\hat{\sigma}^2} \tag{2}$$

where

Y_J *j*-th fitted response value,
Y_J *j*-th fitted response value, where the fit does not include observation *i*,
p number of regression coefficients,
σ estimated variance from the fit, based on all observations (mean squared error).

Moreover, we verify multicollinearity using correlation matrix, VIF, and Condition Index. Variance inflation factor (VIF) detects multicollinearity in the regression model. Multicollinearity represents a high intercorrelation between a set of independent variables. It leads to an unreliable and inaccurate output.

$$\text{VIF} = \frac{1}{1 - R^2} \tag{3}$$

where

R^2 coefficient of determination.

The Condition index is used to identify the dependency between several independent variables. If the indicator exceeds the recommended values, these variables are excluded. The condition index is calculated from the eigenvalues. It is derived from the square root of the ratio of the largest eigenvalue to the eigenvalue of the dimension. If the value is above 15, it indicates multicollinearity; for example, 30 means very strong multicollinearity.

$$CI_i = \sqrt{\frac{\lambda_{\max}}{\lambda_i}} \tag{4}$$

where

λ conventional symbol for an eigenvalue.

On the other hand, Durbin Watson's statistics tests autocorrelation in the residuals from a regression model. It has a value ranging between zero and four; one to three indicates there is no autocorrelation detected in the sample. If the value is below one, it indicates a positive autocorrelation. On other hand, if the value is above three, it indicates a negative autocorrelation [36].

$$d = \frac{\sum_{i=2}^{n} (e_i - e_{i-1})^2}{\sum_{i=1}^{n} e_i^2} \tag{5}$$

where

e_i residuals,

n number elements in the sample,

k number of independent variables.

Finally, we validate normal distribution, homoscedasticity, and linear relationship using scatterplots and partial regression plots in IBM SPSS 25.

4. Results

Table 7 shows all models demonstrate that OPF is a statistically significant indicator in all Central European countries. SMEs should monitor cash flow to pay their short-term liabilities. The results show that the model recommends that funds exceed total current liabilities. As can be seen, this indicator has a positive effect on the growth of the company's performance, especially in Hungarian (0.150) and Slovak (0.118) small and medium-sized enterprises, in contrast to other companies from other member states of the Visegrad Group. On the other hand, CAR harms corporate profitability because all three regression models reduce the profitability the most for Hungarian small and medium-sized enterprises. In addition, Slovak profitability is reduced not only by the cash ratio but also by the current ratio, including inventories and receivables. We find that no liquidity indicator has a statistically significant impact on Polish companies. Other indicators such as ART, CLT, DPO, and CCC have minimal impact on business performance. However, the current assets to total assets have the greatest impact on profitability compared to other coefficients for Czech companies. The results show that the company size is a decisive indicator for Czech and Slovak companies. We find that a small business achieves lower business performance than a medium-sized business. The variable is also significant in the universal model for the whole region. As can be seen, small businesses are unlikely to exploit the potential of working capital management, probably due to limited work capacity. We expected that the higher the share of current assets in total assets, the greater the role that current assets play in working capital management to corporate performance. CATA plays a statistically significant role in the Czech Republic. This coefficient has the greatest impact on the performance of Czech companies.

Table 7. Coefficients.

Acronym	Variable	CZ	HU	PL	SK	V4
-	intercept	0.082	0.076	0.133	0.155	0.177
OPF	cash flow/current liabilities	0.082	0.150	0.044	0.118	0.049
CAR	(cash and cash equivalent)/current liabilities		−0.035		−0.012	−0.011
QUR	(current assets—stock)/current liabilities					
CUR	current assets/current liabilities	−0.021			−0.018	
INT	sales/stock					

Table 7. *Cont.*

Acronym	Variable	CZ	HU	PL	SK	V4
ART	sales/receivables	0.001				
CLT	sales/current liabilities			−0.002		
DIO	(stock/sales) × 365					
DCA	(current assets/sales) × 365					
DRO	(receivables/sales) × 365					
DPO	(current liabilities/sales) × 365			−0.000144		−0.000020
COC	days inventory outstanding + days receivable outstanding					
CCC	conversation cycle—days payable outstanding				0.000016	
CATA	current assets/total assets	0.099				
CZ	Czech Republic					
HU	Hungary					
SK	Slovakia					0.050
S_code	Small company	−0.061			−0.059	−0.071

Note: All coefficients are statistically significant ($p < 0.05$).

As can be seen, Table 8 shows the key metrics describing the individual regression models. Regression models are statistically significant. In addition, these models express a return on assets of more than 30% according to adjusted R square, except for the sample consisting of small and medium-sized enterprises in Poland and the universal model for V4.

Table 8. Model summary.

	CZ	HU	PL	SK	V4
R	0.582	0.712	0.373	0.666	0.428
Adjusted R Square	0.322	0.499	0.135	0.437	0.180
Durbin–Watson Statistics	1.880	2.012	1.937	1.164	1.454
Condition Index	7.470	3.224	3.197	5.376	2.600
Excluded Variables for CI	CAR QUR CATA	QUR CUR CLT	CAR QUR CUR DCA	QUR CUR	QUR CUR
F	20.567	62.173	33.980	69.091	62.277
p-value	0.000	0.000	0.000	0.000	0.000
Normality	✓	✓	✓	✓	✓
Homoscedasticity	✓	✓	✓	✓	✓

Table 8 demonstrates that models achieve different results in the studied countries based on adjusted R square. We excluded several independent variables to eliminate multicollinearity based on the Condition Index. The results show that the selected predictors achieve multicollinearity below the recommended value of 15. The results indicate that the variables are correctly selected. The four independent variables, CAR, QUR, CUR, and

DCA, were excluded in designing the regression model for Polish SMEs. As can be seen, we excluded QUR in all prediction models. We most often excluded liquidity ratios such as quick ratio and current ratio. These indicators were removed from all samples except for the sample of Czech companies. In this sample, we excluded CAR and the share of current assets in total assets. Durbin–Watson statistics showed that residues are not autocorrelated. In some samples, this statistic was slightly above the recommended value of one.

Significant indicators are selected using the stepwise method. These models achieve the recommended values of Condition Index and Durbin–Watson Statistics. On the other hand, the profitability of Polish transport companies is explained by less than 15%. In this case, we find that working capital management indicators are not suitable for estimating corporate performance, unlike in Hungarian companies. Selected indicators of working capital management explain the almost 45% variability of corporate profitability in Slovak small and medium-sized enterprises. All presented models are statistically significant. In addition, we do not detect multicollinearity between statistically significant variables. We exclude the most common liquidity indicators, specifically the quick and current ratio, in all presented models, except the regression model for small and medium-sized enterprises in the Czech Republic. In some cases, we exclude some indicators of activity.

5. Discussion

The added value of the research lies in the development of current theoretical and empirical knowledge on working capital management in Central Europe. The current research on working capital management is focused mainly on the Polish and Czech business environment in various sectors of the national economy, such as manufacturing, the automotive industry, construction, tourism, and the food sector. Zimon (2019) [37] analyzed the strategy of working capital management in LOT Polish Airlines. Zimon and Zimon (2020) [38] analyzed the effect of quality working systems on working capital based on 102 small trading companies in Poland in 2017–2019. The results demonstrate that effective management is typical for large companies for economies of scale and joint purchases based on liability turnover ratio in days. Zimon and Zimon (2020) [38] recommend applying quality management systems for optimizing working capital. Anton and Afloarei Nucu (2020) [24] examined the association between working capital management and the profitability of 719 Polish companies on the stock exchange from 2007 to 2016. The empirical results show that the U-shape reversed the level of working capital and profitability. In other words, working capital has a positive effect on the profitability of Polish companies to the breaking point. After the turning point, working capital begins to harm profitability. Anton and Afloarei Nucu (2020) [24] disseminate new knowledge, expressing the nonlinear relationship between working capital management and business performance in Poland. Ref. [39] determines corporate strategies of working capital management in the construction sector in 2009–2014. Zimon and Gosik (2017) [40] argue that transport costs have an impact on various kinds of sectors in Poland. Gołaś (2020) [26] examines the efficiency of working capital management on return on assets based on days sales of inventory (DSI), days sales outstanding (DSO), days payable outstanding (DPO), and the cash conversion cycle (CCC). The results show that an increase in independent variables such as DSI, DSO, DPO, and CCC harm return on assets in dairy companies.

Our research focuses on transport companies, which are an important pillar for the free movement of people, goods, and services in the European Union. Transport is also an important pillar for other sectors. We expand previous research to include transport companies from the Visegrad Group. We aimed to design a statistically significant model to explain the return on assets using significant independent variables describing working capital management as a comprehensive tool for managing current assets such as cash-flow management, inventory, and receivables management. The results show that the models statistically significantly explain the return on assets. We use the return on assets (calculated by EBITDA/total assets), unlike other research, because this indicator is appropriate to use in several countries with different tax and depreciation policies. The return on assets (of

EBITDA) is a dependent variable because this indicator considers different interest rates, tax, and depreciation policies, as opposed to EAT or EBIT. Bieniasz and Gołaś (2011) [34] examine the impact of working capital management on business performance in various companies, classified by size as a small, medium, and large companies, in the food sector across several European countries, especially Western Europe, for the period 2005–2009. These models achieve different values of selected statistical metrics. However, we find that the return on assets as a dependent variable is best explained for small enterprises as opposed to large enterprises, according to R square.

Ugurlu and Jindrichovska (2017) [41] model profitability ratios using independent variables of working capital management based on small–medium companies in the Czech Republic during the economic crisis. Yousaf et al. (2021) [22] explain that working capital management is one of the crucial parts of making decisions in corporate finance for all companies. The research determines significant variables such as days sales outstanding (DSO), days inventory outstanding (DIO), days payable outstanding (DPO), and cash conversion cycle (CCC), based on 332 companies in the Czech Republic.

Table 9 compares results from previous research from major authors in the field of working capital management, with a focus on Central Europe. Our total sample is higher compared to other studies. On the other hand, the data are drawn from one year, unlike previous authors. However, regression models explain variability better than other models. Our models explain more than 13% of variability compared to less than 8% in research from Anton and Afloarei Nucu (2020) [24] based on adjusted R^2. The regression model for Hungarian and Slovak small and medium-sized enterprises is better than the model for Polish enterprises and the universal model for the entire region. These results show that the potential impacts of working capital management vary significantly, depending on the member countries of the Visegrad Group.

Table 9. Summary.

	Anton and Afloarei Nucu (2020) [24]			Yousaf et al. (2021) [22]		Our Research				
Total sample	719			332	570	1250	1307	701	3828	
Industry sector	n/a			manufacturing, automobile, construction			transport			
Country	PL			CZ	CZ	HU	PL	SK	V4	
Year	2007–2016			2015–2019			2019			
Method	pooled OLS regression analysis	static panel model with fixed effects	panel-corrected standard errors	pooled regression model			multiple linear regression model			
Dependent variable	ROA net income/TA			ROA EBIT/TA			ROA EBITDA/TA			
R^2	0.0722	0.0739	0.0588	0.1215	0.338	0.507	0.139	0.444	0.183	
Adjusted R^2	n/a	n/a	n/a	0.1170	0.322	0.499	0.135	0.437	0.180	

We evaluate our proposed models with models from previous research focusing on the Central European region. In this region, we find that working capital management is a relatively new research area, with enormous potential for the future. We realize that this research is present mainly in Poland and the Czech Republic, focusing on various industries such as food, manufacturing, automotive, construction, transport, etc. This research builds on current knowledge from Polish and Czech authors and provides a comprehensive assessment of working capital management at transport companies in the Visegrad Group. These data are drawn from the pre-pandemic situation based on financial

statements. Although the independent variables are calculated based on data from 2019, the initial samples consist of a larger number of enterprises than in previous studies.

We find that liquidity does not affect corporate performance in Polish companies, unlike others. In addition, Hungarian and Slovak companies must focus their attention on cash management. CAR, as the only liquidity indicator, reduces corporate performance. In other words, businesses should have the necessary amount of money at their disposal for day-to-day operations to encourage interesting investments. In addition, the size of the business also has a significant impact on business management. The results show that small companies have lower economic results than medium-sized companies, especially Czech and Slovak companies. However, this indicator is statistically significant for all countries in Central Europe. This indicator has one of the highest coefficients in the model for the Visegrad Group. This knowledge will help identify key areas of business management, such as cash management, inventory management, or receivables management.

Similarly, Anton and Afloarei Nucu (2020) [24] and Yousaf et al. (2021) [22] determine the associations between corporate performance and working capital management. However, the return on assets is calculated differently; the difference lies in the different forms of profit. We apply EBITDA as opposed to net income or EBIT because we model corporate performance in many countries in Central Europe. Yousaf et al. (2021) [22] use different indicators. Their results show that corporate performance is negatively affected by the debt ratio (-4.250), the share of fixed assets in total assets (-4524), and DPO (-0.15). On the other hand, the size of the company, defined as the natural logarithm of total operating income, represents (3.174) in contrast to our models. Anton and Afloarei Nucu (2020) [24] find that the debt ratio and working capital ratio to the square (-0.0025) harm corporate performance in the difference between working capital ratio (0.0117), cash ratio (0.0798), and sales growth (0.0036), using pooled OLS regression analysis. Our results emphasize that the cash ratio as an indicator of liquidity harms corporate performance, unlike other models.

Our research differs from previous research because we use different ratios, such as operating cash flow ratio, cash ratio, and days' current liabilities turnover, based on a broad literature search. In addition, we also apply non-financial indicators such as country and company size, broken down into small and medium-sized enterprises according to the European classification. The results clearly show that many of these indicators have a statistically significant impact on business performance, and regression models explain the greater degree of variability according to adjusted R^2 as opposed to other models [24,26]. We find that entrepreneurs should be pragmatic when choosing a company headquarters in V4. The results demonstrate that locating a company is a strategic decision to increase business performance. We assume that Slovakia, as one category of the categorical variable (country), has a positive impact on performance in the universal model for the whole region, probably for Euro area membership, unlike other countries. Future research on working capital management may also consider other categorical variables, such as Euro area membership and other macroeconomic indicators. Furthermore, companies with a higher amount of funds have profitability according to the model for Hungarian and Slovak companies. Finally, we indicate that the indicators used in the survey without reference to other research confirm our expectations. The results show that OPF, CAR, and CLT have a statistically significant impact on the performance of companies, according to the resulting models. Finally, medium-sized companies have better business performance based on most models, except for the model for Hungarian and Polish companies. These results can motivate strategic mergers and headquarters decisions in the Visegrad Group member states.

Limitations. First, we focus on transport companies. Therefore, the results may not be generalized to all sectors. Second, the research is limited by data availability.

Future research. We see a potential research gap in measuring the effectiveness of company performance. Future research should focus on assessing the effectiveness of working capital management on business performance using statistically significant indicators,

representing input variables using data envelopment analysis. The results of this article represent one of the potential steps in the relevant selection of input variables to the data envelopment analysis method, with a focus on increasing output variables such as business performance or sales and comparing with competing companies across the region. In other words, the method identifies strengths and weaknesses to improve the management of current assets. Moreover, the research on working capital management can be extended to new indicators from the previous research of Zimon and Tarighi (2021) [23], Anton and Afloarei Nucu (2020), Arnaldi et al. (2021), Boțoc and Anton (2017), Gołaś (2020a), Gołaś (2020b), Högerle et al. (2020), Korent and Orsag (2018), Madhou et al. (2015), Mielcarz et al. (2018), Okyere-Kwakye et al. (2015), Ren et al. (2019), Vuković and Jakšić (2019), Yousaf et al. (2021), and Yousaf and Bris (2021) [3,14,15,20–22,24–26,29,31–33,35].

6. Conclusions

The main purpose of the paper represents cross-country research in the V4 countries. The paper extends the current scientific literature on significant factors improving working capital management and corporate profitability by focusing on small and medium-sized companies in Central Europe. The research provides a perspective on how working capital management affects corporate profitability. These results could be interesting to stakeholders, lenders, investors, and financial analysts. The presented research bridges the gap between theoretical assumptions and practical models used for the evaluation of corporate performance in the transport sector, using variables of working capital management. We find that the cash ratio harms corporate performance in all models, except the model for Czech and Polish companies. The model for Hungarian companies achieves the highest coefficient for the cash ratio compared to others. On the other hand, liquidity has no statistically significant impact on reducing asset returns. In addition, small businesses are at a disadvantage in working capital management compared to medium-sized companies in the Czech and Slovak Republics. This negative impact is also shown in the universal model for transport models in the Visegrad Group. However, the results show that Slovak companies achieve a higher return on assets than companies from other members, based on the proposed model for the whole region.

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Appendix A

• Total sample

• Financial variables

• Descriptive statistics

• Identifying outliers using Cook Distance

• Correlation analysis

• Identifying multicollinearity using Collinearity Index

• Elimination of Independent variables

• Verification of assumptions such as normal distribution, homoscedasticity, and linear relationship using scatterpots to create regression models

• Creating a regression model

• Model comparison

• Interpretation of results

Figure A1. Methodology process.

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