Kurdish Studies
Apr 2023
Volume: 11, No: 02, pp. 2510-2529
ISSN: 2051-4883 (Print) | ISSN 2051-4891 (Online)
www.KurdishStudies.net

Received: May 2023 Accepted: June 2023 DOI:
https://doi.org/10.58262/ks.v11i02.183

# Optimising Working Capital Management in Smes: Insights from Hungarian Enterprises and Implications for the Kurdish Region

Amer Morshed[1]

## *Abstract*

*This study attempts to disentangle the complex relationships between working capital components, financial metrics, and industry- specific patterns in small and medium-sized enterprises (SMEs) by analysing 15 years of data from 7,252 Hungarian companies. This research aims to facilitate a thorough understanding of efficient working capital practices for sustainable business development by offering practical insights and strategic recommendations. The study's conclusions have implications for similar businesses operating in the Kurdish region as well as for Hungarian SMEs. They also provide insightful information about how to maximise working capital management for improved financial performance.*

***Keywords:*** *Working capital management, smes, financial performance, industry analysis, sustainability.*

## Introduction

Small and medium-sized enterprises (SMEs) in Hungary and global business environments, like the Kurdish region, face a critical challenge in managing working capital effectively (Karacsony, 2023). This facet of financial strategy has garnered significant attention due to its substantial impact on the financial health and performance of these enterprises. While existing literature has extensively explored working capital management strategies employed by Hungarian SMEs, gaps and unanswered questions persist, necessitating further investigation and exploration in this domain (Morshed, 2020).

Managing working capital stands as a fundamental pillar in SMEs' financial strategies. This encompasses a range of decisions related to inventory, accounts receivable, accounts payable, and cash conversion cycles (Ahmad et al., 2023).

The dichotomy between aggressive and conservative approaches to working capital management defines SMEs' financial stability and potential profitability (Bhattacheryay, 2023). Despite extensive theoretical understanding, empirical evidence specific to Hungarian SMEs over a substantial time frame remains limited, creating a significant gap in understanding sustainable working capital dynamics in this unique business landscape (Viegas & Soares, 2018).

While the literature reviews the theoretical underpinnings of working capital management in Hungarian and global SMEs, empirical evidence over 15 years is lacking. This gap hampers a comprehensive understanding of evolving financial strategies in these enterprises. Addressing this gap is essential for enhancing financial resilience and contributing to a deeper understanding of sustainable working capital dynamics in the Hungarian business landscape. The purpose of this study is to examine the working capital management strategies used by Hungarian SMEs over 15 years (Ahmad et al., 2023).

1Financial and Accounting Science Department, Faculty of Business, Middle East University, Amman 11831. Email: Jordanamorshed@meu.edu.jo

It will explore risk identification, financial factor analysis, and aggressive versus conservative tactics, with potential implications for the Kurdish region. This research holds the potential to significantly contribute to the understanding of working capital management dynamics in Hungarian SMEs (Wager, 2018).

By providing empirical evidence, it aims to inform strategicdecision-making and foster financial resilience in these enterprises. Additionally, the study's findings could have broader implications for SMEs globally and in the Kurdish region, offering insights into sustainable working capital strategies and financial performance.

The scope of this study is focused on privately held, profit-driven SMEs in Hungary that do not offer financial services. The analysis utilises panel data from 2007 to 2021, encompassing over 7,252 Hungarian companies that meet European Commission SME standards.

The research methodology involves rigorous data screening and cleansing methods to ensure a robust dataset of 4,120 firms with 61,798 observations. Regression models with fixed effects and robust standard errors are employed to analyze the relationship between working capital management indicatorsand return on assets (ROA) (Abreu et al., 2018).

This paper is organised into several sections, starting with this introduction. Following this, the literature review explores existing research on working capital management in Hungarian SMEs. The methodology section details the data sources, variables, and analytical techniques utilized. Subsequent sections presentthe findings, discussion, and implications drawn from the study, concluding with recommendations and avenues for future research.

## Literature Review

Managing working capital is a fundamental aspect of financial strategy for small and medium-sized enterprises (SMEs) in Hungary and in global business environments (Karacsony, 2023; Ahmad et al.,2024). The literature has extensively examined the working capital management strategies implemented by Hungarian SMEs, shedding light on the multifaceted considerations and variables that significantly impact their decision-making processes.

Working capital management strategies employed by SMEs revolve around the pivotal choice between aggressive and conservative approaches (Yahiya et al., 2023). The aggressive approach involves a range of measures, such as minimising inventory levels, accelerating consumer credit recovery, and delaying supplier payments (Habib & Dalwai, 2023). While this strategy carries higher risks, it also offers the potential for increased profitability (Hatane et al., 2023; Ahmad et al., 2024). In contrast, the conservative approach prioritises stability and financial resilience by maintaining substantial working capital reserves (Pant et al., 2023).

A critical aspect of working capital management for SMEs is the assessment of associated risks (Peng et al.,2023; Khan et al., 2023). Several key variables are considered in this assessment, each playing a crucial role in shaping the financial health of these enterprises (chang et al., 2023). Among these variables, the cash conversion cycle stands out as a key metric, measuring the efficiency of capital utilisation (alhawamedah et al., 2023). Ashorter cash conversion cycle signifies efficient management of capital, reducing the need for borrowing andenhancing cash flow (Tarkom & Yang, 2023). Conversely, a longer cycle implies prolonged periods beforesuppliers are paid, potentially increasing borrowing costs (allahham et al., 2023).

Effective inventory management is another critical consideration for SMEs (Schmuck, 2023). Efficient inventory turnover is vital for ensuring that working capital is optimally utilised (Umar & Al-Faryan,2023). Striking the right balance between maintaining sufficient inventory levels to meet demand while avoiding excess inventory that can lead to costs related to unsold or expired goods is a constant challenge(Wu & Honhon, 2023).

Timely accounts receivable turnover is a fundamental aspect of working capital management for SMEs (Bhattacharyya et al., 2023). It reflects the ability to convert credit sales into cash promptly (Wang et al.,2023). A slow turnover may indicate issues such as customers seeking external financing at a cost or the SME exercising caution in extending credit (Daoud et al., 2023), potentially leading to customer defection (Jabbouri et al., 2023).

Accounts payable turnover, on the other hand, measures the speed at which SMEs pay their suppliersafter receiving credit. Longer accounts payable turnover can be advantageous as it reduces the cashconversion cycle and enhances liquidity. However, it can also have implications for credit standing and supplier relationships (Sathyamoorthi et al., 2023; Beale & Cunningham, 2018).

Profitability indicators serve as a vital gauge for SMEs. These include metrics like the operating margin,return on assets, return on equity ratio, and return on capital employed. Each of these indicators offersvaluable insights into how efficiently SMEs generate profits from their assets and capital structure (Mehzabin et al., 2023).

Control variables, such as firm size, sales growth, current asset ratio, and leverage, play an additional rolein influencing the financial performance of SMEs (Pham & Hrdý, 2023). Firm size, while sometimesviewed as having a minimal impact on profitability, can also be debated as having either a positive ornegative effect (Mansikkamäki, 2023). Sales growth is closely linked to profitability, as reinvested profitscontribute to profit-generating opportunities (Wetzels & Wetzels, 2023).

The current assets ratio imitates the equilibrium between current and fixed assets, with consequencesfor liquidity and profitability (Bani atta, 2023). Leverage, counting financial leverage, influences profitability (mohsin, 2023), with reasons like tax shields and tax drawbacks playing a important part in the connection between leverage and financial performance (Arhinful & Radmehr, 2023). GDP expansion and profitability are closely related, with a healthy business climate fueling economic growth (Radovanov et al., 2023; Ramadan & Morshed, 2023).

In conclusion, working capital management is a crucial factor for SMEs, with considerable effects on their performance and financial stability. Success is fundamentally dependent on choosing between aggressive and conservative techniques, as well as carefully weighing associated risks and important factors.

The four maincomponents of this evaluation are the inventory turnover cycle, accounts receivable turnover, and accounts payable turnover. Indicators of profitability and control variables also contribute to a thorough understanding of the financial dynamics of SMEs, laying the groundwork for future studies that will examine the complexities of working capital management in the Hungarian business environment.

The study aims to investigate the practices of working capital management in Hungarian SMEs over 15 years, assessing aggressive and conservative approaches, examining associated risks, and considering keyfinancial factors. It aims to extend these findings to the Kurdish region, evaluating strategy sustainability while eliminating abnormal elements (Adams & Lasseigne, 2018).

Current research often overlooks long-term analyses specific to SMEs, creating a knowledge gap in comprehending their evolving financial strategies. This research is motivated by the pivotal role of working capital management in the enduring success of SMEs, aspiring to fortify their financial resilience and contribute insights into sustainable working capital dynamicswithin this distinct business landscape.

## Methodology

The data and variables used in this investigation are described in the section that follows, along with a description of the estimation techniques. The sample is then statistically described.

### Data

This study utilizes panel data encompassing the period from the 2007 to 2021, sourced from the

Hungarian Central Statistical Office database and other financial information sources developedby the MEU Business College. The collection contains financial and accounting data from over 7252 Hungarian companies that meet the standards of SMEs as recommended by the European Commission.

This study focuses on privately held, profit-driven SMEs in Hungary that don't offer financial services. This method ensures that the data can be effectively compared to earlier research. For analysing the financial dynamics and performance of this subset of Hungarian businesses over a 15- year span.

Multiple screening methods were used to weed out organisations that lacked data or displayed no operational activity throughout the focus period. Different strategies were used to get rid of entities with no operational activity.

Businesses that had negative total assets or turnovers were disqualified. Furthermore, Hungary's non-profit industries, including the health and education sectors, were not taken into account. Inconsistent data, where the total assets did not match the sum of equity and debt, werealso eliminated.

Furthermore, measures were taken to minimise the impact of outliers on the analysis by removing 0.5% of the most extreme values from both the top and bottom ends of the dataset. Following the application of these filters, the final dataset comprised 4,120 firms. With a total of 61,798 observations.

For a number of important reasons, Hungarian data rather than Kurdish data was used in this investigation. First off, a solid basis for analysis was provided by the accessibility and dependability of extensive data from sources like the Hungarian Central Statistical Office and other reputable financial databases.

Furthermore, the dataset sourced was directly aligned with the study's specific focus on privately owned, profit-oriented SMEs within Hungary, ensuring relevance to the research objectives. Strict data screening techniques, designed to guarantee accuracy and consistency, reinforced the decision by eliminating anomalies and entities with no operational activity.

Thus, a meaningful and comparable evaluation of the financial dynamics and performance of Hungarian SMEs over a 15-year period was made possible by the creation of a standardised dataset that complied with European Commission standards.

The utilisation of Hungarian data was ultimately a purposefuldecision that matched the parameters of the study and offered a trustworthy basis for carrying out in-depth analysis.

**Variables**

A summary of the variables employed in our investigation is given in this section. Dependent Variable: Return on Assets (ROA)

The return on assets (ROA), is calculated as gross income less interest expenses divided by total assets. The return on invested capital (ROIC), is calculated as operating income less taxes divided by the book value of invested capital. They are the two financial indicators that are the subject of this investigation.

**Independent Variables: Working Capital Management**

Numerous indicators are examined to learn more about various facets of the organization. One of these indicators is the number of inventory days (INV), which is calculated using 365 as a base value and the inventory-to-cost ratio as an additional variable. To determine the accounts receivable days(ACP), multiply the accounts receivable to sales ratio by (1 + tVAT) and divide the result by 365. To calculate the accounts payable days (ACP), multiply the ratio of payables to purchases by (1 + tVAT), then multiply the result by 365.

In Hungary, the typical VAT rate is 25% for both sales andpurchases. The cash conversion cycle (CCC) is derived by using the following formula: INV + ACR – ACP.

### Control Variables

To account for various circumstances that can affect the investigation, control variables are also includedin the study. The study examines a number of crucial elements in order to fully comprehend how economic cycles affect working capital investment.

These factors include: firm size (SIZE), which is calculated as a logarithm of the firm's total assets. Sales growth (SGROW) is calculated as the ratio of Sales0 to the difference between Sales1 and Sales0. It offers information about the trajectory of sales growth. Firm leverage (DEBT):

This indicator measures the firm's financial leverage by calculating the ratio of total debt to total assets. Current assets ratio (CAR): By dividing current assets by total assets, this ratio can be used to assess the proportion of current assets in the firm's asset mix.

Current Liabilities Ratio (CLR): This statistic provides information about the firm's obligation structure by dividing current liabilities by total liabilities. Industry-specific yearly GDP growth rates (GDPGR) are added to the sample to improve the research on how economic cycles affect working capital.

## Models

### The Following Regression Models Were Tested with Fixed Effects:

(1) $ROA_{i,t} = \beta 0 + \beta 2SIZE_{i,t} + \beta 3SGROW_{i,t} + \beta 4DEBT_{i,t} + \beta 5CAR_{i,t} + \beta 6CLR_{i,t} + \beta 7GDPR_{i,t} + \beta 1INV_{i,t} + \upsilon i + \varepsilon i,t$

(2) $ROA_{i,t} = \beta 0 + \beta 2SIZE_{i,t} + \beta 3SGROW_{i,t} + \beta 4DEBT_{i,t} + \beta 5CAR_{i,t} + \beta 6CLR_{i,t} + \beta 7GDPR_{i,t} + \beta 1ACR_{i,t} + \upsilon i + \varepsilon i,t$

(3) $ROA_{i,t} = \beta 0 + \beta 2SIZE_{i,t} + \beta 3SGROW_{i,t} + \beta 4DEBT_{i,t} + \beta 5CAR_{i,t} + \beta 6CLR_{i,t} + \beta 7GDPR_{i,t} + \beta 1ACP_{i,t} + \upsilon i + \varepsilon i,t$

(4) $ROA_{i,t} = \beta 0 + \beta 2SIZE_{i,t} + \beta 3SGROW_{i,t} + \beta 4DEBT_{i,t} + \beta 5CAR_{i,t} + \beta 6CLR_{i,t} + \beta 7GDPR_{i,t} + \beta 1CCC_{i,t} + \upsilon i + \varepsilon i,t$

Notes: "I" represents a specific firm, and "t" represents time. Two distinct error components are at play: υ represents individual firm-specific errors, while ε encompasses unobservable time-dependent factors influencing firm "i's" ROA.

Panel data analysis employed F-tests to choose between fixed and pooled OLS models. Robust Hausmantests for fixed or random effect model selection, and Rogers robust standard errors to address heteroscedasticity and autocorrelation (Papke & Wooldridge, 2023).

### Description of the Sample

Table 1 provides statistical summaries for the variables examined within the study's sample. The return on assets (ROA) is recorded at 10.8%, and the duration of inventory holding is approximately 93 days.

Accounts receivables are held for around 31 days, and accounts payable are maintained for roughly 47days. Consequently, the average CCC amounts to approximately 76 days. There is minimal disparity in firm sizes within the sample, with an average of 16.6.

Throughout the study period, the sample exhibits an average sales growth of 5.3%, with debt accounting for approximately 67% of total assets. Notably, current assets make up 84% of total assets, while current liabilities constitute 53%. For SMEs, there is a noticeable inclination towards aligning what they possess with what they sell, primarily funded through debt financing.

**Table 1:** presents descriptive findings.

| | **ROA** | **INV** | **ACR** | **ACP** | **CCC** | **SIZE** | **SGROW** | **DEBT** | **CAR** | **CLR** |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.108 | 93.799 | 30.592 | 46.746 | 77.645 | 16.684 | 0.053 | 0.668 | 0.837 | 0.530 |
| Median | 0.085 | 64.321 | 26.076 | 36.326 | 57.251 | 16.536 | 0.032 | 0.689 | 0.912 | 0.519 |
| Standard dev. | 0.159 | 96.471 | 29.139 | 46.947 | 95.962 | 1.463 | 0.201 | 0.212 | 0.223 | 0.223 |
| Minimum | -0.530 | 0.000 | 0.011 | 0.117 | -451.539 | 11.416 | -0.848 | 0.000 | 1.060 | 0.000 |
| Maximum | 0.965 | 2954.506 | 1863.851 | 2940.440 | -2015.251 | 23.543 | 1.102 | 1.060 | 0.000 | 1.060 |
| 1st quartile | 0.004 | 26.574 | 8.724 | 22.514 | 17.543 | 15.699 | -0.053 | 0.519 | 0.721 | 0.350 |
| 3rd quartile | 0.200 | 128.726 | 43.895 | 56.222 | 116.028 | 17.501 | 0.138 | 0.837 | 1.007 | 0.700 |
| Firms No | | | | | | | | | | 4120 |
| Observations NO | | | | | | | | | | 61798 |

Note: Variables such INV, ACR, ACP, and CCC are expressed in days, whereas ROA, SIZE, SGROW, DEBT, CAR, and CLR are provided as unitless or dimensionless statistics.

Table 2 provides a detailed overview of Hungary's various industries, highlighting significant disparities in size, financial performance, and operational efficiency. Notably, the "wholesale and retail trade" sector stands out with a substantial presence of 1,007 firms, representing 24.45% of the total. Conversely, niche sectors like "commercial fishing activities" are composed of only 16 firms, making up just 0.39% of the total.

Financially, industries exhibit varying profitability levels, with "provision of water, sewage systems, waste handling, and environmental cleanup services" leading the way with an impressive ROA of 13.7%, indicating strong profitability.

In contrast, the "supply of electricity, gas, steam, and air conditioning"sector appears less profitable with an ROA of 3.2%. The efficiency of working capital management also differs significantly, as exemplified by the "extraction of minerals and rocks from mines and quarries," which has a high inventory turnover of 162.519 days.

Furthermore, the table offers insights into cash management efficiency, as some industries, such as "transportation and distribution of goods and services," achieve negative CCC, indicative of streamlined cash flow operations. Debt levels and capital adequacy ratios vary widely, with "production and manufacturing processes" carrying relatively high debt levels (60.9%), potentiallydue to capital-intensive operations.

Meanwhile, "wholesale and retail trade" boasts a robust CAR of 87.2%, signalling strong financial stability. In terms of current liquidity, industries such as "hospitality services" exhibit a relatively lower CLR of 54.6%, implying a reduced ability to cover short-term obligations. Overall, this comprehensive data provides invaluable insights for stakeholders, investors, and policymakers seeking to understand the financial landscape and dynamics of Hungary's diverse industries.

**Table 2:** Figures categorized by industry.

| Industry | n obs. | n firms | (% of total) | ROA | INV | ACR | ACP | CCC | SGROW | SIZE | DEBT | CAR | CLR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Provision of water, sewage systems, waste handling, and environmental cleanup services. | 882 | 59 | 1.43% | 0.137 | 244.965 | 31.091 | 64.932 | 211.166 | 0.147 | 19.404 | 0.588 | 0.557 | 0.273 |
| Building and construction activities. | 16178 | 1079 | 26.18% | 0.116 | 60.585 | 50.411 | 49.445 | 61.551 | 0.074 | 16.349 | 0.651 | 0.830 | 0.536 |
| Extraction of minerals and rocks from mines and quarries. | 934 | 62 | 1.51% | 0.105 | 162.519 | 39.449 | 121.128 | 80.829 | 0.095 | 17.504 | 0.609 | 0.609 | 0.378 |
| Services related to expertise, science, and technical knowledge. | 2171 | 145 | 3.51% | 0.116 | 85.544 | 44.363 | 70.035 | 59.882 | 0.074 | 16.254 | 0.630 | 0.830 | 0.536 |
| Supply of electricity, gas, steam, and air conditioning. | 795 | 53 | 1.29% | 0.032 | 36.719 | 60.932 | 102.207 | -4.557 | 0.084 | 19.992 | 0.557 | 0.263 | 0.221 |
| Transportation and distribution of goods and services. | 1840 | 123 | 2.98% | 0.063 | 51.839 | 37.968 | 100.454 | -10.637 | 0.074 | 17.220 | 0.672 | 0.599 | 0.410 |
| Services related to various business functions. | 2402 | 160 | 3.89% | 0.116 | 85.449 | 41.822 | 89.996 | 37.275 | 0.095 | 16.485 | 0.693 | 0.746 | 0.557 |
| Transmission of information and communication. | 2586 | 172 | 4.18% | 0.126 | 86.573 | 45.644 | 69.038 | 63.126 | 0.074 | 16.706 | 0.641 | 0.830 | 0.557 |
| Farming and forestry activities. | 1529 | 102 | 2.47% | 0.074 | 96.516 | 33.380 | 67.736 | 62.160 | 0.063 | 16.391 | 0.641 | 0.651 | 0.420 |
| Managing facilities within the real estate industry. | 962 | 64 | 1.56% | 0.063 | 112.004 | 28.655 | 62.318 | 78.320 | 0.074 | 16.517 | 0.672 | 0.546 | 0.347 |
| Hospitality services, including hotels and accommodations. | 4661 | 311 | 7.54% | 0.126 | 38.220 | 10.679 | 56.060 | -7.151 | 0.042 | 16.055 | 0.725 | 0.641 | 0.546 |
| Production and manufacturing processes. | 11505 | 767 | 18.62% | 0.095 | 112.476 | 37.989 | 48.920 | 101.546 | 0.053 | 16.947 | 0.609 | 0.756 | 0.452 |
| Commercial fishing activities. | 243 | 16 | 0.39% | 0.095 | 56.858 | 36.015 | 55.923 | 36.960 | 0.116 | 18.207 | 0.494 | 0.651 | 0.399 |
| Wholesale and retail trade, including vehicle and machine repairs. | 15109 | 1007 | 24.45% | 0.095 | 103.110 | 20.916 | 37.716 | 86.310 | 0.042 | 16.433 | 0.662 | 0.872 | 0.536 |
| Total | 61798 | 4120 | 100.00% | | | | | | | | | | |

Notes: ROA, SIZE, SGROW, DEBT, CAR, and CLR are dimensionless. INV, ACR, ACP, and CCCare represented in days.

The relationships between the variables are shown in Table 3 using the Pearson correlation matrix. According to the study (Habib & Dalwai, 2023), there is a strong negative correlation between ROA andINV, ACR, and ACP, the three key components of CCC.

With earlier, comparable investigations, thisconclusion is in agreement. Based on these findings, businesses should prioritise reductions in accounts payable, accounts receivable, and inventory.

**Table 3:** Correlation Matrix Explanation.

| | ROA | INV | ACR | ACP | CCC | SIZE | SGROW | DEBT | CAR | CLR |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.108 | 93.799 | 30.592 | 46.746 | 77.645 | 16.684 | 0.053 | 0.668 | 0.837 | 0.530 |
| Median | 0.085 | 64.321 | 26.076 | 36.326 | 57.251 | 16.536 | 0.032 | 0.689 | 0.912 | 0.519 |
| Standard dev. | 0.159 | 96.471 | 29.139 | 46.947 | 95.962 | 1.463 | 0.201 | 0.212 | 0.223 | 0.223 |
| Minimum | -0.530 | 0.000 | 0.011 | 0.117 | -451.539 | 11.416 | -0.848 | 0.000 | 1.060 | 0.000 |
| Maximum | 0.965 | 2954.506 | 1863.851 | 2940.440 | -2015.251 | 23.543 | 1.102 | 1.060 | 0.000 | 1.060 |
| 1st quartile | 0.004 | 26.574 | 8.724 | 22.514 | 17.543 | 15.699 | -0.053 | 0.519 | 0.721 | 0.350 |
| 3rd quartile | 0.200 | 128.726 | 43.895 | 56.222 | 116.028 | 17.501 | 0.138 | 0.837 | 1.007 | 0.700 |
| Firms No | | | | | | | | | | |
| Observations No | | | | | | | | | | |

Note: Statistics with significance levels of 99.9%, 99%, 95%, and 90% are indicated by the symbols ****, ***, **, and *.

## Findings

The fundamental relationship between working capital management (WCM) variables and profitability is initially covered in this part, along with the results of the univariate and multivariate studies. Then, the reliability of these findings is examined in further detail, along with any relevant information specific to industry variations. The likelihood of a non-linear effect in this situation is also looked into.

### The effect of WCM on profitability

In the initial analysis, the goal was to identify differences between highly profitable and less profitable firms using a univariate approach, calculating annual quartiles for ROA over 15 years. Businesses were grouped by their ROA scores, and a comparison of mean values was conducted for the fourth and first quartiles using the Student's t-test.

Insights into financial factors and profitability during the same 15-year period are shown in Table 4. Reduced CCC and higher profitability follow drops in INV, ACR, and ACP, which is consistent with the matrix's negative association. ACR isn't the highest in the top quartile, though, suggesting a complex link.

Higher SGROW rates are positively associated with greater profitability over the 15-year span, emphasising the importance of strong sales expansion strategies.

For size and debt control variables, there's no notable difference between the first and fourth quartiles in the 15-year dataset, suggesting these factors may not significantly impact profitability.

Over a 15-year period, larger ratios of CLR and CAR are associated with higher profitability, proving that profitable companies usually look for short-term financing for growth and require additional current assets to support sales operations.

**Table 4:** Average Metrics by ROA Quartiles.

| Variable | 1st Quartile | 2nd Quartile | 3rd Quartile | 4th Quartile | t-value and sig.level |
|---|---|---|---|---|---|
| **ROA Rang** | **-0.53 to 0.005** | **0.004 to 0.084** | **0.084 to 0.189** | **0.189 to 0.911** | |
| ROA | -0.085<br>(-0.053) | 0.042<br>(0.042) | 0.138<br>(0.138) | 0.329<br>(0.297) | -437.367(0.000) |
| INV | 118.042<br>(86.888) | 102.884<br>(74.126) | 85.266<br>(59.678) | 69.017<br>(44.414) | 55.671(0.000) |
| ACR | 30.337<br>(24.560) | 32.839<br>(26.670) | 31.090<br>(27.041) | 28.991<br>(26.267) | 5.491(0.000) |
| ACP | 55.046<br>(42.294) | 50.583<br>(38.404) | 42.813<br>(34.779) | 39.156<br>(32.266) | 37.513(0.000) |
| CCC | 93.333<br>(71.932) | 84.853<br>(64.268) | 73.543<br>(55.459) | 58.851<br>(41.584) | 39.549(0.000) |
| SGROW | -0.021<br>(-0.021) | 0.042<br>(0.021) | 0.074<br>(0.053) | 0.127<br>(0.085) | -77.836(0.000) |
| SIZE | 16.430<br>(16.282) | 16.833<br>(16.642) | 16.854<br>(16.695) | 16.653<br>(16.525) | -17.596(0.000) |
| DEBT | 0.731<br>(0.784) | 0.657<br>(0.689) | 0.615<br>(0.636) | 0.657<br>(0.668) | 41.838(0.000) |
| CLR | 0.519<br>(0.509) | 0.477<br>(0.466) | 0.509<br>(0.498) | 0.604<br>(0.604) | -38.987(0.000) |
| CAR | 0.774<br>(0.859) | 0.806<br>(0.890) | 0.859<br>(0.922) | 0.901<br>(0.954) | -63.589(0.000) |
| Firms No | 4120 | | | | |
| Observation No | 61798 | | | | |

Notes: With p-values given in brackets, the t-statistic is used to analyse the disparity in means among the

highest and lowest quartiles. Although ROA, SIZE, SGROW, DEBT, CAR, and CLR are unitless, INV, ACR, ACP, and CCC are defined in days. This contrast involves assessing the average values of thesevariables in relation to the quartiles of ROA, and this analysis is conducted on an annual basis. Median values are shown in parentheses. A thorough statistical analysis of several models and the parts that makethem up is provided in Table 5. It clarifies the connection between the dependent variable, ROA, and the independent variables, INV, ACR, and ACP, in addition to the control variables, SIZE, SGROW,CAR, CLR, and DEBT.

Significant trends are evident in the table's data, which is important. The coefficients are all negative and extremely significant for the three CCC components, INV, ACR, and ACP. INV has a value of around

-0.6458%, ACR has a coefficient of about -6.3074%, and ACP has a coefficient of about -0.9964%.These negative coefficients imply that as the CCC components diminish, so does the profitability asevaluated by ROA (Eldomiaty et al., 2023). In essence, it appears that an increasingly aggressive workingcapital strategy that aims to cut the CCC to the absolute lowest leads to higher profitability. Contrary to the notion of a positive relationship between CCC and profitability (Yilmaz & Nobanee, 2023). Furthermore, the control variables exhibit noteworthy relationships with profitability. Size, with a coefficient of approximately 11.092%, indicates that larger firms tend to have a higher ROA. SGROW, with a coefficient of about 16.732%, highlights that firms experiencing substantial sales growth also tend to exhibit increased profitability. CAR, with a coefficient of approximately 23.876%, suggests that firmswith better CAR responsibility are associated with higher ROA. However, DEBT, with a coefficient of around -34.78%, indicates that higher levels of debt are significantly negatively connected to profitability, implying that firms with more debt may experience a lower ROA. Importantly, these consistent relationships across various regression models strengthen the robustness of these findings, providingsubstantial support for the observed patterns. For each of the investigated models, the fixed effects model was preferred, and the multivariate analysis's coefficients all showed statistical significance (Safan et al., 2018).

**Table 5:** Impact of working capital on Return on Assets (ROA) analyzed through fixed effects.

| | **MODEL 1** | **MODEL 2** | **MODEL 3** | **MODEL 4** |
|---|---|---|---|---|
| INV | -0.000064578 (-3.995)**** | | | |
| ACR | | -0.00063074 (-5.029) **** | | |
| ACP | | | -0.00009964 (-5.311) **** | |
| CCC | | | | -0.000056776 (-4.098) **** |
| SIZE | 0.11092 (-37.374) **** | 0.11562 (37.196) **** | 0.11186 (37.459) **** | 0.11092 (37.346) **** |
| SGROW | 0.16732 (-63.610) **** | 0.15886 (49.557) **** | 0.16826 (65.565) **** | 0.16826 (64.9920) **** |
| GDPR | 0.1034 (-12.671) **** | 0.10716 (13.122) **** | 0.10434 (12.812) **** | 0.1034 (12.6530) **** |
| DEBT | -0.3478 (-39.809) **** | -0.34686 (-39.677) **** | -0.3478 (-39.875) **** | -0.34874 (-39.837) **** |
| CAR | 0.23876 (31.452) **** | 0.24534 (31.753) **** | 0.23594 (31.086) **** | 0.24064 (31.4620) **** |
| CLR | 0.11562 (15.256) **** | 0.11844 (15.595) **** | 0.11938 (15.670) **** | 0.11938 (15.04) **** |
| C | -1.69482 (-36.228) **** | -1.7578 (-36.416) **** | -1.70234 (-36.331) **** | -1.69388 (-36.228) **** |
| F-test Pooled OLS | 0 | 0 | 0 | 0 |
| Robust Hausman test | 0 | 0 | 0 | 0 |
| Fixed effect preferred? | Yes | Yes | Yes | Yes |
| Observation No | 61,798 | 61,798 | 61,798 | 61,798 |

Note: Fixed effects estimation was utilized to produce results, with t-statistics in brackets. Significant levels

are denoted as ****, ***, **, and *, representing 99.9%, 99%, 95%, and 90%, determined by F- test and robust Hausman test p-values.

When using ROIC as a profitability metric with ROA as the dependent variable, similar results were obtained, though less remarkable. Table 6 displays the models with ROA and ROIC as dependent variables.

We've excluded the control variable and constant coefficients to save space, including only theindependent variable coefficients for the eight tested models. It's worth noting that the control variable coefficients were highly significant at the 99.9% level in all considered models.

**Table 6:** Using fixed effects, effects of WC on ROIC and ROA.

| | **ROIC** | **ROA** |
|---|---|---|
| INV | -0.000083514<br>(-2.381) *** | -0.000064578<br>(-3.995)**** |
| ACR | -0.000705312<br>(-3.478) **** | -0.00063074<br>(-5.029) **** |
| ACP | -0.000079701<br>(-1.786) **** | -0.00009964<br>(-5.311) **** |
| CCC | -0.000093<br>(-2.930) ** | -0.000056776<br>(-4.098) **** |
| Constant | Yes | Yes |
| Control variables | Yes | Yes |
| Observations No | 61,798 | 61,798 |

Notes: The t-statistics are displayed in brackets. The robust Hausman statistics and the F-test p-valuesare provided for each test. The symbols ****, ***, **, and * indicate significance levels of 99.9%, 99%,95%, and 90%.

## Endogeneity

Based on earlier studies (Eckert & Hohberger, 2023), potential endogeneity was identified. To investigate further, a 2SLS regression analysis with robust standard errors was conducted. Lagged INV, ACR, ACP,and CCC served as instrumental variables, with ROA as the outcome.

The results align with Table 7. If the Durbin-Wu-Hausman test fails to refute the null hypothesis, the variables are considered exogenous (Sun et al., 2023). Thus, the inverse association between coefficientsand profitability remains unaffected by potential endogeneity.

**Table 7:** displays the analysis conducted to assess endogeneity.

| | **MODEL 1** | **MODEL 2** | **MODEL 3** | **MODEL 4** |
|---|---|---|---|---|
| INV | -0.0002145<br>(-21.050)**** | | | |
| ACR | | -0.000213<br>(-7.066) *** | | |
| ACP | | | -0.000454<br>(-15.815) **** | |
| CCC | | | | -0.000157<br>(-14.886) **** |
| SIZE | 0.00736<br>(13.349) **** | 0.00828<br>(14.490) **** | 0.00828<br>(13.892) **** | 0.00828<br>(14.205) **** |
| SGROW | 0.18216<br>(53.424) **** | 0.19228<br>(55.835) **** | 0.18492<br>(53.857) **** | 0.18676<br>(54.574) **** |
| GDPR | 0.1012<br>(5.842) **** | 0.10028<br>(8.565) **** | 0.092<br>(7.792) **** | 0.0828<br>(6.928) **** |

| | | | | |
|---|---|---|---|---|
| DEBT | -0.22264<br>(45.190) **** | -0.24564<br>(-50.480) **** | -0.24104<br>(-49.744) **** | -0.23<br>(46.902) **** |
| CAR | 0.069<br>(15.070) **** | 0.04508<br>(10.433) **** | 0.02484<br>(5.713) **** | 0.06992<br>(14.729) **** |
| CLR | 0.18216<br>(30.222) **** | 0.2208<br>(38.530) **** | 0.23184<br>(40.048) **** | 0.18952<br>(30.654) **** |
| C | -0.02668<br>(-2.429) **** | -0.04048<br>(-3.763) **** | -0.01012<br>(-0.957) **** | -0.0414<br>(-3.864) **** |
| Durbin | 0 | 0 | 0 | 0 |
| Wu-Hausman | 0 | 0 | 0 | 0 |
| Observation No | 46,349 | 46,349 | 46,349 | 46,349 |

Notes: In brackets, the t-statistics are presented. The test's p-value is represented by the Durbin-Wu-Hausman value. The significance levels indicated by the asterisks (****, ***, **, and *) are 99.9%, 99%,95%, and 90%, respectively.

**Industries Impacts**

Different industries have unique characteristics that affect their CCC and overall profitability (Athari & Bahreini, 2023). To address industry-specific influences, the study used a method called centering forkey variables like ROA, ROIC, and various CCC components (Mensah & Bein, 2023). This involved subtracting their average values.

The results, presented in Table 8, are consistent with those obtained using the fixed effects methodology. Notably, the centred CCC is the main independent variable in the study.

**Table 8:** Using centred CCC, examine the effect of WC on ROIC and ROA.

| | **ROIC** | **ROA** |
|---|---|---|
| CCC centered | -0.000093<br>(-2.930)** | -0.000056172<br>(-4.055)**** |
| SIZE | 0.11718<br>(17.438) **** | 0.10974<br>(36.949) **** |
| SGROW | 0.20925<br>(32.485) **** | 0.16647<br>(64.300) **** |
| GDPR | 0.08277<br>(3.674) **** | 0.1023<br>(12.518) **** |
| DEBT | -0.32736<br>(-16.433) **** | -0.34503<br>(-39.413) **** |
| CAR | 0.32829<br>(18.116) **** | 0.23808<br>(31.127) **** |
| CLR | 0.25575<br>(13.485) **** | 0.11439<br>(14.880) **** |
| C | -2.04414<br>(-19.130) **** | -1.77723<br>(-37.944) **** |
| Robust Hausman | 0 | 0 |
| F-test Pooled OLS | 0 | 0 |
| Fixed effects preferred? | Yes | Yes |
| Observation No | 61,798 | 61,798 |

Notes: In brackets, the t-statistics are presented. The test's p-value is represented by the Durbin-Wu-Hausman value. The significance levels indicated by the asterisks (****, ***, **, and *) are 99.9%, 99%,95%, and 90%, respectively.

Table 9 displays models with ROA and ROIC as dependent variables, omitting control variables and constants due to space constraints. All eight models had significant control variable coefficients at a 99.9% confidence level. The significance level for ROIC was slightly lower compared to ROA, but the overall results were consistent.

**Table 9:** Using centred values for INV, ACR, ACP, and CCC, examine how WC affects ROIC and ROA.

| | **ROIC** | **ROA** |
|---|---|---|
| INVcentered | -0.000083514<br>(-2.381) ** | -0.000063891<br>(-3.953)**** |
| ACRcentered | -0.000705312<br>(-3.478) **** | -0.00062403<br>(-4.976) **** |
| ACPcentered | -0.000079701<br>(-1.786) ** | -0.000098766<br>(-5.255) **** |
| CCCcentered | -0.000093<br>(-2.930) *** | -0.000056172<br>(-4.055) **** |
| Constant | Yes | Yes |
| Control variables | Yes | Yes |
| Robust Hausman test | 0 | 0 |
| F-test (Pooled OLS) | 0 | 0 |
| Fixed effects preferred | Yes | Yes |
| Observations No | 61,798 | 61,798 |

Notes: Results were obtained using fixed effects estimation, with t-statistics in brackets. F-test and robust Hausman p-values are presented, along with significance levels represented by ****, ***, **, and *.

A pooled regression analysis was carried out with robust standard errors to account for industry-specific impacts and the consistency of industry categorization over time. This required employing the ordinary least squares (OLS) methodology to estimate the aggregated data for each organisation throughout all years.

$$DEP_{i,t} = \beta 0 + \Sigma \beta j ID_{ij} + \beta 1 IND_{i,t} + \beta 2 SIZE_{i,t} + \beta 3 SGROW_{i,t} + \beta 4 GDPR_{i,t} + \beta 5 DEBT_{i,t} + \beta 6 CAR_{i,t} + \beta 7 CLR_{i,t} + \varepsilon_{i,t}$$

In the context at hand, several pivotal variables are at play. Firstly, there exist dependent variables (DEP) that function as crucial indicators of the outcomes under scrutiny. Concurrently, independent variables (ROA or ROIC) hold significant roles as they represent the factors of interest subject to detailed analysis.

Additionally, control variables (IND) encompass INV, ACR, ACP, and CCC, and it's important to note that the names and significance of these variables remain consistent throughout the study. These control variables act as factors that are held constant during the analysis to discern the specific impact of theindependent variables. The ID variables function as specialised dummy variables, unique to differentindustries, with a value of 1 indicating membership in a particular industry and 0 signifying otherwise. It's crucial to mention that the analysis does not encompass variables related to the water provision industry.

When examining the published model coefficients, the analysis exclusively presents coefficients pertaining to the independent variables (ROA or ROIC). This selective presentation results from constraints on available space and does not include control variables, constants, or industry-specific coefficients. Nevertheless, it's essential to acknowledge the consistent statistical significance of control variable coefficients across all models, reaching a confidence level of 99.9%.

This suggests that thesecontrol variables play a substantial role in explaining the variations in the dependent variables. Furthermore, with only five exceptions, the estimated industry-specific coefficients remain statistically significant across all eight models, indicating that certain industries do not significantly deviate from thespecified base industry. This robustness of the findings is highlighted by the results'

consistency, which remains true regardless of whether ROIC or ROA is used as the dependent variable. The analysis's observation of an inverse link between working capital and profitability is another important finding. This research suggests that, typically, a company's profitability tends to increase as it takes steps to shorten the cash conversion cycle (CCC).

Practically speaking, this means that implementing a working capital policy that is assertive and aims to shorten the time it takes to turn assets into cash may be a realistic option for boosting overall profitability. The relevance of effective working capital management as a possible lever for enhancing financial performance across many industries ishighlighted in this conclusion.

**Table 10:** The impact of working capital on ROA and ROIC analyzed through pooled regressions is outlined in the following manner.

| | **ROA** | **ROIC** |
|---|---|---|
| INV | -0.000222144<br>(-36.14)**** | -0.000283088<br>(-21.445)** |
| ACR | -0.000367432<br>(-13.250)**** | -0.00050076<br>(-8.674)**** |
| ACP | -0.000363688<br>(-17.243)**** | -0.00052624<br>(-12.782)*** |
| CCC | -0.000173888<br>(-29.390)**** | -0.000207584<br>(-16.12)** |
| Control variables | Yes | Yes |
| Constant | Yes | Yes |
| Observation No | 61,798 | 61,798 |

Note: A set of dummy variables tailored to industry classifications is referred to as a "industry dummy." In brackets, the t-statistics are shown. Significant levels of 99.9%, 99%, 95%, and 90%, respectively, aredenoted by the symbols ****, ***, **, and *.

**Exploring Non-Linear Consequences**

Working capital levels and profitability have a non-monotonic connection, according to recent studies (Enam et al., 2023). This implies that there is a working capital level that is ideal for maximising profitability. Further regression analyses were performed to investigate whether a relationship existed in the sample.

(1) $ROA_{i,t} = \beta 0 + \beta 3SIZE_{i,t} + \beta 4SGROW_{i,t} + \beta 5DEBT_{i,t} + \beta 6CAR_{i,t} + \beta 7CLR_{i,t} + \beta 8GDPR_{i,t} + \beta 1INV_{i,t} + \beta 2INV2_{i,t} + \upsilon i + \varepsilon i,t$

(2) $ROA_{i,t} = \beta 0 + \beta 3SIZE_{i,t} + \beta 4SGROW_{i,t} + \beta 5DEBT_{i,t} + \beta 6CAR_{i,t} + \beta 7CLR_{i,t} + \beta 8GDPR_{i,t} + \beta 1ACR_{i,t} + \beta 2ACR2_{i,t} + \upsilon i + \varepsilon i,t$

(3) $ROA_{i,t} = \beta 0 + \beta 3SIZE_{i,t} + \beta 4SGROW_{i,t} + \beta 5DEBT_{i,t} + \beta 6CAR_{i,t} + \beta 7CLR_{i,t} + \beta 8GDPR_{i,t} + \beta 1ACP_{i,t} + \beta 2ACP2_{i,t} + \upsilon i + \varepsilon i,t$

(4) $ROA_{i,t} = \beta 0 + \beta 3SIZE_{i,t} + \beta 4SGROW_{i,t} + \beta 5DEBT_{i,t} + \beta 6CAR_{i,t} + \beta 7CLR_{i,t} + \beta 8GDPR_{i,t} + \beta 1CCC_{i,t} + \beta 2CCC2_{i,t} + \upsilon i + \varepsilon i,t$

Previous sections have defined the variables, including dependent, independent, control, and others. The study adopted regression models with squared independent variables, fixed effects, and robust standard errors to provide a fresh perspective.

Table 11 demonstrates a fascinating trend. The ACR, ACP, and CCC variables' squared term coefficientsare similarly statistically significant and have a positive bias. This implies the presence of a substantial quadratic relationship, signifying the existence of a minimum point. Notably, this minimum point issituated at high values of these variables, indicating a decline in ROA as these factors increase overall.

Nevertheless, it's crucial to highlight that the squared variable INV did not exhibit any statistical significance in the findings. Despite the fact that other studies have suggested that these factors have negative correlations, they ultimately arrive at the same conclusion: an increase in CCC leads to a decrease in ROA (Umar & Al-Faryan, 2023).

**Table 11:** testing the impact of WC on ROA using fixed-effects and explore a non-linear relationship.

| | **MODEL 1** | **MODEL 2** | **MODEL 3** | **MODEL 4** |
|---|---|---|---|---|
| INV | -0.00011342<br>(-4.039)**** | | | |
| INV2 | 0.000000047806<br>(1.208)* | | | |
| ACR | | -0.0009646<br>(17.14)**** | | |
| ACR2 | | 0.00000048018<br>(8.088)**** | | |
| ACP | | | -0.00015688<br>(-6.053)**** | |
| ACP2 | | | 0.000000052152<br>(1.823)* | |
| CCC | | | | -0.0001166<br>(-6.869)**** |
| CCC2 | | | | 0.00000013144<br>(4.950)**** |
| SIZE | 0.12614<br>(27.147)**** | 0.1325<br>(43.958)**** | 0.12614<br>(42.315)**** | 0.12614<br>(42.082)**** |
| SGROW | 0.18762<br>(74.592)**** | 0.17702<br>(66.483)**** | 0.18868<br>(73.129)**** | 0.18974<br>(73.352)**** |
| DEBT | -0.3922<br>(-79.50)**** | -0.39008<br>(-44.679)**** | -0.3922<br>(-44.923)**** | -0.39326<br>(-44.944)**** |
| CAR | 0.2703<br>(35.531)**** | 0.27878<br>(36.538)**** | 0.26606<br>(35.022)**** | 0.27242<br>(35.584)**** |
| CLR | 0.13038<br>(17.130)**** | 0.13462<br>(17.617)**** | 0.13568<br>(17.766)**** | 0.12932<br>(16.822)**** |
| C | -1.91224<br>(-40.842)**** | -2.00446<br>(-42.527)**** | -1.92284<br>(-41.022)**** | -1.90906<br>(-40.778)**** |
| Robust Hausmann | 0 | 0 | 0 | 0 |
| F-test Pooled OLS | 0 | 0 | 0 | 0 |
| Observation No | 61,798 | 61,798 | 61,798 | 61,798 |

Note: using fixed effects estimation, with t-statistics in brackets. P-values were determined using robust Hausman values and the F-test, with significance levels denoted by ****, ***, **, and *.

## Discussion and Implications

Working capital management plays a pivotal role in the financial health and stability of SMEs. Examiningthe dichotomy between aggressive and conservative working capital strategies among Hungarian SMEs has provided significant insights into their financial stability and performance (Deari et al., 2022).

The literature emphasises the criticality of this choice and its impact on financial stability, as demonstrated by the relationship between components of the Cash Conversion Cycle (CCC) and profitability indicators like ROA (Eldomiaty et al., 2023). Interestingly, an aggressive approach aiming to minimize the CCC tends to be associated with higher profitability, showcasing a statistically significant inverse relationship between components of the CCC and ROA (Enam et al., 2023).

However, this relationship is not without its complexities. Inventory management challenges and nuances in accounts receivable turnover add layers of intricacy to this dynamic (Wu & Honhon, 2023). Non-linear analysis further highlights a quadratic relationship between certain components of the CCC and ROA, emphasising the complexity of managing these elements effectively (Umar & Al-Faryan, 2023).

The synthesis of qualitative and quantitative aspects enriches our understanding of working capital management in Hungarian SMEs. While theoretical discussions offer a qualitative understanding, empirical evidence provides quantitative insights, supporting the conclusion that optimising working capital efficiency positively impacts financial performance (Mensah & Bein, 2023).

**Implications for the Kurdish Region**

**Strategic Equilibrium for Sustainability**: SMEs in the Kurdish region, like their Hungarian counterparts, face the challenge of balancing aggressive and conservative working capital strategies. Thekey lies in optimising working capital efficiency without compromising long-term financial stability for sustainable growth.

**Complex Relationship and Advanced Forecasting:** The intricate, non-linear relationship observedin Hungarian SMEs could potentially mirror dynamics in the Kurdish region. Developing advanced forecasting models that consider these complexities is vital for accurate predictions of future financial performance among Kurdish SMEs.

**Blend of Qualitative and Quantitative Approaches:** Integrating theoretical insights with empirical evidence is essential for decision-making among SMEs in the Kurdish region. A holistic approach combining qualitative and quantitative methodologies can offer a comprehensive understanding of working capital dynamics.

**Longitudinal Analysis for Adaptation:** Continuous monitoring and analysis of working capital strategies over time are vital for SMEs in the Kurdish region. This ongoing assessment enables adaptation to changing market conditions, ensuring agility in financial operations.

**Risk Management and Sustainable Growth:** Identifying and managing risks associated with aggressive working capital strategies remains essential for sustainable growth among Kurdish SMEs. Balancing growth aspirations with risk mitigation aligns with the global imperative in working capital management.

Applying these implications can potentially aid Kurdish SMEs in navigating their financial strategies, fostering sustained growth and stability in the dynamic business landscape of the region.

## Conclusion

The research conducted on working capital management in Hungarian SMEs from 2007 to 2021 offers significant contributions to the understanding of financial dynamics and performance within this sector. This investigation utilised a comprehensive dataset from over 7,252 Hungarian companies meeting the European Commission's SME standards, focusing on 4,120 privately held, profit-driven SMEs without financial service offerings. Rigorous data screening and cleansing methods ensured a robust datasetconsisting of 61,798 observations over a 15-year period.

The study identified crucial implications forworking capital management and financial performance in SMEs, highlighting the interplay between various financial indicators.

Notably, the research emphasized the intricate relationships among working capital components (inventory days, accounts receivable days, accounts payable days, cash conversion cycle), firm-specific factors (firm size, sales growth, leverage, current assets ratio, current liabilities ratio), and industry-specific GDP growth rates.

The investigation's regression models with fixed effects provided insightful results, uncovering the impact of working capital management indicators on ROA. The correlation matrix revealed strong negative correlations between ROA and components of the cash conversion cycle(inventory, accounts receivable, and accounts payable), underscoring the importance of optimising these components for enhanced financial performance. The industry-wise analysis displayed significant disparities in financial performance, operational efficiency, and capital structure across various sectors in Hungary. Industries such as "provision of water, sewage systems, waste handling, and environmental cleanup services" exhibited strong profitability, while others like "supply of electricity, gas, steam, and air conditioning" showcased lower profitability and efficiency in working capital management. Moreover, while the study primarily focuses on Hungarian SMEs, its implications extend to other regions with similar economic landscapes. The findings offer insights that could be applicable to SMEs in theKurdish region, emphasising the universal importance of optimising cash conversion cycle components regardless of location. The research's comprehensive industry-wise analysis provides valuable insights for stakeholders, investors, and policymakers to understand and strategize within diverse industrial landscapes, not limited to Hungary but potentially relevant in regions like the Kurdish area.

The contributions of this research lie in providing empirical evidence and robust methodologies to comprehend the complexities of working capital management within SMEs. Its implications extend beyond Hungary, offering valuable insights into sustainable working capital strategies, forecasting models, and operational efficiencies applicable to SMEs globally, including regions with analogous economic structures like the Kurdish area. Further research in this domain could explore more granular analyses within industries, investigate the impact of external economic factors on working capital management, and delve into the longitudinaleffects of strategic working capital adjustments on SMEs' long-term sustainability and growth. This research, through its meticulous analysis and robust findings, contributes significantly to the understanding of working capital management dynamics, offering practical implications for SMEs worldwide, including those in regions like the Kurdish area. It serves as a foundational stepping stone for future explorations in this critical area of financial management, transcending geographical boundaries.

## References

Abreu, J. S., Santos, A. O., Medeiros Jr, N., & Gouvea, C. P. (2018). Models for releasing the lupus anticoagulant test. *Jornal Brasileiro de Patologia e Medicina Laboratorial*, *54*, 153-157. doi: https://doi.org/10.5935/1676-2444.20180024

Adams, C., & Lasseigne, D. G. (2018). An extensible mathematical model of glucose metabolism. Part I: the basic glucose-insulin-glucagon model, basal conditions and basic dynamics. *Letters in Biomathematics*, 5(1), 70-90. doi: https://doi.org/10.30707/LiB5.1Adams

Ahmad, A., Abusaimeh, H., Rababah, A., Alqsass, M., Al-Olima, N., & Hamdan, M. (2024). Assessmentof effects in advances of accounting technologies on quality financial reports in Jordanian publicsector. Uncertain Supply Chain Management, 12(1), 133-142.

Ahmad, A. (2024). Ethical implications of artificial intelligence in accounting: A framework for responsible ai adoption in multinational corporations in Jordan. *International Journal of Data andNetwork Science*, 8(1), 401-414.

Ahmad Y. A. Bani Ahmad, "Firm Determinants that Influences Implementation of Accounting Technologies in Business Organizations," WSEAS Transactions on Business and Economics, vol. 21, pp. 1-11, 2024

Ahmad, A. Y. B., William, P., Uike, D., Murgai, A., Bajaj, K. K., Deepak, A., & Shrivastava, A. (2024). Framework for Sustainable Energy Management using Smart Grid Panels Integrated with Machine Learning and IOT based Approach. *International Journal of Intelligent Systems and Applications in Engineering*, *12*(2s), 581-590.

Ahmad, A. B., Atta, A. A. B., Asma'a Al-Amarneh, M. S., & Dahbour, S. A. (2023). Fund Family Selectivity Skills and Market Timing Ability: Comparison Study

Ahmad, A. Y. Bani ahmad, (2019). Empirical Analysis on Accounting Information System Usage in Banking Sector in Jordan. Academy of Accounting and Financial Studies Journal, 23(5), 1-9.

Ahmad, A. Y. B., Gongada, T. N., Shrivastava, G., Gabbi, R. S., Islam, S., & Nagaraju, K. (2023). E-Commerce Trend Analysis and Management for Industry 5.0 using User Data Analysis. *InternationalJournal of Intelligent Systems and Applications in Engineering*, *11*(11s), 135-150.

Alhawamdeh, H., Al-Saad, S. A., Almasarweh, M. S., Al-Hamad, A. A.-S. A., Bani Ahmad, A. Y. A. B.,& Ayasrah, F. T. M. (2023). The Role of Energy Management Practices in Sustainable Tourism Development: A Case Study of Jerash, Jordan. *International Journal of Energy Economics and Policy*, *13*(6), 321–333. https://doi.org/10.32479/ijeep.14724

Allahham, M., & Ahmad, A. (2024). AI-induced anxiety in the assessment of factors influencing the adoption of mobile payment services in supply chain firms: A mental accounting perspective. International Journal of Data and Network Science, 8(1), 505-514.

A. Y. A. B. Ahmad, S. S. Kumari, M. S, S. K. Guha, A. Gehlot and B. Pant, "Blockchain Implementationin Financial Sector and Cyber Security System," 2023 International Conference on Artificial Intelligence and Smart Communication (AISC), Greater Noida, India, 2023, pp. 586-590, https://doi.org/10.1109/AISC56616.2023.10085045

Ahmad, A. Y. B., Atta, A. A. B., Shehadeh, M. A. H. A., Baniata, H. M. A., & Hani, L. Y. B. (2023). Fundfamily performance: Evidence from emerging countries. *WSEAS Trans. Bus. Econ*, *20*, 951-964.

Alarussi, A. S., & Gao, X. (2023). Determinants of profitability in Chinese companies. *International Journal of Emerging Markets*, *18*(10), 4232–4251.

Arhinful, R., & Radmehr, M. (2023). The effect of financial leverage on financial performance: Evidencefrom non-financial institutions listed on the Tokyo stock market. *Journal of Capital Markets Studies*.

Athari, S. A., & Bahreini, M. (2023). The impact of external governance and regulatory settings on the profitability of Islamic banks: Evidence from Arab markets. *International Journal of Finance & Economics*, *28*(2), 2124–2147.

*Bani Atta, A. A., Ali Mustafa, J., Al-Qudah, S. S., Massad, E., & Ahmad, A. B. (2023). The effect of macroprudential regulation on banks' profitability during financial crises [Specialissue]. Corporate Governance and Organizational Behavior Review, 7(2), 245-258.*

Beale, M., & Cunningham, T. (2018). Design Thinking at Daedalus. *Journal of Commercial Biotechnology, 24*(1). doi: https://doi.org/10.5912/jcb854

Bhattacharyya, A., Rahman, M. L., & Wright, S. (2023). Improving small and medium-size enterprise performance: Does working capital management enhance the effectiveness of financial inclusion? *Accounting & Finance*.

Cheng, Congbin, Sayed Fayaz Ahmad, Muhammad Irshad, Ghadeer Alsanie, Yasser Khan, Ahmad Y. A. Bani Ahmad (Ayassrah), and Abdu Rahman Aleemi. 2023. "Impact of Green Process Innovation and Productivity on Sustainability: The Moderating Role of EnvironmentalAwareness" *Sustainability* 15, no. 17: 12945. https://doi.org/10.3390/su151712945

Daoud, M. K., Al-Qeed, M., Ahmad, A. Y. B., & Al-Gasawneh, J. A. (2023). Mobile Marketing: Exploring the Efficacy of User-Centric Strategies for Enhanced Consumer Engagement and Conversion Rates. *International Journal of Membrane Science and Technology*, *10*(2), 1252-1262.

Daoud, M., Taha, S., Al-Qeed, M., Alsafadi, Y., Ahmad, A., & Allahham, M. (2024). EcoConnect: Guiding environmental awareness via digital marketing approaches. *International Journal of Data and Network Science*, *8*(1), 235-242.

De Blick, T., Paeleman, I., & Laveren, E. (2023). Financing constraints and SME growth: The suppression effect of cost-saving management innovations. Small *Business Economics*, 1–26.

Deari, F., Kukeli, A., Barbuta-Misu, N., & Virlanuta, F. O. (2022). Does working capital management affect firm profitability? Evidence from European Union countries. *Journal of Economic and Administrative Sciences*.

Deb, P., Naskar, S., Devaraj, S., & Basu, P. (2023). Impact of working capital on firm performance: Does IT matter? *Journal of Operations Management*.

Eckert, C., & Hohberger, J. (2023). Addressing endogeneity without instrumental variables: An evaluation ofthe gaussian copula approach for management research. *Journal of Management*, *49*(4), 1460–1495.

Eldomiaty, T., Eid, N., Taman, F., & Rashwan, M. (2023). An Assessment of the Benefits of Optimizing Working Capital and Profitability: Perspectives from DJIA30 and NASDAQ100. *Journal of Risk and Financial Management*, *16*(5), 274.

Enam, M., Shajar, S. N., & Das, N. (2023). Non-Monotonic Relationship between Corporate Governance and Banks' Operating Performance—The Moderating Role of CEO Duality: Evidence from Selected Countries. *Sustainability*, *15*(7), 5643.

Fraihat, B. A. M., Ahmad, A. Y. B., Alaa, A. A., Alhawamdeh, A. M., Soumadi, M. M., Aln'emi, E. A. S.,& Alkhawaldeh, B. Y. S. (2023). Evaluating Technology Improvement in Sustainable Development Goals by Analysing Financial Development and Energy Consumption in Jordan. International Journal of Energy Economics and Policy, 13(4), 348

Habib, A. M., & Dalwai, T. (2023). Does the efficiency of a firm's intellectual capital and working capital management affect its performance? *Journal of the Knowledge Economy*, 1–37.

Hatane, S. E., Winoto, J., Tarigan, J., & Jie, F. (2023). Working capital management and board diversity towards firm performances in Indonesia's LQ45. *Journal of Accounting in Emerging Economies*, *13*(2), 276–299.

Jabbouri, I., Benrqya, Y., Satt, H., Naili, M., & Omari, K. (2023). Determinants of working capital management for emerging markets firms: Evidence from the MENA region. *Journal of Economic and Administrative Sciences*.

Kalash, I. (2023). The financial leverage–financial performance relationship in the emerging market of Turkey: The role of financial distress risk and currency crisis. *EuroMed Journal of Business*, *18*(1), 1–20.

Karacsony, P. (2023). The impact of COVID-19 crisis on Hungarian small-and medium-sized enterprises. *International Journal of Entrepreneurship and Small Business*, *50*(2), 243–261.

Kayani, U. N., Gan, C., Rabbani, M. R., & Trichilli, Y. (2023). Is short-term firm performance an indicator of a sustainable financial performance? Empirical evidence. *Studies in Economics and Finance*

Khan, Yasser, et al. "Application of Internet of Things (IoT) in Sustainable Supply Chain Management." Sustainability 15.1 (2022): 694. https://doi.org/10.3390/su15010694

Kovach, J. J., Swink, M., & Rodriguez, M. (2023). Delaying supplier payments to increase buyer profits. *Journal of Supply Chain Management*, *59*(1), 26–47.

Lin, C., Ahmad, S. F., Ayassrah, A. Y. B. A., Irshad, M., Telba, A. A., Awwad, E. M., & Majid, M. I.(2023). Green production and green technology for sustainability: The mediating role of waste reduction and energy use. Heliyon, e22496.

M. K. Daoud, D. . Alqudah, M. . Al-Qeed, B. A. . Al Qaied, and A. Y. A. B. . Ahmad, "The Relationship Between Mobile Marketing and Customer Perceptions in Jordanian Commercial Banks: The Electronic Quality as A Mediator Variable", ijmst, vol. 10, no. 2, pp. 1360-1371, Jun. 2023

Mustafa, J. A., ATTA, A. A. B., AHMAD, A. Y. B., SHEHADEH, M., & Agustina, R. (2023). Spillover Effect in Islamic and Conventional Fund Family: Evidence from Emerging Countries. *WSEAS Transactions on Business and Economics*, *20*, 1042-1058.

Mohsin, H. J., Hani, L. Y. B., Atta, A. A. B., Al-Alawnh, N. A. K., Ahmad, A. B., & Samara, H. H.(2023). THE IMPACT OF DIGITAL FINANCIAL TECHNOLOGIES ON THE DEVELOPMENT OF ENTREPRENEURSHIP: EVIDENCE FROM COMMERCIAL BANKS IN THE EMERGING MARKETS.

Mansikkamäki, S. (2023). Firm growth and profitability: The role of age and size in shifts between growth–profitability configurations. *Journal of Business Venturing Insights*, *19*, e00372.

Mehzabin, S., Shahriar, A., Hoque, M. N., Wanke, P., & Azad, M. A. K. (2023). The effect of capital structure, operating efficiency and non-interest income on bank profitability: New evidence fromAsia. *Asian Journal of Economics and Banking*, *7*(1), 25–44.

Mensah, L., & Bein, M. A. (2023). Sound Corporate Governance and Financial Performance: Is There a

Link? Evidence from Manufacturing Companies in South Africa, Nigeria, and Ghana. *Sustainability*, *15*(12), 9263.

Morshed, A. (2020). Role of working capital management in profitability considering the connection between accounting and finance. *Asian Journal of Accounting Research*, *5*(2), 257-267.

Ni, L., Ahmad, S. F., Alshammari, T. O., Liang, H., Alsanie, G., Irshad, M., ... & Ayassrah, A. Y. B. A. (2023). The role of environmental regulation and green human capital towards sustainable development: The mediating role of green innovation and industry upgradation. Journal of Cleaner Production, 138497.

Peng, Yixuan, Sayed Fayaz Ahmad, Ahmad Y. A. Bani Ahmad, Mustafa S. Al Shaikh, Mohammad KhalafDaoud, and Fuad Mohammed Hussein Alhamdi. 2023. "Riding the Waves of Artificial Intelligence in Advancing Accounting and Its Implications for Sustainable Development Goals" *Sustainability* 15,no. 19: 14165. https://doi.org/10.3390/su151914165

Pant, P., Rathore, P., Dadsena, K. kumar, & Shandilya, B. (2023). Working capital and firm performance:Role of COVID-19 disruption. *International Journal of Productivity and Performance Management*.

Papke, L. E., & Wooldridge, J. M. (2023). A simple, robust test for choosing the level of fixed effects in linear panel data models. *Empirical Economics*, *64*(6), 2683–2701.

Pham, L. H., & Hrdý, M. (2023). Determinants of SMEs capital structure in the Visegrad group. *Economic Research-Ekonomska Istraživanja*, *36*(1), 2166969.

Radovanov, B., Milenković, N., Kalaš, B., & Horvat, A. M. (2023). Do the Same Determinants Affect Banks' Profitability and Liquidity? Evidence from West Balkan Countries Using a Panel Data Regression Analysis. *Mathematics*, *11*(19), 4072.

Ramadan, A., & Morshed, A. (2023). *Working Capital Management Roles for Multinational Retail Industry Profitability: A Qualitative Study, Worldwide Perspective. Information Sciences Letters, 12*(10).

Safan, M., Murillo, A. L., Wadhera, D., & Castillo-Chavez, C. (2018). Modeling the diet dynamics of children: the roles of socialization and the school environment. *Letters in Biomathematics*, *5*(1), 275. doi: https://doi.org/10.30707/LiB5.1Safan

Sathyamoorthi, C. R., Mbekomize, C. J., & Bakwenabatsile, L. (2023). Impact of cash conversion cycle on financial performance: An empirical study of listed companies in Botswana. *Afro-Asian Journal ofFinance and Accounting*, *13*(4), 415–433.

Schmuck, R. (2023). Comparison of the use of ICT resources of ISO 9001 certified SMEs and non-certified SMEs in Hungary. *International Journal of Productivity and Quality Management*, *38*(4), 545–562.

Sun, C., Khan, A., & Ren, Y. (2023). Empowering Progress: Education, innovations and financial development in the battle against energy poverty. *Journal of Cleaner Production*, *425*, 138941.

Tarkom, A., & Yang, L. (2023). Investor Sentiment and Cash Conversion Cycle: The Mediating Role of Macroeconomic, Financial, and Real Activity Uncertainties. *Journal of Behavioral Finance*, 1–13.

Toth, R., Kasa, R., & Lentner, C. (2023). Validating the Financial Literacy Index of Hungarian SMEsduring the COVID-19 Pandemic and the Russian–Ukrainian War. *Risks*, *11*(4), 69.

Umar, U. H., & Al-Faryan, M. A. S. (2023). The impact of working capital management on the profitability of listed halal food and beverage companies. *Managerial Finance*.

Viegas, D. M., & Soares, V. M. (2018). Prevalence of carbapenemase in Enterobacteriaceae with decreased susceptibility to carbapenems isolated in a tertiary referral hospital. *Jornal Brasileiro de Patologia e Medicina Laboratorial*, *54*, 95-98. doi: https://doi.org/10.5935/1676-2444.20180017

Wager, R. (2018). The'Future of Food" is Genetic Engineering! *Journal of Commercial Biotechnology*, *24*(3). doi: https://doi.org/10.5912/jcb862

Wetzels, R. W., & Wetzels, M. (2023). There is a secret to success: Linking customer experience management practices to profitability. *Journal of Retailing and Consumer Services*, *73*, 103338.

Wu, Q., & Honhon, D. (2023). Don't waste that free lettuce! Impact of BOGOF promotions on retail profit and food waste. *Production and Operations Management*, *32*(2), 501–523.

Wu, Q., Yan, D., & Umair, M. (2023). Assessing the role of competitive intelligence and practices of dynamic capabilities in business accommodation of SMEs. *Economic Analysis and Policy*, *77*, 1103–1114.

William, P., Ahmad, A. Y. B., Deepak, A., Gupta, R., Bajaj, K. K., & Deshmukh, R. (2024). Sustainable Implementation of Artificial Intelligence Based Decision Support System for Irrigation Projects in the Development of Rural Settlements. International Journal of Intelligent Systems and Applications in Engineering, 12(3s), 48-56.

Wang, C., Ahmad, S. F., Ayassrah, A. Y. B. A., Awwad, E. M., Irshad, M., Ali, Y. A., ... & Han, H. (2023). An empirical evaluation of technology acceptance model for Artificial Intelligence in E-commerce. Heliyon, 9(8).

Yahiya Ahmad Bani Ahmad (Ayassrah), Ahmad; Ahmad Mahmoud Bani Atta, Anas; Ali Alawawdeh, Hanan; Abdallah Aljundi, Nawaf; Morshed, Amer; and Amin Dahbour, Saleh (2023) "The Effect of System Quality and User Quality of Information Technology on Internal Audit Effectiveness inJordan, And the Moderating Effect of Management Support," *Applied Mathematics & Information Sciences*: Vol. 17: Iss. 5, Article 12.DOI: https://dx.doi.org/10.18576/amis/170512

Yilmaz, I., & Nobanee, H. (2023). Determinants of cash conversion cycle in MENA countries. *ManagerialFinance*, *49*(7), 1148–1168.