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Research Article

Exploring the Causal Effect of Cash Conversion Cycle Signals on Profitability of Tanzanian Manufacturing Firms

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Abstract

Management of Cash Conversion Cycle (CCC) components is piercing for firms' profitability. Financial Managers world-wide, adopts cash conversion cycle in measuring and estimating the level of risks and return of their firms for profit and wealth maximization. As a result, managers keep an eye on the drivers and derailers of profitability. The study focused on establishing the causal effect of cash conversion cycle on profitability while exploring whether single or double digit indicators matter for profitability determination of manufacturing firms. Theoretical and extant empirical literature reviewed guided the scholar foundations for gap identification. The findings were elicited from annual audited financial statements of companies enrolled on DSE from 2008 to 2022 with a sample of 8 manufacturing firms for 15 years, aggregating to a total of 120 observations. Profit was estimated using Profit-After Tax (PAT) and the Cash Conversion Cycle was measured through Inventory Turnover Days (ITD), Debt Collection Days (DCD) and Credit Payment Days (CPD). In model selection, Hausman test was adopted to pick between fixed effect and random effect model while Panel Regression was favored in estimating the causal effect of CCC and profitability. Based on regression analysis, Inventory Turnover Days (ITD) has a negative impact on firms' profitability and Debt Collection Days (DCD) revealed an insignificant positive relationship between DCD and profitability. Furthermore, the study found a negative relationship between Credit Payment Days (CPD) and profitability. On the other hand, the research found that profitability of most firms with double digit cash conversion cycle proved to be higher than those firms with single or triple cash conversion cycle. The research findings unveiled that CCC correlates positively with profitability and significantly impacts manufacturing firms' profitability. So, for DSE firms to increase their profitability and firm value under modern competitive era, concentration on double digit cash conversion cycle is paramount ought to the nature of business and assets invested in. Therefore, we conclude that there is a significant causal-relationship of cash conversion cycle on profitability for firms in Tanzania, indicating the necessity of managing appropriately the CCC components.

Keywords

Inventory Turnover Days, Debt Collection Days, Credit Payment Days

1. Introduction

The re-occurrence of financial crises in addition to COVID-19 pandemic that was experienced recently arose the attention of financial managers across the globe to working capital management. In respect to this, Nguyen et al [33] illustrates in their study that the Cash Conversion Cycle (CCC) retains its role as an effective measure or determinant

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of an organization's working capital since it illustrates the variation between the incurred costs in the purchase of inputs and the amount collected from sales [33]. Aris et al.'s [7] study concurs with Nwude et al [9], as they note that the CCC is commonly used by financial managers in measuring the working capital by reflecting the duration between the time an organisation paid for productive resources and the time it recovered the spent amount through product sales. Gujral [2] holds similar view by describing CCC as the duration from when payment was made for raw materials that a company used in producing products that were sold to recover the spent cash. According to Sugathadasa [30] argues that the distance or time taken to sale products and have actual sale receipts from the time actual cash was made on the raw products equates to a "cash gap." Nwude et al.'s [9] definition of CCC compares to Sugathadasa's [30] since it acknowledges the duration an organization's cash is withheld as a working capital until it is returned in form of actual purchases by customers. Although the usefulness of CCC is emphasized by multiple studies, recent study by Kouaib and Bu Haya [17] shows that organizations with low CCCs records better performance compared to those with high CCCs. A conclusion that can be drawn from the analysed sources is that a manufacturing company or organization's financial performance is shaped by management practices of existing assets together with liabilities. A firm's current assets are equally understood as assets that are converted within a year into physical cash when they smooth flow of business without drop in value or experience of any disturbance in the performance of a company [34]. Nevertheless, the contradiction of Kouaib and Bu Haya's [17] study to the definitions of most scholars necessitated conduction of investigation to understand whether individual stocks or type of industries influences the observed novel anomaly.

Assets that a firm converts into money within a short duration to promote its operation is understood as a working capital. The key reason for conversion of assets into working capital is to increase the value of an organization or firm. Thus, organizations capitalize on cash values as well as fix assets based on demands of different sectors. Although organizations varied in terms of total assets, business owners' together with managers' primary focus is often on cash management as well as their enterprises' cash cycle. Consequently, financial managers spend a considerable amount of their working hours on cash management. Dogan and Kevser [11] are among the few researchers who explored the effects of cash conversion cycle. Tomewi and Zulvia [15] equally conducted their study recently and established a significant increase in companies' not only cash, but also similar items in form of total assets. Companies' practices necessitate researchers' interest in understanding enterprises' cash needs as well as the contributions of these factors on the overall performance of business.

Cash flow of firms have direct relationship with the management of cash and inventories as well as receivables and payables. In this context, Ponsian et al [26] recommend evaluation of idle funds in what they describe as short-term financial instruments, converting the existing receivables into cash besides selling inventories quickly and settling debts late to avoid increasing costs. CCC increases when there is an increase in receivables turnover period as well as inventor turnover period [8]. Chandra et al [8] also illustrate that the shortening of debt payment period while having constant inventories turnover period as well as receivable turnover period extends CCC. Accordingly, the contraction of CCC suggests reduction of inventories turnover as well as receivable turnover period.

Scholars hold different views regarding cash determinants alongside their effects on the financial performance of firms. Purnamasari and Windarti [27] argue that cash assets lower financial costs, as firms use growth in external financing costs as well as information asymmetry as determent of CCC. Ceylan [12] disagrees with argument based on the claim that it is unrelated not only to profitability but also a firm's financial needs. Tago and Ponsian [32], on the other hand, claim Gitman relied on CCC in determining the effectiveness of working capital management in generating profit. The assumption that can be drawn from these studies is that CCC varies in different sectors.

A firm's CCC can be positive or negative. According to Ghabban et al [24] positive CCC refers to the duration an organization can borrow or tie its capital before receiving cash receipts of sales. A negative CCC refers to the total number of days an organization received cash receipts from sales before paying suppliers of raw materials. The survival and success of an organization is realized through effective management of CCC components that include the period of collecting receivables, the period of converting inventories, and the deferral period of payables. Research shows that a short CCC equates to profitability due to efficient use of working capital [6]. That is, a short CCC illustrates a firm's effectiveness in managing and processing inventories timely, collection of receivable cash quickly, and delayed settlement of suppliers.

Existing research links a short CCC with growth of a firm's not only value and profitability, but also liquidity as well as cash flow [21]. In the same context, a short CCC is associated with drop in profitability, liquidity, and cash flow as well as the overall value of a firm [1]. Nevertheless, some studies including Arumona and Adeyeye's [23] present mixed findings regarding the effect of CCC on the firm's operational performance. Arumona and Adeyeye [23] established there was significant negative correlation between trade cycle and the generated profit in Belgium, which is stressed by Oktavianus and Handoyo [22] who conducted their research in Pakistan and learned CCC components had negative effects on profitability. Contrary to these scholars with negative correlation, Patricia and Izuchukwu [25] conducted their research in Greece and observed CCC components impacted profitability positively.

Maximization of profits as well as a firm's value is the primary objective of all businesses across the globe, hence their usefulness in evaluating the ultimate performance of firms. Liquidity is essential as much as profitability is concerned, considering it as one of the firm's key objective. Firms experience considerable challenges in developing as well as sustaining the right balance between liquidity and profitability. Ensuring there is a balance between the two requires a pragmatic approach in addition to adequate attention. Firms should ensure their liquidity-profitability status is in equilibrium to evade occurrence of a crisis and bankruptcy as well as insolvency. For this equilibrium to be realized, the CCC components should be managed appropriately and effectively.

Researches present mixed findings regarding the correlation of CCC components with profitability. The reviewed literature showed either positive relationship or negative relationship. As illustrated, [3, 13] established a considerable positive link between CCC and profitability contrary to [33, 35] who established a negative correlation between the two. Deari and Palomba [10] varied from that of other scholars, as they observed non-significant relationship between CCC components and profitability. The illustration of disagreement in reviewed materials suggests existence of knowledge gap, which the current study sought to fill.

Research Hypotheses:

In order to achieve the stated study objectives, the following Hypotheses were formulated and tested:

Ho1: There is no causal relationship between inventory turnover days and profit after tax among listed DSE firms in Tanzania.

Ho2: Debt collection days does not affect profit after tax among listed DSE firms in Tanzania.

Ho3: Credit payment days does not affect profit after tax among listed DSE firms in Tanzania.

Ho4: Being single or double digit CCC does not influence profit after tax among listed DSE firms in Tanzania.

2. Literature Review

2.1. Theoretical Review

2.1.1. Cash Conversion Cycle Theory

The Cash Conversion Cycle theory refers to the link between a firm's working capital and its cash flow. This theory can be useful in determining the amount of money needed to achieve specific sales. Firms employ this theory in determining their working capital since it illustrates the duration covered from the day raw materials were purchased to the day cash receipts were received from sold products [3]. A company realizes its objectives when it manages its liabilities together with short-term assets in continuously. Lewliyadda and Subasinghe [19] argue that companies with long-term prospects and strong bottom line often fail to settle their debts and manage their liquidity.

Anser [28] developed CCC as an operating cycle by adding the inventory period to accounts receivable period and subtracting accounts payable. The primary focus is on the duration between the day of receiving raw materials and the day of receiving cash from the sales of produced products. Nguyen et al [33] argue that the assessment of liquidity management entails evaluating the statement of income as well as balance sheet to quantify profitability using time measure. The accurate CCC method, according to Ruguru [29], is to compare a specific company with its establishment. Based on the review information, CCC duration equates to:

$$\text{CCC} = \text{Inventory days} + \text{Trade receivables days} - \text{Trade payables days}$$

A shorter CCC suggests low resource requirement, whereas a longer CCC suggests completion of investments [16]. A prolonged CCC can lead to increase in sales, which equates to high profitability. On the negative side, an extended CCC is associated with increased investments that can lead to drop in the preeminent profitability.

2.1.2. Operating Cycle Theory

Richards and Laughlin developed the Operating Cycle theory in 1980 basing their attention on the management of working capital along with individual elements. They developed the liquidity flow concept from extending their evaluation of static balance sheet with the objective of understanding the potentials of liquidation coverage of a firm's value as well as its income statement in reference to operating activity. Zakari [36] learned that the incorporation of receivable accounts together with inventory turnover measures to the operating cycle concept provided a clear view of management of liquidity compared to solvency indicators, including the current and acid taste ratio.

Ruguru [29] further claim that additional liquidity measures provide a clear illustration that some working capital components rely on the extent of production and distribution as well as collection that can be either non-instant or un-synchronized. Change in collection policies or credit policies often affects a firm's receivable balance for annual sales. Similarly, the granting of liberal terms results in creation of large receivable current investment that is less liquid in customers excluding the time a firm records a considerable increase in sales that impact receivables positively. A deteriorating liquidity can be identified from a lower receivable turnover as well as an extended receivable collection duration. Firms achieve greater ratios in currency together with acid test by adopting options aimed at sustaining bigger receivable investments [36]. The number of receivable accounts cumulative days and its investment inventory determines the length of a firm's operating cycle. The incorporation of turnover to assets ratio to the operating cycle a firm's conversion period provides a liquidity indicator that is more realistic despite

being incomplete.

2.2. Empirical Review

Ruguru [29] extracted information from Ozkan and Ozkan's (2004) study investigating the influencers of the United Kingdom firms' corporate cash holdings. The analysed information, using panel data method, comprised data from 1,092 firms that ran between 1984 and 1999. The outcome of the analysis showed that growth opportunities, liquid assets, and leverage as well as cash flows and bank debt were key influencers of cash holdings. Similarly, Lazaridis and Tryfonidis [18] conducted a detailed analysis on data collected from 131 firms that operated between 2001 and 2004 in Athens Stock Exchange using regression models. This research used return on assets, inventories turnover, and debt maturity as well as receivable turnover, debt maturity in addition to leverage as key variables. The outcome of Lazaridis and Tryfonidis' [18] showed that the extension of CCC affected profitability negatively.

Iqbal et al [15] equally researched how CCC affected the profitability of a Pakistan company associated with oil and gas engineering. Data was gathered from 10 firms that operated between 2010 and 2018 and analysed using regression and correlation analyses. The outcome of the analysis showed that debt collection duration and the duration of inventory turnover had significant implication on the profits generated by firms in the oil and gas sector. Duration of credit payment had positive association with profitability. Fuime and Jilenga [13] also conducted most recent research to determine the effect of CCC on the profitability of a government agency, company tasked with supplying electricity, in Tanzania. The outcome of the analysis showed that CCC has significant implication on profitability. Nguyen et al [33] similarly conducted their study in Vietnam, using 23 companies that operated between 2015 and 2021 in food and beverage sector. Use of Fixed and Random Effect Models showed that a drop in CCC results in increase in profitability. This research, however, showed leverage had non-significant correlation with cash holding. The conclusion that was drawn from the collected results is that the cash for companies with growth opportunities often doubles that of firms with poor growth opportunities.

Compared to other scholars, Deari and Palomba [10] researched on the effect of CCC on profitability using 13 firms identified as most liquid and non-financial in Macedonia Stock Exchange that ran between 2011 and 2019. The gathered evidence correlated to that of previous studies, as the outcome showed positive correlation between profitability and CCC. Nevertheless, it was illustrated in this study that a constricted CCC increased profitability as a result of better performance promoted by efficient and effective working management approaches. Chandra et al [8] equally conducted research most recently to determine whether CCC impacted profitability. PERTAMINA Balikpapan Hospital was used as the research subject and its total assets considerable moderating variables. Evidence from the analysed data using the panel data regression model showed that CCC influenced profitability. Subsequently, it was illustrated in Chandra et al [8] study that companies with huge total assets recorded higher effect of CCC on their profitability. Ghabban et al [24] contradict the findings reported by [8], as they established from their analysis of data collected from firms enlisted in Saudi stock market that CCC had considerable effect on Earnings Per Share (EPS). Both studies shows CCC has varied effects on the profitability of companies.

Aris et al [8] also conducted their research recently to determine the effect of CCC using firms running in Bursa Malaysia. They gathered data from 43 firms that operated between 2016 and 2019, and used ratio analysis and evaluating it. The outcome of the analysis showed that the cash flow cycle of most companies presented negative payable outstanding. Similarly, it showed that the outstanding day sales had positive implication on the firms' profitability. Conclusively, the gathered evidence showed that most firms were efficient in their cash management besides having adequate cash levels. Equally, Yusan and Handoyo [22] researched on the relationship between CCC and profitability. They gathered data from 686 enterprises incorporated in Indonesian Stock Exchange as Food and Beverage companies. The outcome of the collected evidence showed a positive association between CCC and return on assets excluding return on equity. A study by Yung-jang [35] that relied on 5 companies from Japan as well as 5 companies from Taiwan as research sample in evaluating the association of CCC with the performance of a company showed negative correlation. The findings, after using the Pearson correlation coefficient, illustrated negative correlation between CCC and return on assets as well as between CCC and return on equity in the analysed companies. Evidence from Taiwan illustrated significant negative association between CCC and return on assets in majority of the industries. Yung-jang [35] also evaluated whether liquidity management influenced the profitability of a company and value using manufacturing firms in Japan and Taiwan that had run for at least 11 years. The gathered evidence showed negative correlation between CCC and profitability on not only return on equities, but also return on assets ratio. Moreover, it was illustrated in this study that reduction of CCC to strengthen liquidity management improved the performance of a company besides increasing the company's value. Accordingly, the regression analysis affirmed the considerable negative effect of CCC on return on assets.

Lewliyadda and Subasinghe [19] explored the information published by Deloof (2003) presenting 1009 manufacturing firms that operated in Belgium between 1992 and 1996 to determine the link between CCC and profitability. The initial researcher divided CCC into three components, including inventory and receivables in addition to payables. The outcome of the analysed information showed that increases in CCC in the entire period reduced profitability. Eljelly's (2004)

study that is cited by Tomewi and Zulvia [15] equally researched whether profitability had any link with liquidity using the current ratio and CCC as the measures. Data from 929 Saudi Arabian companies listed by Joint Stock were analyzed, and the findings showed that CCC had stronger effect on profitability compared to current ratio. However, the firm's profitability was negatively associated with the liquidity level. Tomewi and Zulvia [15], who equally cited Amit, Debashish, and Rakshit (2005) that explored the link between liquidity and profitability using pharmaceutical companies in India, observed non-significant relationship between a firm's profitability and liquidity. Although the collected evidence showed CCC was positively associated with current ratio and quick ratio, the observed negative relationship exceeded not only the net profit ratio but also return on equity. The outcome of the cited study did not show whether CCC had any correlation with return on assets.

Ruguru [29] who focused their research on Binathan Household Supermarkets located in Kenya, retrieved information from Nobanee's (2006) study that researched on the United States' manufacturing companies. The collected evidence showed that CCC enhanced evaluation of WCM effectiveness by considering all its three components. Ruguru's study showed that the highest levels of inventory and receivables as well as payables can be achieved by reducing the handling together with opportunity costs of not only holding inventories and creditors but also debtors in addition to ensuring the duration of CCC is favourable. Ruguru [29] also cited Teruel and Solano's (2007) study that was conducted in Spain using small and medium sized companies in the manufacturing sector. Evidence published by the cited study showed that receivable days as well as inventory days had negative effect on profitability. A recommendation by Ruguru's [29] study based on the analysed evidence was that SMEs should consider improving WC management by reducing their CCC.

Dogan and Kevser [11] similarly researched on the impact of using CCC as a technique for managing working on profitability of companies in the manufacturing sector identified by Turkey's Istanbul Stock Exchange between 1998 and 2007. The observations on CCC, account receivable duration, and inventory duration as well as return on assets as measures of profitability. The outcome of the regression analysis illustrated the significant positive implication of profitability on the company's growth and it affected accounts receivable duration as well as inventory duration negatively (11). Nwokoye [21] compared to other scholars researched on the effect of CCC on profitability. They collected data from 50 manufacturing companies in Nigeria that were operational between 1996 and 2005. Use of panel data econometrics in conducting a pooled regression analysis and merging and estimating time-series with cross-sectional observations showed all the three CCC components were negatively associated with net profit. Nwokoye [21] also observed non-significant differences in the impacts of working capital management for large companies and small companies. However, the duration companies took to collect receivable cash was negatively associated with profitability. Accordingly, the duration used in converting into turnover had positive effect on profitability, a finding that contradicts evidence by majority of the reviewed literature that showed positive correlation between profitability and the duration companies take to pay debts.

A study by Gill et al [14], which used 88 firms from America identified by the New York Stock Exchange and operated between 2005 and 2007 illustrated significant correlation between CCC and profitability. Use of gross operating profit in measuring the firm's performance showed accounts receivables had significant negative effect on the companies' profitability. Based on the collected evidence, Gill et al [14] argued that companies could increase their profitability by reducing their working capital. The assumption was that firms that record low profits are likely to reduce their accounts receivables to minimize CCC cash gap. Compared to [14, 33] established from their recent research that working capital management influenced the profitability together with liquidity of companies. This conclusion was drawn from the analysis of data presented by companies listed in Vietnam's stock exchange between 2006 and 2008. The key variables of Nguyen et al.'s [33] study was profitability, CCC and its components, and their association. The outcome showed the listed variables had significant negative association among themselves besides showing increase in CCC caused a drop in profitability. Similarly, the results showed reduction of account receivable period as well as inventory period resulted in profitability increase.

Purnamasari et al [27] reviewed Mohamad and Saad's (2010) study that extracted 172 companies published on Bloomberg's database as sources of data. The selected companies were operational between 2003 and 2007. Evidence from correlational and regression analysis of the extracted data showed that the ratio of current assets to total assets impacted Tobin Q, return on asset and ROA positively. CCC, the ration of current asset to current expenditure/liabilities as well as the ratio of current expenditure/liabilities to total assets presented negative correlation with not only Tobin Q, but also ROA. Conclusively, there is broad association between a company's profitability with receivable period, inventory period, payable period, and CCC. Lewliyadda and Subasinghe [19] equally chose hotel companies operating in Sri Lanka to determine the effect of CCC on profitability. The analysed findings showed that ICP had significant effect since its increase was associated significant negative increase of ROA. Correlation calculations showed that CCC had negative association with ROA. The findings showed that an increase in CCC resulted in drop in ROA. Accordingly, the authors recommended increase of profitability through lowering the inventory and receivable days. A decade old study by Anser [28] explored the effect of CCC on the profitability of the manufacturing companies incorporated in Pakistan's Karachi

Stock exchange. ROA and return on equity (ROE) were key determinants of profitability, whereas the size of the company and debt ratio were treated as control variables. CCC was treated as an independent variable. Data was from the selected companies that operated between 2007 and 2011. Evidence from the collected data showed the selected manufacturing companies recorded low average ROA and high average ROE with reasonable CCC. The findings also illustrated an inverse relationship between CCC with ROA and ROE, implying lower CCC increases profitability when measured using ROA and ROE. Muruguse [20] equally explored the impact of CCC on profitability using 10 companies from Sri Lanka in the plantation sector between 2008 and 2012. The results showed that CCC was negatively associated with ROE. Accordingly, CCC had strong implication on the overall profitability and value or companies in the plantation sector in Sri Lanka.

The literature reviewed draws contradicting findings, where some prior researchers indicate that cash conversion cycle influences profitability positively, contrary to the view and findings of other researchers who observed negative correlation between cash conversion cycle and profitability of firms. These disagreements indicate lack of conclusion regarding cash conversion cycle on profitability debate among researchers. In addition, all reviewed studies, none had conducted a study on the impact of whether single or double digit indicator of cash conversion cycle influences company profitability. This study seeks to address this literature gap as well as reduce the weakness in the existing research by focusing on manufacturing firms listed on the Dar es Salaam Stock Exchange in Tanzania from 2008 to 2022.

3. Research Methodology

The study adopted a quantitative research approach using Panel Regression. The inquiry's data were collected purposively from published financial statements of eight (8) manufacturing firms listed on the Dar es Salaam Stock Exchange Market from 2008 to 2022 [4]. The duration of the study is fifteen years (15), with a total of 120 sampling observations. In order to arrive at an appropriate research approach, Hausman test was used to select between fixed effect model and random effect model. Three separate models according to the three independent variables namely debt collection days (DCD), inventory turnover days (ITD), and credit payment period (CPD) were analyzed. For each of the three models analyzed in this study, the Hausman test was insignificant compelling the use of random effect model.

The Independent variables of the study are; Debt Collection Days (DCD). DCD is used as a proxy of debt collection policy, calculated as the ratio of trade receivable to sales multiplied by 365. Another variable is Inventory Turnover Days (ITD), this is the time taken to convert inventory into cash, used as a proxy for inventory policy and is also calculated as the multiple of 365 and ratio of average inventory to cost of goods sold. The study also employed Credit Payment Day (CPD) as a proxy for firm's payment policy. Mathematically, CPD is calculated by using trade payable to purchases ratio multiplied by 365. Lastly, the model includes the cash conversion cycle which is an overall measure of all the independent variables. It is expressed as the sum of debt collection days and inventory turnover days minus credit payment days.

Model specification

This study adopted a model from [5] which was improved by including CCC as dummy variable for double or single indicator and the control variables of firm size (FS), and Leverage (LEV). The following research models were formulated to determine the relationship between Cash Conversion Cycle and Profitability:

$$PAT_{it} = \beta_0 + \beta_1(DCD)_{it} + \beta_2(FS)_{it} + \beta_3(LEV)_{it} + \beta_4(CCC)_{it} + \varepsilon_{it} \quad (1)$$

$$PAT_{it} = \beta_0 + \beta_1(ITD)_{it} + \beta_2(FS)_{it} + \beta_3(LEV)_{it} + \beta_4(CCC)_{it} + \varepsilon_{it} \quad (2)$$

$$PAT_{it} = \beta_0 + \beta_1(CPD)_{it} + \beta_2(FS)_{it} + \beta_3(LEV)_{it} + \beta_4(CCC)_{it} + \varepsilon_{it} \quad (3)$$

Definition of Variables

β_0 = Intercept coefficient

$\beta_1 - \beta_3$ = Coefficients of independent variables

$(PAT)_{i,t}$ = Profit after Tax of firm i at time t

$(DCD)_{i,t}$ = Debt Collection Days of firm i at time t

$(ITD)_{i,t}$ = Inventory Turnover Days of firm i at time t

$(CPD)_{i,t}$ = Credit Payment Days of firm i at time t

$(FS)_{i,t}$ = Firm Size of firm i at time t

$(LEV)_{i,t}$ = Leverage of firm i at time t

$\varepsilon_{i,t}$ = Random error term for firm i at time t

4. Research Findings and Discussion

4.1. Correlation Matrix

Magnitude and nature of the relationship that exists between dependent variables and independent variables are best analyzed through correlation analysis. Table 1, indicates the correlation results that exist between variables that are used in this study. The results shows that there is positive relationship between PAT of listed manufacturing firms on cash conver-

sion cycle variables at 5 percent significant level except DCD (-0.2940) and the control variable of leverage (-0.4290).

Table 1. Correlation Results.

	PAT	DCD	ITD	CPD	CCCD	FS	LEV
PAT	1.0000						
DCD	-0.2940*	1.0000					
ITD	0.1447	-0.2126*	1.0000				
CPD	0.0212	0.1414	0.2864*	1.0000			
CCCD	0.0352	0.0029	0.7176*	-0.3959*	1.0000		
FS	0.8290*	-0.3412*	0.0484	-0.0037	-0.0573	1.0000	
LEV	-0.4290*	0.2803*	-0.1372	0.1317	-0.1429	-0.314	1.0000

Source: Annual Report of Listed Manufacturing Firms (2008-2022)

Table 2. Hausman Test for Model Selection.

	Model 1	Model 2	Model 3
Chi2(6)	6.71	5.77	6.58
P-Value	.3480	.4493	.3610

Source: Annual Report of Listed Manufacturing Firms (2008-2022)

4.2. Model Selection Test

The study used Hausman test to decide on whether random or fixed effect model. The insignificant Hausman test statistics compelled the study to use random effect model in each of the three models. The results in Table 2 clearly indicates that in each model, the difference in coefficients were not systematic. As a result, the models were all in favor of random effect.

All the p-values are larger than 0.05 which indicates insignificant test statistics. Therefore, the insignificant Hausman tests in all the models makes the study fail to reject the null hypotheses which are in favor of random effect model.

4.3. Model Estimation Results

Below are Tables 3, 4, and 5 showing the results of panel regression analysis of Inventory Turnover Days, Debt Collection Days, and Credit Payment Days respectively. Panel regression is used to analyze and show the causal-effect of cash conversion cycle on profitability.

Table 3. The effect of Inventory turnover on profitability.

Variables	Coefficient	Standard Error	Z-value	P-value
Inventory turnover days	-.1424	.0643	-2.21	.027
Leverage	-38.77	9.829	-3.94	.000
Firm Size	.0767	.0155	4.96	.000
Cash Conversion Cycle				
Negative Digits (base)				
Single Digit	5.775	8.168	.71	.480
Double Digit	15.14	5.739	2.64	.008
Tripple Digit	10.36	8.922	1.16	.246
Constant	46.19	14.98	3.08	.002

Source: Annual Report of Listed Manufacturing Firms (2008-2022)

The effect of inventory turnover days and leverage on firms' profitability is negative and statistically significant respectively. On average, an increase in inventory and leverage by one unit decreases firms' profitability by 0.1424 and 38.77 billion respectively. These results are similar to that of [32, 33]. Firm size on the hand positively affects profitability of a particular firm and the effect is statistically significant at all levels of significance. The findings also show that firms with positive double positive double digit cash conversion cycle were more effective in influencing firm profitability than those with negative digits. Nevertheless, this also shows that double digit firms were more effective than triple and single digit. Because being single and triple digit did not significantly differ from being negative digit. So, the single and triple digits dummies did not significantly differ from the base digit dummy which is negative in this case.

Table 4. *The effect of Debt collection period on firm's profitability.*

Variables	Coefficient	Standard Error	Z-value	P-value
Debt Collection days	.0347	.1204	.29	.773
Leverage	-39.41	10.42	-3.78	.000
Firm Size	.0767	.0164	4.68	.000
Cash Conversion Cycle				
Negative Digits (base)				
Single Digit	5.200	8.379	.62	.535
Double Digit	10.19	5.566	1.83	.067
Tripple Digit	-.0504	8.160	-.01	-.995
Constant	33.04	13.70	2.41	.016

Source: Annual Report of Listed Manufacturing Firms (2008-2022)

Debt collection days (DCD) have insignificant positive effect on profitability, this result contradict the findings [22, 31] who found a negative relationship between cash conversion cycle on Return on Assets (ROA) and Return on Equity (ROE). The findings imply that the more the firms take advantage of debts, profitability of firms' increases though to an insignificant extent. Likewise, the findings of the study shows that the control variable, of firm size, positively influences profitability, on the other hand, a control variable of leverage negatively influences profitability of firms. The findings also show that firms with positive double digit cash conversion cycle were more effective in influencing firm profitability than those with single digit and triple digits. Ideally, customers would like a long debt payment period while suppliers discourages a longer debt collection, hence double digit CCC is an optimal as per the study findings. Therefore, single and triple digits dummies did not significantly differ from the base digit dummy which is negative in this case.

Table 5. *The effect of credit payment period on firm's profitability.*

Variables	Coefficient	Standard Error	Z-value	P-value
Credit payment days	-.0784	.0576	-1.36	.173
Leverage	-36.09	10.15	-3.56	.000
Firm Size	.0822	.0158	5.22	.000
Cash Conversion Cycle				
Negative Digits (base)				
Single Digit	1.153	8.870	.13	.897
Double Digit	6.343	6.234	1.02	.309

Variables	Coefficient	Standard Error	Z-value	P-value
Tripple Digit	-8.271	10.18	-.81	.416
Constant	44.95	15.55	2.89	.004

Source: Annual Report of Listed Manufacturing Firms (2008-2022)

The findings of the study shows an inverse relationship of cash conversion cycle on firms profitabilty. These findings are in line with earlier studies of [7, 22] who found insignificant negative relationship between cash conversion cycle and profitability. Surprisingly, these findings are contrary to the studies [5, 32]. The effect of firm size is significant postive contrary to leverage which is significant negative on firms' profitability. The findings also show that firms with single and double digit cash conversion cycle were more likely to influence firms' profitability than those with Tripple (negative) digits. Nevertheless, the findings also shows that double digit firms had a postive insignificant influence more than triple digit CCC firms.

5. Conclusion

The study investigated the influence of Cash Conversion Cycle (CCC) while exploring whether single or double digit indicator matters in profitability determination of Manufacturing firms listed on the DSE in Tanzania from 2008 to 2022.

Based on the study findings, Inventory Turnover Days (ITD) has a negative impact on firms' profitability. These facts are in line with the normal theory of inventory turnover days. The shorter the days' inventory stays in business the more profitable the firm should be, as result of reduced administration costs like heating and lighting, rental, security and theft likelihood.

Also, the findings of Debt Collection Days (DCD) reveals an insignificant positive relationship between DCD and profitability. Implying that, as the debt collection days increases the profitability of firms' increases to a small extent. Therefore, the management of firms can create shareholders wealth and value by reducing the number of debt collection days, this is because as the DCD decreases, the profitability of DSE firms increases. In theory, an increased debt collection days increases the level of bad debts and in-turn decrease profitability. The study recommends management of firms to control or reduce the number of DCD.

Furthermore, the study found a negative relationship between Credit Payment Days (CPD) and profitability. These findings implies that as firms take longer to pay their obligations, their profitability deceases. So, this study finds that, in order for firms to increase profitability, among other factors, it is advised that, firms has to pay their debts early to take advantage of offered discounts and maintained long-term and friendly business relations with suppliers.

On the other hand, the profitability of most firms with double digit cash conversion cycle proved to be higher than those firms with single and triple cash conversion cycle. Triple digit indicator seems to delay on-time cash availability as debt collection takes longer, hence limiting availability of cushion cash for re-investment, emergencies and multiplier effect. Similarly, the study findings did not favor single digit indicator, given the nature of capital assets of manufacturing firms, mostly long term and non-reversible running into billions to acquire. Therefore, firms to increase their profitability and firm value under modern competitive era concentration on double digit cash conversion cycle is an option given the nature of business and assets. At, this point, the measurement of profitability of double digit indicator on cash conversion cycle provides an accurate, reliable and meaningful results of profitability of firms.

Lastly, no study is self-sufficient without limitations. This study focused on listed manufacturing firms on DSE from 2008 to 2022, mostly large companies measuring CCC by Profit After Tax (PAT); future studies could also investigate the same or other variables on Small and Medium Enterprises (SMEs) and possibly applying other measurements like Return on Assets (ROA) or Return on Equity (ROE).

Abbreviations

CCC	Cash Conversion Cycle
CPD	Credit Payment Days
DCD	Debt Collection Days
ITD	Inventory Turnover Days
PAT	Profit After Tax
ROA	Return on Assets
ROE	Return on Equity

Author Contributions

Gwatako Tago: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing

Sadiki Sumawe: Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – review & editing

Conflicts of Interest

The authors declare no conflicts of interest.

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