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Article

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Financial Internet Quarterly

Provided in Cooperation with:

University of Information Technology and Management, Rzeszów

Suggested Citation: Yousaf, Muhammad (2022) : Working capital management efficiency: A study of certified firms from the EFQM Excellence Model, Financial Internet Quarterly, ISSN 2719-3454, Sciendo, Warsaw, Vol. 18, Iss. 3, pp. 21-34, <https://doi.org/10.2478/fiqf-2022-0017>

This Version is available at:

<https://hdl.handle.net/10419/266905>

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WORKING CAPITAL MANAGEMENT EFFICIENCY: A STUDY OF CERTIFIED FIRMS FROM THE EFQM EXCELLENCE MODEL¹

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Abstract

Working capital management (WCM) plays an important role in a firm's value, financial risk, and firm profitability. WCM requires continuous management to maintain a certain level of the numerous components of working capital (WC). The main aim of this study is to estimate the efficiency of WCM of certified firms from the European Foundation for Quality Management (EFQM) Excellence Model. The study also tests the speed to attain each firm's target level of efficiency using industry norms as the target level of efficiency. The financial data of the Czech certified firms from the manufacturing sector was derived from the CRIBIS database from 2015 to 2020. The efficiency of WCM is measured by utilization index (UI), performance index (PI), and efficiency index (EI). The findings revealed that Gerresheimer Horsovsy Tyn Spol., Miele Technika, and Koyo Bearings Česká Republika efficiently managed WC, as their indexes are greater than 1. The number of efficient firms was the lowest in 2020 based on the year-wise comparison which means that the efficiency of WCM of the firms was severely affected by the coronavirus pandemic (COVID-19). All the β values are lower than one, which signifies that none of the selected firms outperform the manufacturing industry as a whole. The findings of the current research are useful to the management of the firms and recommends that they give importance to the different indexes of WCM and efficiently use the current assets to generate sales.

JEL classification: G00, L15, L60

Keywords: quality management, working capital, manufacturing sector, COVID-19, EFQM Model

Received: 28.05.2022

Accepted: 25.07.2022

Cite this:

Yousaf M. (2022) Working capital management efficiency: a study of certified firms from the EFQM excellence model. Financial Internet Quarterly 18 (3), pp. 21-34.

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¹Funding: This work was supported by Internal Grant Agency (IGA) in Tomas Bata University in Zlin; Czech Republic, under the project No IGA/FAME/2021/008.

Data availability statement: The data that support the findings of this study are available at the CRIBIS database homepage, <https://www.cribis.com>.

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INTRODUCTION

Total quality management (TQM) is a continuous process that improves the quality of services and output. It is an approach that seeks to improve quality and performance through customers' expectations and satisfaction (Zink, 2012). The EFQM Excellence Model is one of the most effective quality models to measure the TQM approach. The European Foundation was established in 1989; however, the first Excellence Award was given by the Foundation in 1992 (Magd et al., 2021). The Foundation is well-known globally for giving quality certificates and quality awards. It is the most famous European Foundation to implement TQM in European firms (Westlund, 2001). There are numerous advantages and achievements to implementing the model in the firms (Asadi, 2020). Many firms obtain quality certificates and awards from the Foundation worldwide every year. Several researchers have explored how the awarded firms perform better than non-awarded firms (Zhang et al., 2021; Asadi, 2020; Augustyn et al., 2019; Boulter et al., 2013; Hendricks & Singhal, 2001). The same findings have been reported in the prior literature that quality certified firms also perform better than non-certified firms (Yousaf, 2022; Yousaf, 2021; Yousaf & Bris, 2021a; Yousaf & Bris, 2020).

The European Foundation is popular worldwide for implementing TQM, but Czech firms are not interested in implementing TQM. Therefore, Czech firms don't acquire any global quality awards and do not compete with neighboring countries' firms in the context of TQM (Nenadál et al., 2018). However, the Czech firms have different quality certifications from the European Foundation, which are very important to obtain the EFQM Global Awards. Around 11 Czech firms are included from the manufacturing sector in the present study that have quality certificates from the European Foundation.

Working capital management (WCM) is related to a firm's operating activities, and it signifies a firm's operating liquidity. WCM level is one of the most critical decisions that directors, managers, and policymakers make. Efficient management of working capital (WC) is one of the most important factors of overall corporate strategy that affects the firm's profitability and value. A firm tries to keep an optimum level of WC that maximizes its value. The main objective of WCM is to maintain an optimal balance between each of the WC components. Therefore, a firm's success or failure heavily depends on the capability of financial executives to efficiently manage payables, inventory, and receivables.

Certified firms from the manufacturing sector are selected in the current study as the sector belongs among the labour-intensive as well as capital-intensive sectors. There are many specific characteristics of the sector, such as a large amount of investment, a high operating risk, a long development cycle, etc. Therefore, the manufacturing sector needs to improve the efficiency of WCM in order to improve the competitiveness of the sector. Additionally, the manufacturing sector is selected as it contributes more than 20% of the Czech Republic's gross domestic product (GDP). According to World Bank Statistics, the share of the manufacturing sector was around 20.84% of the Czech Republic's GDP in 2020.

This research analyses the WCM efficiency of certified firms from the European Foundation of the manufacturing sector. WCM is a mammoth topic, but there is rare empirical literature on the efficiency of WCM, specifically for quality-certified firms. However, the present research is going to fill this gap. To the best of our knowledge, this is the first research that emphasizes the WCM for certified firms separately in a comprehensive analysis. The precise objectives of the present study are:

- 1) To examine the efficiency of WCM practices of the certified firms in the manufacturing sector.
- 2) To test how fast the certified firms have improved their respective level of efficiency in WCM in the context of achieving a target level (industry average). In this way, the current research contributes to better understanding the efficiency indexes of the WCM of the certified firms from the manufacturing sector.

After the introduction, the paper is divided into four main sections. The second section is literature review that analyses the theoretical background. The research methodology section presents the database information, sample selection, and the calculation of different indexes of WCM. The empirical results section contains the empirical findings of the different indexes of WCM and regression results. The last section is focused on the conclusion of the research with concluding remarks, further study, and limitations of the current study.

LITERATURE REVIEW

A firm may implement WCM policies that are either aggressive or conservative. Brigham and Houston (2015) argued that the conservative WCM policies use low current liabilities and high current assets. The WCM with the conservative policy comes with low risk,

but the profitability is also low. Conversely, the aggressive WCM policies use lower current assets than long-term assets or investments and have a high level of current liabilities to finance its current assets (or fixed assets sometimes). The aggressive WCM decision comes with higher profitability but the risk is also higher. S.M. Abbadi and R. Abbadi (2013) stated that there are several factors that affect WCM, and they change over time. According to Nwude et al. (2020), efficient WCM controls and plans current liabilities and current assets to decrease the risk of insolvency and to avoid excessive borrowing and unnecessary investments. Eljelly (2004) mentioned that efficient WCM revolved around monitoring current assets and liabilities in such a way as to keep the firms from excessively spending on assets and to minimize the potential debt.

WCM is a significant topic in academic research and application; however, the topic became more important worldwide after the financial crises (2007-2009) and in the current COVID-19 pandemic situation. Some researchers stated that about 89% of research on this topic is quantitative (Kayani et al., 2019; Simon et al., 2021). García-Teruel and Martínez-Solano (2007) and Raheman and Nasr (2007) claimed that the literature on WC is limited in scope; however, most authors' research focused on finding the relationship between WCM and firm profitability (performance).

To study the relationship between WCM and firm profitability, many researchers considered WC as a dependent variable (Jaworski & Czerwonka, 2022b; Sardo & Serrasqueiro, 2021; Sharma et al., 2020; Kinasih et al., 2019; Nyeadi et al., 2018; Singh & Kumar, 2017; S.M. Abbadi & R. Abbadi, 2013). On the other hand, some scholars used WC as an independent variable (Thi & Phung, 2021; Rey-Ares et al., 2021; Senan et al., 2021; Farhan et al., 2021; Chauhan, 2021; Fernández-López et al., 2020; Pham et al., 2020; Högerle et al., 2020). Numerous researchers employed components of WC, which are days sales outstanding, cash conversion cycle, days inventory outstanding, and days payable outstanding, to examine the relationship between WCM and firm profitability (Banerjee et al., 2021; Yousaf et al., 2021; Högerle et al., 2020; Goel & Sharma, 2015).

The previous literature has demonstrated both positive and negative results regarding the relationship between WRC and firm performance. Various researchers reported a positive relationship between WRC and firm performance (Jaworski & Czerwonka, 2022a; Pham et al., 2020; Kinasih et al., 2019; Nyeadi et al., 2018; Singh & Kumar, 2017). On the other hand, some studies reported a negative relationship between the two

(Soukhakian & Khodakarami, 2019; Seth et al., 2020). According to Dalci and Ozyapici (2018), the mixed results by some researchers may be because of the impact of leverage that they did not include in their studies. Baños-Caballero et al. (2010) stated the negative relationship between the variables is easy for profitable firms to raise external capital. In this way, the firms try to keep the cash level at a minimum.

The concept of measuring the efficiency of WCM was introduced by Bhattacharya (1997). Later on, many scholars have used the concept to examine the efficiency of WCM, such as Kasiran et al. (2016); Kaur and Singh (2013); Valipour and Jamshidi (2012); Afza and Nazir (2011); Anandasayanan (2011); Ramachandran and Janakiraman (2009); Ghosh and Maji (2004). These scholars employed different sectors to study the efficiency of WCM. For instance, the studies by Afza and Nazir (2011); Ghosh and Maji (2004) used data from the cement sector; Ramachandran and Janakiraman (2009) derived data from the paper industry, and Kaur and Singh (2013) obtained data from the capital goods sector.

The automotive sector (which is a part of the manufacturing sector) has been reporting weak sales due to COVID-19. According to Bhattacharyay (2021), Toyota Motor Corporation predicted annual profit for 2021 would decrease by 80% because of the pandemic. In 2020, around 16,111 companies were shut down in the Czech Republic due to the COVID-19, the highest number in the country's history in a year (CRIBIS statistics). Similar to the financial crises in 2007-2009, the current pandemic situation is alarming for the manufacturing sector. On one side, prior studies show that quality-certified firms perform better. On the other hand, it would be interesting to explore how certified firms efficiently utilize the WC in the current pandemic. As discussed above, various researchers have examined the relationship between WCM and the firm's profitability. Instead of employing the traditional relationship, the current study used different indexes to examine the efficiency of WCM of the certified firms.

RESEARCH METHODOLOGY

DATA AND SAMPLE

The secondary data was retrieved from the CRIBIS database from 2015 to 2020. Many scholars have employed the data from the CRIBIS database (Virglerová et al., 2022; Tešovičová & Krchová, 2022; Dvorský et al., 2022; Elexa et al., 2022; Kotaskova et al., 2020; Civelek et al., 2020; Ključnikov et al., 2022; Yousaf & Bris, 2021b). There are only 11 firms in the current study

that have quality certificates from the European Foundation. However, the number of firms in the previous literature was also small for the analysis. For instance, Yousaf (2022) included 18 certified firms, Yousaf and Bris (2021a) included 20 certified firms, Afza and Nazir (2011) included 21 firms, and Kaur and Singh (2013) included 14 firms.

Table 1 displays the information about the selected firms with the quality certificate category. The information about the selected firms was obtained from the EFQM recognition database. The automotive is part of the manufacturing sector. However, it is mentioned in the certification category separately in the EFQM recognition database. Therefore, it is also mentioned separately in Table 1.

Table 1: Selected firms’ information with quality certificate category

Firm’s Name	Quality Certificate Category	Sector
Fraenkische CZ	Committed to Excellence 2 Star	Automotive
Gerresheimer Horsovsy Tyn Spol.	Committed to Excellence 2 Star	Automotive
Hyundai Motor Manufacturing	Recognised for Excellence 5 Star	Automotive
Iveco Czech Republic	Recognised for Excellence 4 Star	Automotive
Kasko Spol.	Recognised for Excellence 5 Star	Automotive
Kermi	Recognised for Excellence 4 Star	Manufacturing
Koyo Bearings Česká Republika	Recognised for Excellence 5 Star	Automotive
Maxion Wheels Czech	Committed to Sustainability 2 Star	Automotive
Miele Technika	Recognised for Excellence 5 Star	Manufacturing
Pierburg	Recognised for Excellence 5 Star	Automotive
První Brněnská Strojírna Velká Bíteš	Recognised for Excellence 4 Star	Manufacturing

Source: Own elaboration.

PERFORMANCE INDEX, UTILIZATION INDEX, AND EFFICIENCY INDEX

Following Bhattacharya (1997), first of all, the Utilization Index (UI) of WCM was calculated as follows:

$$WCM_{UI(it)} = \frac{A_{t-1}}{A_t} \tag{1}$$

Where, A = current assets/sales, and t = time from 2015 to 2020.

The following five components are included in the current assets: inventory, cash, accounts receivables, short-term marketable securities, and other current assets.

WCM_{UI} describes as the ability of a firm to generate sales by utilizing the current asset. Next to measure the efficiency of WCM is the Performance Index (PI), which can be calculated as:

$$WCM_{PI(it)} = \frac{I_s \sum \frac{W_{i(t-1)}}{W_{it}}}{N} \tag{2}$$

In (2), I_s represents Sales Index, which is defined as: S_t / S_{t-1}, W_i = Individual group of current assets, N = Number of current assets group, and i = 1,2,3, ... n.

WCM_{PI} demonstrates the average performance index of the numerous items in the current assets. Finally, the Efficiency Index (EI) of WCM was calculated by multiplying the PI with UI as follows.

$$WCM_{EI(it)} = WCM_{UI(it)} \times WCM_{PI(it)} \tag{3}$$

WCM_{EI} is a measurement of the ultimate efficiency level of the selected certified firms. If the value of WCM_{UI}, WCM_{PI}, and (or) WCM_{EI} of the firm is greater than 1, it can be concluded that the firm utilized its current assets efficiently to generate sales. Moreover, the following regression model examines the firm’s efficiency in achieving the target level of efficiency during the study period.

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon \quad (4)$$

Where $Y_{it} = Z_{it} - Z_{it-1}$, $X_{it} = Z^*t - Z_{it-1}$, Z_{it} = Index at time t for firm i , Z^*t = Average index at a previous time ($t-1$).

In (4), β is the coefficient that signifies the speed of an individual firm in improving its efficiency. If $\beta = 1$ for a firm, then the degree of firms' efficiency in managing WC is the same as the average efficiency level. In the same way, if $\beta < 1$, it shows the need for further improvements in WCM by the firm. The STATA software is used to estimate the results.

EMPIRICAL RESULTS

Table 2 displays the measuring efficiency of WCM of all three indexes with the minimum and maximum values. Table 2 reveals that Iveco Czech Republic has a minimum of UI, Fraenkische CZ has a minimum of PI, and Kasko Spol. has a minimum value of EI. Miele Technika has the maximum values of all indexes: UI, PI, and EI. There is variation in the minimum and maximum values of the three indexes of WCM; however, Fraenkische CZ, Gerresheimer Horsovsky Tyn Spol., Kasko Spol., Kermi, Koyo Bearings Česká Republika, Maxion Wheels Czech, Miele Technika, and První Brněnská Strojírna Velká Bíteš have the maximum value is greater than 1 in all components of WCM. On the other hand, the Iveco Czech Republic and Pierburg have a maximum value below 1 in all indexes of WCM.

Table 2: Indexes values of certified firms: 2016-2020

Firm's Name	Utilization index		Performance index		Efficiency index	
	Min	Max	Min	Max	Min	Max
Fraenkische CZ	0.968 (2019)	2.370 (2016)	0.240 (2017)	1.605 (2018)	0.892 (2020)	1.168 (2018)
Gerresheimer Horsovsky Tyn spol.	0.767 (2019)	1.299 (2018)	0.945 (2017)	1.202 (2020)	0.789 (2019)	1.350 (2018)
Hyundai Motor Manufacturing	0.799 (2020)	1.026 (2019)	0.876 (2020)	0.906 (2017)	0.700 (2020)	0.926 (2019)
Iveco Czech Republic	0.361 (2016)	0.939 (2019)	0.833 (2020)	0.965 (2019)	0.763 (2020)	0.906 (2019)
Kasko Spol.	0.752 (2020)	1.039 (2017)	0.725 (2020)	1.026 (2017)	0.545 (2020)	1.065 (2017)
Kermi	0.366 (2016)	1.046 (2017)	0.923 (2020)	1.005 (2017)	0.817 (2018)	1.050 (2017)
Koyo Bearings Česká Republika	0.978 (2018)	3.151 (2016)	0.873 (2020)	1.066 (2017)	0.698 (2020)	1.074 (2017)
Maxion Wheels Czech	0.947 (2019)	1.366 (2016)	0.901 (2020)	1.001 (2016)	0.878 (2020)	1.041 (2018)
Miele Technika	0.896 (2017)	3.647 (2016)	1.098 (2018)	1.329 (2017)	1.121 (2017)	1.881 (2016)
Pierburg	0.672 (2018)	0.979 (2016)	0.800 (2019)	0.849 (2017)	0.574 (2018)	0.794 (2017)
První Brněnská Strojírna Velká Bíteš	0.790 (2017)	1.153 (2020)	0.807 (2017)	1.095 (2019)	0.638 (2017)	1.205 (2020)

Source: Own elaboration.

Table 3 shows the average values of all components of WCM of the selected certified firms. During the study period, the highest average index of WCM is for Miele Technika, followed by Gerresheimer Horsovsky Tyn Spol. Conversely, Hyundai Motor Manufacturing, Iveco Czech Republic, Kasko Spol., Kermi, Pier-

burg, and První Brněnská Strojírna Velká Bíteš are considered less efficient firms, as these firms have an average value of indexes of WCM is below than 1 during 2016-2020. These findings show a need for improvement of all the selected certified firms except Miele Technika and Gerresheimer Horsovsky Tyn Spol.

Table 3: Average Indexes values of certified firms: 2016-2020

Firm's Name	Utilization index	Performance index	Efficiency index
Fraenkische CZ	1.279	0.789	0.805
Gerresheimer Horsovsky Tyn Spol.	1.038	1.054	1.118
Hyundai Motor Manufacturing	0.909	0.895	0.802
Iveco Czech Republic	0.806	0.920	0.845
Kasko Spol.	0.873	0.913	0.843
Kermi	0.844	0.964	0.930
Koyo Bearings Česká Republika	1.403	0.970	0.940
Maxion Wheels Czech	1.050	0.973	0.945
Miele Technika	1.710	1.258	1.513
Pierburg	0.968	0.829	0.687
První Brněnská Strojírna Velká Bíteš	0.973	0.972	0.958

Source: Own elaboration.

Table 4 shows the number of efficient firms of all three indexes of WCM. The average values of the three indexes of WCM are shown in Table 4 from 2016 to 2020. Many firms were efficient in 2016. However,

most of the firms were not efficient in 2020, comparing the firms by year-wise understudy period. These findings revealed that the certified firms were affected by COVID-19.

Table 4: Number of efficient firms from 2016 to 2020

Year	Utilization index		Performance index		Efficiency index	
	Efficient firms	Percentage	Efficient firms	Percentage	Efficient firms	Percentage
2016	6	54.55	4	36.36	5	45.45
2017	4	36.36	4	36.36	5	45.45
2018	4	36.36	5	45.45	5	45.45
2019	3	27.27	4	36.36	4	36.36
2020	2	18.18	3	27.27	3	27.27

Source: Own elaboration.

Table 5 reports the findings of WCM_{UI} for each of the certified firms from the EFQM Model. Table 5 displays the constant value, β , and R^2 of the models estimated for each firm in the selected sample. Therefore, 11 regressions are estimated for each of the three WCM indexes employed in the current study. The R^2 value shows how well the regression model explains the observed data. Generally, the higher value of R^2 , the better the regression model fits the observations. Moksony and Szemle (1990) argued that a good model can have a low R^2 value and a biased model may have a high R^2 value.

The estimated values of WCM_{UI} of the certified firms show that UI of WCM ranges from 8.6% (Fraenkische CZ) to 41.2% (Kasko Spol.). It could be observed that the certified firms have not utilized their current assets efficiently to generate sales. Moreover, the results show that none of the selected firms have obtained the β value greater than one or close to one (outperforming the manufacturing industry as a whole). Therefore, an improvement is needed in the UI of WCM for the certified firms. The ranking of the firms in the context of β values revealed that Kasko Spol. has positioned itself as the top firm, followed by the Iveco Czech Republic and Maxion Wheels Czech in the context of current assets utilization.

Table 5: Regression results - Utilization Index

Firm's Name	Constant	β	R ²
Fraenkische CZ	-7.048 (7.525)	8.567* (7.737)	0.290
Gerresheimer Horsovsy Tyn Spol.	-1.861 (2.513)	12.982 (2.584)	0.308
Hyundai Motor Manufacturing	0.104 (1.291)	19.142** (1.327)	0.040
Iveco Czech Republic	3.556 (3.277)	32.829*** (3.370)	0.190
Kasko Spol.	2.062 (1.835)	41.223* (1.886)	0.123
Kermi	5.266 (3.132)	14.549* (3.220)	0.395
Koyo Bearings Česká Republika	-10.315 (12.683)	11.870** (13.040)	0.216
Maxion Wheels Czech	-1.641 (2.102)	32.716 (2.161)	0.351
Miele Technika	-17.338 (12.233)	19.596** (12.578)	0.447
Pierburg	-0.756 (4.776)	11.774* (4.910)	0.042
První Brněnská Strojírna Velká Bíteš	6.490 (5.756)	25.887*** (5.918)	0.247

Note: Standard errors are in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Own elaboration.

Table 6 displays the results of WCM_{PI} for all the selected quality-certified firms from the EFQM Excellence Model. Similar to Table 5, Table 6 displays the values of constant, β , and R² for each firm in the selected sample. The values of R² range from 0.128 to 0.366. Pierburg has the highest value of R² (0.366); conversely, Kasko Spol. has the lowest value of R². The estimated values of WCM_{PI} of the certified firms show that PI of WCM ranges from 13.12% (První Brněnská Strojírna

Velká Bíteš) to 44.36% (Kermi). According to β values, the ranking of the firms shows that Kermi has the highest β value, followed by Kasko Spol. and Miele Technika. However, none of the selected firms' β values are close to one or higher than one (outperforming the manufacturing industry as a whole). Therefore, similar to the WCM_{UI} , an improvement is needed in the WCM_{PI} .

Table 6: Regression results - performance index

Firm's Name	Constant	β	R ²
Fraenkische CZ	0.088 (1.109)	30.504 (1.006)	0.277
Gerresheimer Horsovsy Tyn spol.	-0.005 (1.045)	18.788** (0.948)	0.178
Hyundai Motor Manufacturing	0.312 (0.849)	20.375* (0.936)	0.261
Iveco Czech Republic	0.478 (0.989)	19.239** (0.891)	0.223
Kasko Spol.	0.693 (1.022)	39.034*** (0.927)	0.128
Kermi	0.384 (1.018)	44.359* (0.924)	0.151

Koyo Bearings Česká Republika	0.480 (1.053)	15.274** (0.955)	0.325
Maxion Wheels Czech	0.461 (1.034)	29.294 (0.943)	0.131
Miele Technika	0.355 (1.323)	32.604** (1.201)	0.178
Pierburg	0.273 (0.867)	19.362 (0.876)	0.366
První Brněnská Strojírna Velká Bíteš	0.837 (0.336)	13.122* (0.295)	0.182

Note: Standard errors are in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Own elaboration.

Table 7 shows the regression results of EI of WCM for the individually certified firms. Similar to Tables 5 and 6, Table 7 displays the constant value, β , and R^2 of the models estimated for separate each firm. It can be observed from Table 7 that R^2 values lie between 0.131 to 0.512, where Koyo Bearings Česká Republika has the highest value of R^2 and Gerresheimer Horsovsky Tyn Spol. has the lowest R^2 value. The estimated values of EI of WCM illustrate that WCM_{EI} ranges from 13.77% (Maxion Wheels Czech) to 38.25% (Pierburg). The firms

have not employed their current assets well to generate sales. The findings show that all the β values are lower than one, which signifies that none of the certified firms outperform the manufacturing industry as a whole. Hence, there is also a need for improvement in WCM_{EI} for certified firms. The ranking of the firms with respect to β values indicates that Pierburg has the highest β value, followed by Gerresheimer Horsovsky Tyn Spol. and Miele Technika.

Table 7: Regression results - efficiency index

Firm's Name	Constant	β	R^2
Fraenkische CZ	-0.225 (4.267)	13.901 (4.415)	0.214
Gerresheimer Horsovsky Tyn Spol.	-2.158 (4.552)	32.165** (4.771)	0.131
Hyundai Motor Manufacturing	2.349 (2.991)	21.770 (3.101)	0.398
Iveco Czech Republic	1.797 (3.205)	19.163 (3.317)	0.244
Kasko Spol.	2.947 (3.373)	22.365** (3.490)	0.132
Kermi	1.790 (3.587)	20.085* (3.718)	0.327
Koyo Bearings Česká Republika	2.252 (3.714)	18.552* (3.843)	0.512
Maxion Wheels Czech	-0.623 (1.357)	13.774 (3.649)	0.127
Miele Technika	-0.790 (6.143)	26.074*** (6.357)	0.294
Pierburg	0.795 (2.758)	38.254** (2.854)	0.260
První Brněnská Strojírna Velká Bíteš	1.441 (4.123)	17.702** (4.266)	0.319

Note: Standard errors are in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Source: Own elaboration.

To conclude, the key findings of the study are:

- 1) Based on the firm-wise comparison of WCM_{UI} , WCM_{PI} , and WCM_{EI} , Miele Technika, Gerresheimer Horsovsky Tyn Spol., and Koyo Bearings Česká Republika efficiently managed WC, as their indexes are greater than 1. On the other hand, Hyundai Motor Manufacturing, Iveco Czech Republic, Kasko Spol., and Kermi did not manage their current assets efficiently.
- 2) The highest number of efficient firms was found in 2016, and the lowest number of efficient firms was observed in 2020 based on the year-wise comparison.
- 3) All the β values, as seen in Table 5 to Table 7, are lower than one, which indicates that none of the selected firms outperform the manufacturing industry as a whole. To summarise, these findings revealed that the sales generated by the certified firms were less than the amount of WC used.

CONCLUSION

The main purpose of this study is to evaluate the efficiency of the WCM of quality-certified firms. Based on the crucial role of the manufacturing sector in the Czech economy's GDP, the quality-certified firms from the EFQM Excellence Model were selected from the manufacturing sector. The information of the certified Czech firms was gained from the EFQM recognition database. The secondary data of the firms were obtained from the CRIBIS database for a period from 2015 to 2020. Different indexes of WCM, such as UI, PI, and EI, were computed of the selected certified firms. The findings show that the certified firms from the EFQM Model did not perform well during the study period as the firms have not utilized their current assets efficiently to generate sales. The efficiency of WCM of the certified firms was also severely affected by COVID-19, as the number of efficient firms was the lowest in 2020 based on the year-wise comparison.

The findings of the current study make novel contributions to the literature and have practical implications. Theoretically, the research contributes to extending the literature on different types of indexes of WCM, as the previous literature mainly emphasized the rela-

tionship between WCM and firm profitability. Additionally, until now, to the best of our knowledge, this is the first research that examines the efficiency of WCM of the quality-certified firms from the EFQM Model. Hence, the research will extend the literature on WRC efficiency of the quality-certified firms. Practically, the research results will be fruitful for firms' general managers, financial managers, and stakeholders of the certified firms to emphasize WCM. This study suggests how to estimate the different indexes of WCM empirically and then interpret them from the economic and financial points of view. The managers should pay close attention to the different components (indexes) of WCM and efficiently use the current assets to generate sales. Moreover, they should give importance to WC to improve the sustainable growth and profitability of their firms.

There is a scope for further research which can be conducted by including different sectors. Much could be done because further studies can be conducted on WCM with different firm sizes, different quality certificates or awards, extending the years of the sample, and taking different sectors. Further research could be done to investigate the impacts of COVID-19 on WCM.

A number of limitations need to be considered in the current study:

- 1) A short time period (2015-2020) was considered because of the availability of the financial data from the CRIBIS database.
- 2) The consequences of COVID-19 could be felt around the world. However, any precise impacts of COVID-19 are not included in the current study.
- 3) Many variables, such as firm size, debt, firm age, etc., impact WCM; however, only variables are included in the current study that were considered in the prior studies. (4) Only 11 firms were selected in the analysis, as only 11 manufacturing firms have received the quality certificates from the European Foundation.
- 5) Different firms obtain different quality certificates at different times from the Foundation. However, the firms' certification time and certificates' categories were ignored.

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