WORKING CAPITAL MANAGEMENT AND PROFITABILITY OF FIRMS LISTED UNDER CONSTRUCTION AND ALLIED SECTOR AT THE NAIROBI SECURITIES EXCHANGE, KENYA

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ABSTRACT

The construction and allied sector remains key to Kenya’s vision of becoming an industrialised nation by year 2030 as per Kenya Vision 2030. The industry has however faced challenges in terms of erratic profits, reduced access to credit and competition from imports that have affected its growth. The study sought to assess the effect of working capital management (cash management, inventory management, debtors management and creditors management) on profitability of listed construction and allied firms listed at the Nairobi Securities Exchange (NSE), Kenya. The study was anchored on the cash conversion cycle theory, transaction cost theory and agency theory. Descriptive longitudinal design was adopted. The target population comprised all the construction and allied companies listed at the NSE, Kenya. Data was obtained from the annual financial statements of the firms for the years 2010 to 2016. Diagnostic tests were conducted and were all in the affirmative. Data was analysed using Descriptive analysis, Pearson’s Correlation analysis and panel regression analysis (fixed effects model). Results were presented in tables. Correlation analysis documents a negative and weak correlation between average collection period and inventory holding period with profitability. The average payment period and the cash conversion cycle were positively correlated with profitability but this relationship was found to be weak. The study found an inverse and insignificant relation between average collection period and inventory holding period with profitability. The average payment period and the cash conversion cycle were positively related with profitability but this relationship was found to be insignificant. These findings indicate that the firms should increase their payments period and cash conversion cycles and reduce debtor days and inventory days to increase profitability. The study found that the average payments period had the greatest predictive strength in the working capital equation while cash conversion cycle had the weakest predictive strength. Working capital however explains a small portion of profitability as measured by net income. The study concludes that there is an overall inefficiency in the management of working capital by managers of firms operating in the construction and allied sector in Kenya.

Key words: Working Capital Management, Profitability, Construction and Allied Sector and Nairobi Securities Exchange.

Acronyms

APP - Average payments period
I. Introduction and Background
Profitability remains a key factor in explaining firm performance. Economic profits are usually seen as a measure of success for a company (Keramidou, Mimis, Fotinopoulou, & Tassis, 2013). From this point of view, the success of construction and allied firms can be said to have been erratic for the last seven years. The combined profit after tax of the listed construction and allied companies based on their annual financial statements was KShs 6.3 billion in 2010 which rose to KShs 7.9 billion in 2011 and dropped to KShs 6.3 billion in 2012. The profit after tax for the years 2013 to 2016 was as follows: KShs7.4 billion, KShs 5.3 billion, KShs 8.8 billion and KShs 8.0 billion respectively. According to Fitzsimmons, Steffens and Douglas (2005) profitability is a measure of firm success as it increases a firm’s ability to grow. Profitable firms contribute to the gross domestic product of a country and to the overall levels of employment (İşık, 2017). Our research study focused on the relationship between working capital and profitability due to the importance of working capital management to the survival of firms. A firm’s success greatly depends on a manager’s ability to manage the elements of working capital as these are the resources that are used to finance its revenue generating activities (Mwangi, Muathe, & Kosimbei, 2014).

Working capital management (WCM) relates to the management of a company’s short term assets and liabilities so as to achieve the optimum balance between profitability and liquidity (Raheman, Afza, Qayyum, & Bodla, 2010). A company must be liquid enough to settle its short term obligations and to maximise shareholder wealth through profit growth (Ajao & Small, 2012). Sadiq (2016) argues that a company will not be able to survive, despite achieving profitability if it is unable to settle its short term obligations. Working capital is one of the components of the determinants of profitability. Further, there is a very close relationship between the two elements as this relationship plays a key role in increasing shareholder value (Singh & Kaur, 2017). Efficient working capital management is known to have positive effects such as speedy payment of short term commitments, increase internal financing and reduction of the instances of company failure due to insolvency. The effects of poor working capital management include; overtrading, reduced liquidity and loss of business due to stock outs (Agyei...
& Yeboah, 2011). In the Kenyan context, working capital management is crucial to companies operating in all sectors, more so the construction and allied industry as they have a high investment in current assets such as inventory and work in progress which require keen management (Akoto, Awunyo-Vitor, & Angmor, 2013).

The construction and allied sector is key to Kenya’s vision of becoming an industrialised nation by the year 2030 (Vision 2030) (GOK, 2007). Favourable government policies such as the suspension of import duty on key raw materials in the industry facilitated accelerated growth in the sector in the early years (KNBS, 2017). With the passage of time however, these industries have faced slower growth attributed to increased competition from imports in the East African bloc which has also reduced the volume of exports. The weakening of the Kenya Shilling against major world currencies over the years has increased the cost of importing key inputs for the sector and this has translated to an increase in the cost of the output of the industries as compared to imported products. Further, there has been a decrease in the availability of credit to these firms attributed to the increase in the cost of loans and following the interest rate cap introduced in 2016 which increased the underwriting standards for many of the banks in Kenya (Central Bank of Kenya, 2017). When challenges of: global competition, profit contraction and a rising need for cash for the purpose of expansion affect companies, shifting attention to working capital as a source of financing provides management with a competitive advantage (Aminu & Zainudin, 2015). Given this importance, managers and policy makers are required to focus on how these industries can remain competitive and efficient so as to achieve positive results over time (Keramidou, Mimis, Fotinopoulou, & Tassis, 2013). As scarcity of resources becomes a reality, management of the firm’s working capital will be the most critical way through which firms will attain profitability and an improvement in performance (Muhammad, Jibril, K/Wamba, Ibrahim, & Ahmad, 2015).

II. Research Problem
The construction and allied industry is at the heart of the social and economic pillars of Kenya’s vision 2030 (GOK, 2007). However, the growth of the sector has been attributed to the consumption of the imported products as opposed to the consumption of locally manufactured goods. The industry has faced challenges in terms of erratic profits, reduced access to credit and competition from imports. The combined profit after tax of the listed construction and allied companies, based on their annual financial statements, was erratic between the years 2010 and 2016. Due to the nature of business, such industries have a high investment in current assets such as inventory and work in progress which require proper management (Akoto, Awunyo-Vitor, & Angmor, 2013). Muhammad, Jibril, K/Wamba, Ibrahim and Ahmad (2015) suggest that as resources available to organisations become scarce, management of the firm’s working capital becomes the most critical way through which such firms will attain profitability and an improvement in performance. Despite these unfavourable trends in profitability of construction and allied firms, the extent to which working capital management explains such trends remains an issue of empirical investigation especially in developing countries such as Kenya.
Empirical evidence confirms that working capital management has a strong relationship with firm profitability. There is equally empirical evidence documenting contradictory findings regarding the relationship of the various working capital components with profitability. Empirical evidence by Jagongo and Makori (2013), Gull and Arshad (2013), Gakure, Cheluget, Keraro, and Onyango (2012) indicate that there is a negative relationship between the cash conversion cycle, average collection period, inventory holding period with profitability and a positive relationship between the average payment period and profitability. On the other hand studies carried out by Abuzayed (2012) and Omesa, Maniagi, Musiega, and Makori (2013) found that there is a positive relation between the cash conversion cycle and profitability. The empirical contradictions on the nature of the relationship between working capital and profitability formed a basis for the current study.

In view of empirical evidence from the Kenyan context, there is limited research on the impact of working capital management on profitability specific to the construction sector. The study however noted that there was no well known study on the same particularly in the Kenyan context specific to the construction and allied sector. This study therefore attempted to fill the gaps highlighted above with an objective of determining the relationship between working capital management and profitability of listed construction and allied firms at NSE, Kenya.

III. Objectives of the Study
The main objective of the study was to determine the effect of working capital management on the profitability of construction and allied firms listed at the Nairobi Securities Exchange, Kenya. The specific objectives were to determine the effect of cash management, inventory management, creditors management and debtors management on profitability of construction and allied firms listed at NSE, Kenya.

*Null hypotheses were tested (at a significance level of 0.05) in regards to each specific objective.

IV. Significance of the Study
This research sought to assess the impact of the various working capital management components on the profitability of listed construction and allied firms. The management and owners of construction and allied firms will benefit from the findings and recommendations of this study to enable them implement effective practices to increase the profitability of their businesses and ensure continuity. The findings contribute to the general body of knowledge on the relationship between working capital management and profitability of construction and allied sectors.

V. Review of Literature
The study reviewed relevant theories anchoring the variables as well as empirical work from the Kenyan context and other countries.

a. Theoretical Review
The study reviewed key theories in relation to the variables under study. The key theories underpinning the study were: Cash Conversion Cycle theory, Transaction Cost Theory and...
Agency Theory. The Cash Conversion Cycle theory was put forth by Richards and Laughlin (1980) who noted that managers spend a substantial proportion of their daily activities in managing working capital. This entails spending a considerable amount of time in activities such as managing past due sales, monitoring cash movement, negotiating credit terms and sourcing for short-term finance (Aminu & Zainudin, 2015). The proponent states that firms should not rely on static measures of liquidity such as the current asset and acid test ratios as these ratios present the liquidation rather that the going concern approach to measuring a firm’s liquidity. A firm’s primary recourse to meeting obligations should be through employment of inventory and receivable investments in the normal course of operations rather than through liquidation of assets. They thus introduced the concept of the cash conversion cycle as a tool to assess the efficiency of working capital management. The cash conversion cycle is made up of three elements: inventory management, debtor management and payables management (Aminu & Zainudin, 2015). Deloof (2003) suggests that maintaining an ideal level of working capital will maximize shareholder value. A firm must therefore establish the optimum duration from when cash is invested in the purchase of raw materials or finished goods to when the resources are converted back to cash through the collection from trade debtors so as to ensure profitability is achieved whilst ensuring that the firm has the appropriate liquidity to settle its short term obligations.

The transaction cost theory, postulated by Williamson (1981), suggests that a firm attains profitability not only by operating in profitable markets but also by organizing its operations in the most efficient way so as to minimize costs. With reference to working capital, a firm must manage its trade credit using the lowest possible cost. This is achieved by assessing creditworthiness in the ordinary course of business as opposed to using external sources such as credit referencing bureaus, enforcing collectability and enhancing collection of debts by threatening to cut off further supply of goods and varying the level of demand (sales) by varying the extent of credit offered to its customers (Bellouma, 2014). A firm can also reduce the losses from customer default by repossessing the goods previously sold and reselling them. The central claim of the theory is that a firm’s activities should be undertaken in such a manner as to reduce the costs involved in administering them (Hassan & Mberia, 2017). In the context of working capital management a balance must be found between the cost of establishing the creditworthiness of customers and the cost of debt collection. This will ensure that the company will attain profitability due to increased sales on credit and will retain liquidity by collecting cash from its debtors in good time.

Jensen and Meckling (1976) discussed the concept of agency where they state that agency arises where the owner (principal), appoints an agent to undertake tasks on their behalf. However, an agency problem arises because there is a divergence in the interests, risk preference and goals of the principal and agent. Ying (2010) found that by increasing the pay of a manager, he was motivated to improve firm performance. Wang (2010) proposed an approach, termed as an encouraging approach to reducing agency costs which entailed that managers are made shareholders of the firm to motivate them to invest in profitable ventures as this will in turn
benefit them as shareholders. This theory, in relation to working capital management, could be viewed from the perspective of a manager, an agent of the shareholders (principal), who is tasked with the responsibility of managing a company’s short term assets and liabilities. In order for the manager to be sufficiently motivated to adopt the most efficient strategies around managing receivables, payables and inventory, incentives to reduce the agency conflict such as adequate remuneration and share options must be put in place.

b. Empirical Review
A number of studies have explored the relationship between working capital management and company profitability in various sectors with mixed results. Below is a chronology of the empirical review of variables so as to establish the research gap. Babatunde and Akeju (2016) assessed the effect of working capital management on the profitability of 100 companies listed at Nigeria stock exchange (NSE) from 2005 to 2015. The results showed a significant direct relationship between working capital and company profitability.

Muhammad, Jibril, K/Wamba, Ibrahim and Ahmad (2015) sought to explore the effect of managing working capital on the profits of listed food product firms in the Nigerian Stock Exchange between the years 2008 and 2012. The study indicated that there was a direct relationship between current ratio, debtor days and company size with profitability and an inverse relationship between creditor days and inventory turnover in days with profitability.

Malik and Bukhari (2014) analysed the impact of working capital on profitability in cement, engineering companies in Pakistan over a period of five years, 2007 – 2011. The researchers found that the average payment period had a negative and significant relationship while cash conversion cycle had a positive and significant relationship with the profitability. Debtor days and operating cycle had a direct but insignificant whereas inventory days had an inverse but insignificant relationship with profitability.

Akoto, Awunyo-Vitor and Angmor (2013) explored the relationship of profitability with working capital management among Ghanaian manufacturing companies. Data for thirteen companies from 2005 to 2009 was analysed using regression analysis. The study found that receivables collection period negatively affected profitability while the cash conversion cycle, current asset ratio, size, and debtors’ turnover positively impacted profitability.

Gull and Arshad (2013) assessed the effect of working capital management and liquidity with company performance. Data was analysed for a sample of 19 listed cement companies over a 10 year period, between 2005 and 2010. The findings of the analysis suggested that efficient management of working capital and liquidity results in financial success. Makori and Jagongo (2013) analysed the effect of working capital management on company profits in 5 manufacturing and construction firms listed at the Kenyan securities exchange, between 2003 and 2012. The research found an inverse relationship between profitability and the cash conversion cycle and debtor days but a direct impact to profitability by inventory days and the number of days payable. Omesa, Maniagi, Musiega and Makori (2013) explored the impact of managing working capital on the profit levels of companies involved in manufacture and quoted at the NSE, Kenya. Their findings indicated that average collection period, cash conversion cycle...
and the control variables; current liability to total asset ratio and fixed financial ratio has a significant impact on profitability. Cash Conversion Cycle was noted as having a positive relation while average collection period had a negative relation with performance.

Tauringana and Afrifa (2013) analysed the importance of the cash conversion cycle to the profitability of SMEs in the United Kingdom. The findings indicated in order of relative importance, that debtor management ranks first followed by creditor’s management, stock management then cash conversion cycle. Gakure, Cheluget, Onyango and Keraro (2012) studied the impact of WCM to company profitability among manufacturing firms listed at the Nairobi securities exchange between 2006 and 2010. The findings indicate that liquidity has a negative relationship with profitability. Abuzayed (2012) analysed sample listed firms in Jordan between 2000 and 2008 to examine whether increasing efforts in managing working capital improves company profitability, as measured using gross operating profit and value. The findings suggested a positive relationship between profitability and the cash conversion cycle.

Bagchi, Chakrabarti and Roy (2012) assessed the relationship between the profitability of fast moving consumer goods (FMCG) firms in India with the working capital. The study found that there was an inverse and significant relationship between WCM and firm profitability. Raheman, Afza, Qayyum and Bodla (2010) explored the impact of working capital management on the performance of listed Pakistani manufacturing firms. The findings showed that cash conversion cycle, stock turnover in days negatively influence performance. Further findings indicated that debt levels, company size and sales levels had a direct and significant impact on company profit. Mathuva (2010) analysed the influence of working capital management components on firm profitability as measured by net operating profit. The study found the existence of a significant but inverse relation between the debtor days and profitability. The study also noted a significant direct relation between the inventory holding period and creditor days with profitability.

Numerous research reviews have been conducted on the relationship between working capital and profitability in various countries and across numerous sectors. Based on the empirical contradiction and contextual gaps noted in the literature review, this study aimed to explore the relationship between working capital management and profitability of construction and allied firms listed at the Nairobi Securities Exchange by assessing their profitability between the years 2010 and 2016 and measuring profitability using two measures: return on assets and net income.

VI. Methodology
This study adopted a descriptive design. The target population of the study comprised of the five companies listed under the construction and allied category at the Nairobi Securities Exchange, Kenya as at January 2017. The time scope was years 2010 to 2016. The information of interest was: revenue, cost of sales, profit after tax, average inventory, value of trade debtors and value of trade creditors as published in the companies’ annual audited financial statements. The information was obtained from the individual company websites. The study conducted a census review of target firms since the number of firms listed under the sector was small and hence manageable. Data was collected using a document review guide. Data was analyzed using
descriptive analysis, panel regression analysis and correlation analysis. Consistent with previous studies (Jagongo and Makori, 2013; Gull and Arshad, 2013), working capital was modelled as a function of: inventory holding period, cash conversion cycle, average collection period and average payments period.

\[ P_{it} = B_0 + B_1 (CCC_{it}) + B_2 (APP_{it}) + B_3 (IHP_{it}) + B_4 (ARP_{it}) + e \]

Where:
- \( P = \) Profitability for firm \( i \) at time \( t \) (measured by net income and return on assets)
- \( N_{it} = \) Earnings after interest and tax for firm \( i \) at time \( t; \ t = (1, 2\ldots n) \) firms
- \( \text{Roa}_{it} = \) Return on Assets for firm \( i \) at time \( t; \ t = (1, 2\ldots n) \) firms
- \( B_0 = \) Constant
- \( B_{1-4} = \) Coefficients
- \( CCC = \) Cash Conversion Cycle for firm \( i \) at time \( t \)
- \( ACP = \) Average collection period for firm \( i \) at time \( t \)
- \( APP = \) Average payments period for firm \( i \) at time \( t \)
- \( IHP = \) Inventory Holding Period for firm \( i \) at time \( t \)
- \( e = \) Error term

The study variables were operationalised and measured as shown in Table 1 below.

### Table 1: Operationalization and Measurement of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
</tr>
<tr>
<td>Return on assets</td>
<td>Net operating income/ total assets</td>
</tr>
<tr>
<td>Net income</td>
<td>Total revenue – Total expenses (including interest and tax)</td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
<td></td>
</tr>
<tr>
<td>Cash conversion cycle</td>
<td>Inventory holding period + Average collection period - Average payments period</td>
</tr>
<tr>
<td>Average collection period</td>
<td>(Trade receivables/ credit sales)*365</td>
</tr>
<tr>
<td>Inventory holding period</td>
<td>(Inventory/ cost of sales )*365</td>
</tr>
<tr>
<td>Average payments period</td>
<td>(Creditors / cost of sales )*365</td>
</tr>
</tbody>
</table>

Source: Researcher (2018)

VII. Results and findings

The section presents research output in the form of tables and makes interpretation of the results and a brief discussion of the same besides documenting findings. The study sought to establish the sector of operation and duration of listing of the various companies categorized under the construction and allied sector at the Nairobi Securities Exchange (NSE). The data indicated that 60% of the companies reviewed were involved in the manufacture and sale of cement, 20% in
the manufacture and sale of wires and electricity cables and 20% in the manufacture of paints. With regards to the years of listing at NSE, the study found that 60% of the companies have been listed at the NSE for more than 40 years, 20% for between 21 and 40 years and 20% of population has been listed for less than 20 years. The findings indicate that the selected companies represent fairly the sector distribution and maturity profiles for the companies operating in this sector.

**a. Descriptive Analysis**

Secondary data on the indicators of profitability and working capital variables was collected from the firms’ financial statements between the years 2010 to 2016. Table 2 below presents the descriptive statistical analysis of the data collected.

<table>
<thead>
<tr>
<th>Variable</th>
<th>OBS</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCC</td>
<td>35</td>
<td>167.07</td>
<td>99.40</td>
<td>57.99</td>
<td>481.79</td>
</tr>
<tr>
<td>IHP</td>
<td>35</td>
<td>112.78</td>
<td>79.82</td>
<td>58.86</td>
<td>419.53</td>
</tr>
<tr>
<td>ACP</td>
<td>35</td>
<td>59.43</td>
<td>52.70</td>
<td>1.65</td>
<td>194.52</td>
</tr>
<tr>
<td>APP</td>
<td>35</td>
<td>82.44</td>
<td>32.06</td>
<td>21.70</td>
<td>157.51</td>
</tr>
<tr>
<td>ROA</td>
<td>35</td>
<td>0.095</td>
<td>0.27</td>
<td>-0.088</td>
<td>1.60</td>
</tr>
<tr>
<td>Net Income</td>
<td>27</td>
<td>13.53</td>
<td>1.50</td>
<td>9.89</td>
<td>15.59</td>
</tr>
</tbody>
</table>

*Source: Research data (2018)*

The table above indicates that the companies, over the seven year period, had long cash conversion cycles averaging 167 days (5 months) with the longest cash conversation cycle reaching 481 days. This indicates that the firms’ duration from the purchase of stock to the collection of cash from credit sales was approximately five months. The statistics indicate that it takes an average of 112 days (4 months) to convert inventory to sales with a standard deviation of 79 days. Accounts collection period has an average of 59 days with a standard deviation of 27 days. This means that construction and allied companies grant their customers an average credit period of 59 days.

The table above further shows that the average Return on Assets (ROA) was 9.5% with a standard deviation of 29%. The ROA has fluctuated between -8.8% and 160% indicating erratic performance over the period. A low ROA indicates an inefficient the use of firm assets to generate returns (Al-Matari, Al-Swidi & Fadzil, 2014). The mean profit was 13.53 units with a standard deviation of 1.5. The above results (when compared to the industry performance over the period 2003 to 2012 as presented by Jagongo and Makori, 2013) indicate a decline in the efficiency of the companies in collecting cash from debtors, conversion of inventory to sales, managing the overall cash conversion cycle and the efficiency of utilizing assets in the generation of revenue.
b. Diagnostic Tests

In order to determine the suitability of the panel data for statistical analysis, diagnostic tests were carried out to establish whether the panel data met the requirements of classical linear regression. The tests included: normality test, unit root test, multi-co linearity test and heteroscedasticity test. The kurtosis- skewness test of normality indicated that the data was normally distributed as the joint p-values were within the 0.05 significance level. Unit root test was applied on all variables used in the analysis in order to determine whether or not the panel data was stationary. It was necessary to test stationarity of data before conducting regression so as to avoid spurious regression (Gujarati, 2004). The output for the tests indicated that the data was stationary (at a significance level of 0.05) as the p-values for all variables were below 0.05. The data was tested for the presence of multicollinearity to establish the extent to which the changes in the dependent variable are as a result of changes in the independent variable. The study findings indicated that all the VIFs were below 3.5 and all tolerance amounts were greater than 0.1. Our findings were in line with the findings of Gujarati (2004) who states that the VIF of a variable should be below 10 and Alauddin and Nghiemb (2010) who further suggests that the tolerance should be greater than 0.1 to conclude that a variable is not collinear.

The study tested for heteroscedasticity in the data using the Breusch Pagan/Cook-Weisberg method. The results are presented in Table 3 below.

Table 3: Breusch -Pagan/Cook-Weisberg test Results for Panel-level Heteroscedasticity

<table>
<thead>
<tr>
<th>Fixed effects</th>
<th>Dependent variable</th>
<th>Chi²</th>
<th>Prob &gt; Chi²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel model 1a</td>
<td>Return on Assets</td>
<td>854.37</td>
<td>0.000</td>
</tr>
<tr>
<td>Panel model 1b</td>
<td>Net income</td>
<td>1122.14</td>
<td>0.000</td>
</tr>
</tbody>
</table>

H0: Constant error variance (homoscedasticity)

Source: Research data (2018)

The test results for the two models provided chi-square distribution values of 854.37 and 1122.14 with corresponding p-values of 0.0000 in each case. The results show that the chi-square statistics were all significant at 5 percent level and hence the null hypothesis of constant variance was rejected. Baltagi (2005) states that heteroscedasticity is to be expected in cross sectional units which may be of varying size and exhibit different variation. The use of OLS regression would not be efficient in estimating the regression relationship when heteroscedasticity is noted and other estimation techniques should be used.

c. Inferential Analysis

i. Correlation Analysis

Pearson Correlation coefficient was used to gauge the relationship (strength and degree of linear association) between the various components of working capital: average collection period, inventory holding period, average payments period and cash conversion cycle with profitability...
as measured by net income and the return on assets for companies listed at the construction and allied sector at the NSE, Kenya at a significance level of 0.05. Table 4 below documents the correlation coefficient matrix of the study variables.

<table>
<thead>
<tr>
<th></th>
<th>ACP</th>
<th>IHP</th>
<th>APP</th>
<th>CCC</th>
<th>ROA</th>
<th>NI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACP</td>
<td>Coefficient r</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sig</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IHP</td>
<td>Coefficient r</td>
<td>0.0671</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sig</td>
<td>0.7017</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APP</td>
<td>Coefficient r</td>
<td>0.6869</td>
<td>0.4495</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sig</td>
<td>0.000</td>
<td>0.0068</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCC</td>
<td>Coefficient r</td>
<td>0.5956</td>
<td>0.8405</td>
<td>0.7212</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sig</td>
<td>0.0002</td>
<td>0.0000</td>
<td>0.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>Coefficient r</td>
<td>-0.2412</td>
<td>-0.0085</td>
<td>0.1475</td>
<td>0.1301</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>sig</td>
<td>0.1627</td>
<td>0.9614</td>
<td>0.3978</td>
<td>0.4564</td>
<td></td>
</tr>
<tr>
<td>NI</td>
<td>Coefficient r</td>
<td>-0.4911</td>
<td>-0.2529</td>
<td>0.134</td>
<td>0.016</td>
<td>-0.172</td>
</tr>
<tr>
<td></td>
<td>sig</td>
<td>0.0093</td>
<td>0.2031</td>
<td>0.1025</td>
<td>0.0125</td>
<td>0.0959</td>
</tr>
</tbody>
</table>

Source: Research data (2018)

Results presented in Table 4 above indicate that the elements of working capital that is; ACP and IHP had a weak and negative correlation with the two measures of profitability that is return on assets and net income, while APP and CCC had a low but positive correlation with profitability. The positive correlation between CCC and ROA indicates that when there is a large time lag between the purchase of raw materials and the collection of cash from the sale of finished goods, profits will be expected to increase. A negative and weak correlation was observed between IHP and ROA. Such a correlation indicates that companies with high stock levels are not able to remain profitable as they in have their cash investment held up in slow moving inventory (Deloof, 2003).

d. Model Specification Test

In order to establish which estimation effects (between fixed and random) provided superior results for the study, Hausman test was carried out for each of the specified panel regression models and the individual components of working capital with profitability. The test was conducted against the null hypothesis that random effect model was the preferred model. The test results were rejected if the chi-square statistic was significant at significance level of 0.05 otherwise, the null was accepted (Baltagi, 2005). The summary results of the Hausman test carried out on the full regression model and the individual components against profitability are documented in Table 5 below.
The test results show that the chi-square statistics for the full panel equations 1 and 2 were statistically significant at a significance level of 0.05. However, the p-value of equations 3-10 was not statistically significant. The study failed to reject the null hypothesis that the fixed effects estimation was appropriate for panel equations 1 and 2 at 0.05 significance level but accepted the hypothesis for equations 3-10.

### e. Significance of Predictor Variables

Based on the findings of section d, the researcher conducted a regression estimation of the individual components of working capital with profitability as measured by ROA and NI to establish the Wald chi square of each of the variables. A Wald test examines the significance of a particular variable in explaining the dependent variable in a statistical model (Baltagi, 2005). Where a Wald test is greater than zero, the variable should be included in the model as it has an explanatory power in the model, that is, its removal would distort the overall fit of the model (Agresti, 2002). Table 6 below documents summary findings of the individual regression analysis carried out.

### Table 6: Summary regression results of WCM components with profitability

<table>
<thead>
<tr>
<th>Equation Number</th>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Model</th>
<th>Wald chi² 1</th>
<th>Prob &gt; chi² 1</th>
<th>R-Squared</th>
<th>Rho</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>APP</td>
<td>ROA</td>
<td>RE</td>
<td>0.27</td>
<td>0.6005</td>
<td>0.4055</td>
<td>0.0755</td>
</tr>
<tr>
<td>2</td>
<td>APP</td>
<td>NI</td>
<td>RE</td>
<td>4.79</td>
<td>0.0287</td>
<td>0.4226</td>
<td>0.7476</td>
</tr>
<tr>
<td>3</td>
<td>IHP</td>
<td>ROA</td>
<td>RE</td>
<td>0.77</td>
<td>0.3799</td>
<td>0.1345</td>
<td>0.1287</td>
</tr>
<tr>
<td>4</td>
<td>IHP</td>
<td>NI</td>
<td>RE</td>
<td>0.47</td>
<td>0.4930</td>
<td>0.2282</td>
<td>0.8646</td>
</tr>
<tr>
<td>5</td>
<td>ACP</td>
<td>ROA</td>
<td>RE</td>
<td>5.22</td>
<td>0.0224</td>
<td>0.2485</td>
<td>0.7968</td>
</tr>
<tr>
<td>6</td>
<td>ACP</td>
<td>NI</td>
<td>RE</td>
<td>1.21</td>
<td>0.2717</td>
<td>0.2511</td>
<td>0.1237</td>
</tr>
<tr>
<td>7</td>
<td>CCC</td>
<td>ROA</td>
<td>RE</td>
<td>2.28</td>
<td>0.1312</td>
<td>0.0745</td>
<td>0.1678</td>
</tr>
</tbody>
</table>
In view of the results documented in Table 6 above, individual components of working capital (APP, IHP, ACP and CCC) have a Wald Chi square greater than zero indicating that all components have predictive power in modelling profitability. The $R^2$ values for the variables indicate that APP has the greatest predictive power in modelling profitability as it explains 41% of the change in ROA and 42% of the change in NI. The conversion cycle has the lowest predictive power in modelling profitability as it explains 7% of the changes in ROA and 6% of the changes in net income.

**f. Model Summary and Coefficients Table**

In order to shed light on the effect of working capital on profitability, the researcher applied regression analysis in all the components of working capital with profitability for the firms listed under construction and allied sector at the NSE, Kenya. The results are presented in Table 7 below.

<table>
<thead>
<tr>
<th>Equation Number</th>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Wald chi$^2$(1)</th>
<th>Prob &gt; chi$^2$</th>
<th>R-Squared</th>
<th>Rho</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>CCC</td>
<td>NI</td>
<td>1.26</td>
<td>0.2623</td>
<td>0.0554</td>
<td>0.8932</td>
</tr>
</tbody>
</table>

Source: Research data (2018)
Model 1a = the dependent variable is Return on Assets
Model 1b = the dependent variable is Net income

As indicated in Table 7 above, the variables of working capital explain up to 78.44% of variations in the ROA (model 1a) of firms listed under construction and allied sector at the NSE, Kenya. This is based on the resultant determinant coefficient ($R^2$) value equivalent to 0.7844. This indicates a good measure of predictive strength of the variables included in the model. Model 1b demonstrates the relationship between the various working capital components and profitability as measured by net income. The findings of the study indicate that the model has a coefficient of determination of 23% which indicates a weak predictive strength of the variables included in the model.

The regression table above indicates that the average collection period and inventory holding period have an inverse relation with profitability while average payments period and cash conversion cycle have a positive relation with profitability as measured using return on assets and net income. The p-values associated with both models were greater than the significance level of 0.05 hence, the overall regression results suggest that all the four elements of working capital: ACP, IHP, APP and CCC have an insignificant effect on profitability. The findings of an insignificant relationship between WCM and profitability are consistent with the findings of Abuzayed (2012) who noted that the cash conversion cycle and its components do not significantly affect the profit levels of SMEs in Jordan. Empirical evidence by Shah, Gujar and Sohu (2018) noted that the cash conversion cycle and its components did not significantly affect the profit levels of pharmaceutical firms in Pakistan. In addition, Iqbal and Zhuquan (2014) found that working capital management did not significantly affect the performance of 253 non financial firms listed at the Karachi stock exchange. The Wald tests carried out in the previous section, however, indicate that the components of working capital should be incorporated in modelling the WCM relationship with profitability as they contain predictive strength.

VIII. Discussion

The findings of the data analysis in section V above indicated that working capital management is a strong predictor of profitability as modelled by the return on assets. However, the components of working capital are weak predictors of profitability as modelled by net income. In view of panel regression analysis, all elements of working capital do not significantly affect profitability (at a significance level of 0.05). The findings of an insignificant relationship between working capital management and profitability are consistent with the findings of Abuzayed (2012), Iqbal & Zhuquan (2014) and Shah, Gujar and Sohu (2018). The research findings are however contrary to empirical evidence by Gakure, Cheluget, Onyango and Keraro (2012) and Malik and Bukhari (2014) who found a significant effect of working capital components on profitability. When regression was carried out on the individual components of working capital, it was noted that average payment period contributes the highest percentage in explaining the impact of working capital management on profitability. Our findings are consistent with the findings of Mbawuni, Mbawuni and Nimako (2016) who found that days...
granted by creditors are the key driver of profitability. The following section details the findings of the various components of working capital with profitability.

a. Average Payment Period on Profitability

The results of the research analysis established that listed construction and allied companies in Kenya had relatively long payment days that averaged three months. In addition, it was noted that APP has a positive correlation with the return on assets and with net income. When individually regressed against profitability, the variable explains 41% of ROA and 42% of net income and was thus deemed to be an important input in modelling the WCM – profitability relationship. The research noted a direct and insignificant relation between APP and profitability as measured by the return on assets and net income. When companies delay paying their suppliers, they are able to increase their profitability. A long payment period is an inexpensive source of financing in cases where companies are facing challenges in accessing external credit. The null hypothesis that creditor’s management did not have a significant effect on profitability was not rejected. The findings of a direct relationship between creditor days and profitability are consistent with the findings of Malik and Bukhari (2014) and Makori and Jagongo (2013). The findings however contradict the findings of Mbawuni, Mbawuni, and Nimako (2016), Muhammad, Jibril, K/Wamba, Ibrahim and Ahmad (2015) and Tauringana and Afrifa (2013).

b. Average Collection Period on Profitability

With regards to debtor’s management, the research findings indicate that companies in the construction and allied industry grant their customers an average credit period of 59 days. A negative correlation was noted between the average collection period and profitability as measured by the return on assets and net income. Further, the study found an inverse relationship between debtor days and profitability. This relationship was noted as not significant at a significant level of 0.05. The null hypothesis that receivables management did not have a significant effect on profitability was accepted. The review of the prediction strength of ACP on profitability on individual regression indicated that ACP predicts 25% of the change in profitability. In sectors facing great competition, a relaxed credit policy may result in an increase in sales however, the risk of loss due to customer default increases. The findings of the regression analysis indicate however that organizations should reduce their debtor days so as to increase their profitability. The inverse relation between the collection period and profitability is consistent with the findings of Gull and Arshad (2013) and Makori and Jagongo (2013). The study however contradicts the findings of Babatunde and Akeju (2016) and Mathuva (2010).

c. Inventory Holding Period on Profitability

The results of multiple regression analysis indicated an inverse relationship between inventory turnover in days and profitability. The relationship was found to be insignificant at a significance level of 0.05. This means that companies should ensure quick turnover of their inventory so as to realise an increase in profits. The null hypothesis that inventory management did not have a significant effect on profitability was thus supported. The results of the individual regression of
IHP with profitability indicated that inventory days predicts 13% of the change in profit as measured by net income and 23% of the change in WCM as measured by the return on assets. This indicates a low predictive power on working capital. The findings of the Wald test, however, indicated that the IHP is a relevant estimator of relationship between working capital management and profitability and its exclusion in the profitability models may distort the output. The findings of the research are consistent with the findings of Gul et al (2013), Raheman, Afza, Qayyum and Bodla (2010), Bagchi, Chakrabarti and Roy (2012) and inconsistent with the findings of Mathuva (2010).

d. Cash Conversion Cycle on Profitability
The research observed that companies had long cash conversion cycles. The cash conversion cycle was noted to have a positive but weak correlation with return on assets and net income. The regression coefficient indicated a positive but insignificant relation (at 5% significance level) between CCC and the two measures of profitability. We thus did not reject the null hypothesis that cash management does not have a significant effect on profitability. The results of the individual regression of CCC with profitability indicated that inventory days explains 5% of the change in profit as measured by net income and 7% of the change in WCM as measured by the return on assets. The Wald statistic in relation to modelling the predictive power of CCC on profitability was low indicating that it may not be a key consideration in predicting company profitability. This suggests that many of the construction and allied firms manage the elements of cash management, debtor management, payables management and inventory management independent of each other and thus the changes in the elements did not result in CCC having a significant impact on profitability. Our findings of the positive relation between cash conversion cycle and profitability are consistent with the findings of Babatunde and Akeju (2016) and Akoto, Awunyo-Vitor and Angmor (2013). The findings however contradict the empirical evidence by Malik and Bukhari (2014) and Oladipupo and Okafor (2013).

IX. Conclusion and Recommendation
The study makes several conclusions based on the findings on each specific objective as captured in this section. The study results indicate that when the individual components of working capital are regressed against the two measures of profitability, accounts payable days and accounts collection period are the strongest determinants of profitability while CCC is a weak determinant of profitability. The results of multiple regression however indicate that all working capital components have an insignificant effect on profitability. The findings indicated long debtor days, inventory days and cash conversion cycles. In addition weak correlation was noted between working capital and profitability. Based on the above findings, the study concluded that there is an overall inefficiency in the management of working capital by managers of firms operating in the construction and allied sector in Kenya.

The study recommends that managers of construction and allied forms should monitor the duration of sales credit and work towards reducing it so as to ensure profitability. Procurement managers should monitor inventory levels and reorder inventory based on demand to avoid tying
up cash resources in stock so as to increase company profitability. The study further recommends that managers of such firms should undergo training to improve their skills on the management of working capital. The Kenyan government should put in place laws and policies to create a better operating environment for local construction and allied companies. Such policies may include protectionist laws and easing the cost of credit to enable the companies return to profitability.

X. Contribution to Knowledge
The study contributes to knowledge by providing the findings on the impact of working capital management on profitability specific to the construction and allied sector in Kenya. Empirical evidence (on working capital management in Kenya) focused more on banks and manufacturing industries unlike firms in Construction and Allied Sector at NSE, Kenya. The study further contributes to finance theory and practice by introducing a different perspective to the relationship between the working capital components and profitability. The study found that the average payments period and cash conversion cycle have a positive and insignificant relation with profitability while the inventory holding period and average collection period have a negative relation with profitability.

XI. Areas for Further Research
Unique findings of the study present a basis for further studies to be carried out. Empirical research highlights the importance of working capital management in increasing profitability especially in cases where companies operate in challenging economic environments such as competition and low access to credit. The findings of our study indicate that companies in the construction and allied sector have been inefficient in managing working capital despite operating under tough economic conditions. The researcher recommends that future research should be carried out across other sectors in Kenya to assess their efficiency of working capital management when operating under tough economic conditions.

Appendix: List of Construction and Allied Firms, Kenya
1. Athi River Mining
2. Bamburi Cement Limited
3. Crown Berger Limited
4. East Arica Cables limited
5. East Africa Portland Cement

Source: NSE (2017)

References


