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## Working capital management and profitability: Evidence from Jordanian mining and extraction industry sector

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### Abstract

This paper sought to ascertain the existence of the relationship between the working capital management components (cash conversion cycle, receivables collection period, inventory conversion period, and the payment period) and corporate's profitability in the presence of two control variables (corporate's size and debt ratio), in the mining and extraction industry sector of the Jordanian economy. The study sample consists of 9 ASE listed corporations in this sector over a period of 17 years from 2000 to 2016, resulting in 153 firm-year observations.

The study employed four model specifications in order to test the postulated hypotheses. Pearson's correlation and Panel data methodology employed.

The results from the random effect model are prolific enough to depict that there is a strong negative relationship between the components of the working capital management and the corporate's profitability. Similarly, there is a negative relationship between the debt ratio and the profitability of the firm. Finally, a positive relationship is observed between the corporate's size and profitability.

The practical implications of this study are that the corporation manager in mining and extraction Industry Corporation must consider the importance of shortening length of working capital management and its components (especially inventory) to a minimum level in formulating their policies, in order to operate efficiently and effectively because the length of WCM is closely and significantly related to corporation profitability.

**Keywords:** Working Capital Management, liquidity, profitability, Jordan.

### إدارة رأس المال العامل والربحية: دليل ميداني من قطاع الصناعات التعدينية والاستخراجية في الأردن

المخلص:

سعت هذه الدراسة إلى اختبار وجود علاقة بين مكونات إدارة رأس المال العامل ( دورة تحويل النقد، وفترة تحصيل الذمم المدينة، وفترة تحويل المخزون، وفترة السداد) وربحية الشركة بوجود متغيرين مسيطرين (حجم الشركة ونسبة المديونية) في قطاع الصناعات التعدينية والاستخراجية في الاقتصاد الأردني. تكونت عينة الدراسة من 9 شركات مدرجة في بورصة عمان من هذا القطاع وعلى مدى 17 سنة امتدت من عام 2000 إلى عام 2016، مما أدى توفير 153 مشاهدة. استخدمت الدراسة أربعة نماذج انحدار لاختبار فرضيات الدراسة، باستخدام تحليل الارتباط ومنهجية البيانات المقطعية.

أظهرت نتائج نموذج التأثير العشوائي وجود علاقة سلبية قوية بين مكونات إدارة رأس المال العامل المختلفة وربحية الشركة. ووجود علاقة سلبية أيضا بين نسبة الدين وربحية الشركة. وأخيرا، أثبتت النتائج وجود علاقة إيجابية بين حجم الشركة وربحيته. أوصت الدراسة بضرورة إيلاء الإدارة العليا في هذا القطاع أهمية خاصة لتقصير طول فترة التحويل النقدي ومكوناتها (وخاصة فترة تحويل المخزون) إلى أدنى مستوى، من أجل العمل بكفاءة وفعالية، لأن طول هذه الفترة يرتبط ارتباطا وثيقا وبشكل كبير وربحية الشركات.

كلمات مفتاحية: إدارة رأس المال العامل، السيولة، الربحية، الأردن.

## Introduction:

Working capital management (WCM) refers to all management activities and decisions that typically affect the amount and effectiveness of the different current assets and current liabilities elements.

WCM is a crucial component of all business activity especially in manufacturing sectors, where current assets occupy a significant percentage of the total asset structure, it represents approximately more than a half (0.56) of Jordanian manufacturing total assets (Al-Naif, 2005), for there, Brigham and Houston, (2003) conclude that about 60 percent of a typical financial manager's time is devoted to WCM.

Efficient WCM involves planning and controlling of current assets and current liabilities in a manner to strike a balance between liquidity and profitability (Uchenna et al., 2012).

Corporation liquidity is measured from two distinct views: static and dynamic views, the static dimension measure liquidity at a given point in time, employed those ratio calculated from the balance sheet like current ratio and quick ratio. Whereas dynamic dimension measures the time gap from cash outflow to cash inflow which is measured by cash conversion cycle (CCC) (Uyar, 2009). (CCCP) refers to the average period length between the day the corporation starts paying its suppliers and the day it begins to receive cash for sale (Deloof, 2003).

Several prior empirical studies have used the CCCP as a measure of WCM to analyze whether shorting the length of this cycle has negative or positive impacts on corporation profitability (CP), the literature concludes that there might be ambiguity in this relationship.

### 1.2. The Problem Statement

The previous literature as mention below concludes that the relationship between WCM and profitability remains inconclusive and still a debatable issue. Furthermore, most of the priors' studies include all manufacturing sectors, without considering the fact that WCM requirement and practices differ across broad categories of firms (Sur & Chakraborty, 2011:20).

However, a limited work regarding WCM and profitability is available in manufacturing sector of Jordan, most of them concern in WC policies (aggressive, moderate and conservative) in a whole manufacturing sector and its related to firm profitability, none have been done with a particular focus on the mining and extraction industry sector (MEIS) on its own.

The researchers also believe that MEIS depict specialized of a high level of WC compared to the other sectors, So, this sector requires considerable attention. Table (1) shows the relative importance of WCM elements of total assets depending on accumulated data of MEIS in Jordan

Year	Inventory/TA	Receivable/TA	Payable/TA	Total
2000	0.166	0.136	0.121	0.424
2005	0.064	0.109	0.039	0.212
2010	0.081	0.100	0.047	0.227
2015	0.143	0.088	0.080	0.311
2016	0.148	0.083	0.073	0.305
Average	0.124	0.103	0.070	0.297

Source: researcher calculation.

Inventory, account receivables, and account payables represent 12.4, 10.3 and 7 percent respectively of all sector total assets as average over the period 2000 to 2016. All these elements represent 29.7 percent of JIMES total assets.

In summary, the general research question has been posted:

Is there a significant relationship between WCM elements and corporate profitability (CP) for MEIS in Jordan?

From this general question, the researchers can derive the following sub questions:

- Is there a significant relationship between Cash conversion cycle period (CCCP) and CP for MEIS in Jordan?

- Is there a significant relationship between average account receivables collection period (ARCP) and CP for MEIS in Jordan?

- Is there a significant relationship between average Inventories Conversion Period (AICP) and CP for MEIS in Jordan?

- Is there a significant relationship between average Inventories Conversion Period (AICP) and CP for MEIS in Jordan?

- Is there a significant relationship between corporation size and CP for MEIS in Jordan?

- Is there a significant relationship between debt ratio (DR) and CP for MEIS in Jordan?

### **1.3. Objectives of the study**

The present study attempts to fix above weakness and contribute to this body of knowledge by investigating the relationships between all measures of WCM denoted by (CCCP, ARCP, AICP, and APP) and CP in presence of two control variables (TA and DR) for 9 selected Amman Stock Exchange (ASE) listed mining and extraction industry corporations. Furthermore, the results of this study would be beneficial for the stakeholder, and to fill the gaps of non-availability of research work on MEIS in Jordan.

The rest of the paper follows: section two overview of MEIS in Jordan; section three provides literature review, previous studies and developing hypotheses; section four presents research methodology; section five analyzes results of the study, and section six provides the concluding and recommendation of study.

## **2. Overview of MEIS in Jordan:**

Mining and extraction industries sector is considered the cornerstone of the Jordanian economy. The mining sector contribution to Jordan's Gross National Product (GNP) in 2004 and 2014 are 10.5 to 15 percent respectively, it also represents 19.4 percent of 2013 Jordan's Gross Domestic Product (GDP) (Altarawneh, 2016).

In addition, the quarrying Sector has achieved the highest growth rate at 6.5 percent during the 4<sup>th</sup> quarter of 2017 compared with the 4<sup>th</sup> quarter of 2016 (Jordanian Department of Statistics, 2017 report, <http://dosweb.dos.gov.jo>).

Market Capitalization of MEIS in Jordan is around (2.106 MJD) at the end of 2016, it represents 0.60, and 0.68 of the all industry sector Market Capitalization listed in ASE in 2015 and 2016 respectively (ASE annual reports).

The mining sector in Jordan divided into mineral extraction and mineral manufacturing industry. Mineral extraction industry includes a wide range of products including phosphate, potash, zeolites, salt, carbonate, travertine, and, calcium silica in addition to other quarries and mines products (Altarawneh, 2016). On the other hand, the mineral manufacturing industry is composed of

two branches: the chemical industry (chemical acids, aluminum fluoride, fertilizers, quick and quenched lime), and the construction materials industry (white cement, building materials, rock wool, China ceramic tiles and sanitary ware (Zurqeih, 2011).

Recently, Jordan has been ranked as the 2<sup>nd</sup> largest exporter and the 6<sup>th</sup> largest producer of phosphate, the 2<sup>nd</sup> largest exporter and the 4<sup>th</sup> largest producer of potash, and has the 5<sup>th</sup> largest oil-shale reserves in the world (Altarawneh, 2016).

### 3. Literature review, theoretical review, previous studies and developing hypotheses:

#### 3.1. Theoretical Review

This work reviews the theory of WCM and the CCC approach as the basic theories to explain the concept of WCM.

##### 3.1.1. The Theory of WCM:

Academic literature on WCM stems from the theory of WCM by Sagan (1955), he indicated that the management of cash, inventories, accounts receivable and accounts payable is critically affect the health of the corporation (Wanguu & Kipkirui, 2015).

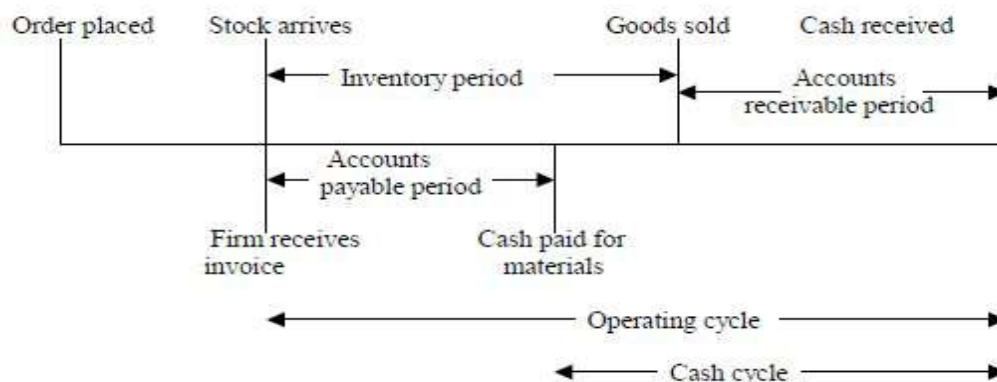
In addition, the theory of WCM suggests that the main task of the cash manager is to provide cash as and when needed, and to invest surplus cash as profitably as possible in view of his particular requirements of liquidity and safety of funds by assessing the risk and return of different investment opportunities (Wanguu & Kipkirui, 2015).

Thus, a manager should take his decisions on the basis of cash flow and total current assets position rather than on the basis of traditional WC ratios (Arabahmadi & Arabahmadi, 2013).

##### 3.1.2. Cash Conversion Cycle Approach

The CCC approach was developed by Richards and Laughlin (1980). He defined the CCC as the net time gap between actual cash outflow paid to the supplier and the cash receipts from good sales (Wanguu & Kipkirui, 2015).

Cash conversion cycle is utilized as a broad, comprehensive and powerful measure of managing WC and assessing liquidity in companies (Richards & Laughlin, 1980). The figure below represents the CCCP and its components



**Figure (1): Cash Conversion Cycle Source: Recourse: (Uyar, 2009).**

Typical business start with purchases raw materials (on credit) from suppliers, converts the raw material to finished goods, sell those goods (mostly on credit), collects cash from clients and pays the cash to the supplier for further production cycle and so on. We defined (CCCP) as the length of time for which cash is tied up in WC (i.e. inventories, payables, and receivables).

It is calculated as the sum of (ARCP) and (AICP) subtracted (APP) (Brigham and Houston, 2003).

### **3.1.3. Pecking Order Theory:**

Pecking order theory was first suggested by Donaldson in 1961, it implies that if the firms have higher debt ratio, the firms would have low or decreasing profitability and vice versa (Nduku, 2015).

### **3.2. The relationship between WCM elements and CP:**

The relation between different measures of WCM and CP has been discussed in the literature, the following review of the literature and previous studies provides a solid foundation on the basis of which the current study is based on.

#### **3.2.1. Corporation profitability (CP)**

According to the financial literature, CP can be measured by various measures. In the context of this study and to compare our results with prior studies, return on assets (ROA) was used to measure profitability. It is derived by dividing the net income by the total assets (Akindele & Odusina, 2015).

#### **3.2.2. The relationship between the length of (CCCP) and (ROA):**

The literature concludes that there were mixed point views about the relationship between CCCP and Profitability.

One filament of writing proposes that CCCP is negatively related with CP (Mathuva, 2010) entailing that a longer CCCP may cause a reduction in corporation performance through increasing the need for external financing (Akindele & Odusina, (2015).

Therefore, the shorter the CCCP, the quicker the corporation can recover its cash from the sales of its products, the more cash the firm will have the more efficient the corporation in managing its cash flow. Based on this point view, the ultimate goal is having low CCCP, if possible negative. CCCP can be shortened in three ways: One, by reducing ARCP by speeding up collections from sales. Two, by reducing AICP by processing and selling goods more quickly and three, by lengthening APP through slowing down firm's own payments (Ponsian, et. al., 2014).

CCCP is likely to be negative as well as positive. A negative value means the ARCP and AICP are less than APP. A positive value indicates the number of days a company must borrow is less than awaiting payment from a client (Hutchison et al., 2007, p.42).

The other filament of writing, on the other hand, recommends that lengthier CCCP augment the CP (Buhina & Dos, 2015 and Gill et al, 2010).

Furthermore, the inconsistent exists not only in the theoretical literature but also it is reported in the empirical strand. A negative relationship between CCCP and CP was confirmed by several previous studies such as; Akindele & Odusina, 2015 in Nigeria; Sharaf, & Haddad, 2015 in Jordan; Upadhyay, et. al., 2015 in USA; Jayarathnea, 2014 in Sri Lanka; Darabi & Yousef, 2012; Napompech, 2012 in Thailand, and Rezazadeh & Heidarian, 2010 in Iran.

On the other hand, limited studies reported a positive relationship between CCCP and CP such as; (Ponsian, et.al, 2014 in Tanzania; Malik & Kifayat, 2011; in Pakistan, and Gill, et.al, 2010) in the USA.

Moreover, there were rare studies reports no significant relationship between CCCP and CP such as; Jakpar, et al. 2017 in Malaysia; Zawaira & Mutenheri, 2014 in Zimbabwe; Bhunia & Das, 2012 in India, and Sharma & Kumar, 2011 in India.

In light of the above theoretical and empirical grounds, the first alternate hypothesis had been formulated as follow:

H<sub>A1</sub>: There is a statistically significant relationship between the length of (CCCP) and JIMEC profitability.

### **3.2.3. The relationship between the length of (ARCP) and CP:**

ARCP represents the average length of period that a corporation needs to collect payment from its customers. ARCP is also known as the receivable days, which is the collection policy. It is calculated by dividing the debtor's' account by sales and multiplying by 365.

The aim of debtor management is to decrease the time period between sales and collection of payment. However, trade credit may increase sales because it allows a company to access product quality before paying (Gill, et al, 2010).

In addition, the empirical results also, document mixed results. A negative relationship between ARCP and CP was confirmed by Sharaf & Haddad, 2015; Jayarathnea, 2014; Ponsian, et.al., 2014; Chatterjee, 2012 in India; Napompech , 2012; Al-Debi', 2011 in Jordan; Mekonnen, 2011 in Ethiopia; Gill, et.al., 2010; Rezazadeh & Heidarian, 2010; and Mathuva, 2010 in Kenya.

Besides that, limited studies confirmed a positive relationship between ARCP and CP such as Jakpar, et., al., 2017, and Malik & Kifayat .2011.

Finally, there were rare studies report no significant relationship between ARCP and CP. As an example, Zawaira & Mutenheri, 2014 and Upadhyay, et.al., 2015. In view of this discussion the research formulate the second alternate hypothesis as follows:

H<sub>A2</sub>: There is a statistically significant relationship between the length of average collection period (ARCP) and JIMEC profitability.

### **3.2.4. The relationship between the length of (AICP) and CP:**

Inventories are lists of stocks of raw materials, work-in-progress and finished goods,

AICP refers to the average time required to convert raw materials into sales in a year. A longer period of storage times means a high level of investment in inventory for a certain level of operations, this policy may decrease the costs of shortage, and prevent production process interruptions (Mathuva, 2010), but at the same time, it may block the funds in WC that could be invested in revenue generating activities which may reduce the CP (Ponsian, et. al., 2014). On the other hand, insufficient inventories can decrease sales and delays for customers etc. (Gill, et al, 2010).

Thus, the key issue for inventory management is to identify the optimum levels for each category and, thereby, minimize the funds tied up in inventory.

Moreover, the multiple points also exist in the empirical strand. A negative association between AICP and CP was confirmed by several studies such as Sharaf & Haddad, 2015; Jayarathnea, 2014; Ponsian, et.al., 2014; Napompech, 2012, and Rezazadeh & Heidarian, 2010.

Besides that, Jakpar, et. al., (2017), and Mathuva, (2010) suggest a positive relationship between AICP and CP. Finally, a non-significant effect was confirmed by Zawaira & Mutenheri (2014).

In view of the earlier explanations, the research formulate the third alternate hypothesis as follows

H<sub>A3</sub>: There is a statistically significant relationship between the length of (AICP) and JIMEC profitability.

### **3.2.5. The relationship between the length of (APP) and CP:**

Accounts payable, are what the corporation owes its suppliers or the vendors from which it

buys its raw materials and other supplies. It is a current liability and they are expected to be repaid within one year. (APP) can be defined as the average length of time between the purchase of raw materials and labor and the payment of cash for them. It is calculated by dividing the average creditors' accounts payable by the sales and multiplying by 365 (Smid, 2007).

This period is also used as an alternative to the payment policy. Account payables play a crucial role in managing WCM because delaying bill payments to suppliers is one of the tools for management to have access to a flexible and inexpensive source of financing. Corporations often regard it as a source of free credit. WCM rule states that corporations should strive to lag their payments as much as possible. At the same time, the opportunity cost of delaying bill payments to suppliers can be expensive if an early payment discount is offered (Ruichao, 2013).

Empirically, A positive relationship between APP and CP was confirmed by; Zawaira & Mutenheri, 2014; Ngwenya, 2012 and Mathuva, 2010).

Besides that, some of the other studies support a negative relationship between APP and the CP such as; Sharaf & Haddad, 2015; Ponsian, et.al., 2014; and Jayarathnea, 2014).

Finally, a non-significant effect was confirmed by some results such as; Upadhyay et. Al., 2015 and, Teruel & Solano, 2007).

This discussion leads us to formulate the fourth alternate hypothesis as follow:

H<sub>A4</sub>: There is a statistically significant relationship between the length of the (APP) and JIMEC profitability.

### **3.2.6. The Control variables and CP:**

Control variables are components that remain constant and intensively impact values. In other words, it is a variable that must unchanged throughout a study because it affects the independent variables and thus affects the outcome of the study (Mawutor, 2014). Following several previous studies such as Sharaf & Haddad, 2015; Gill, et al., 2010, and Teruel & Solano, 2007), this study utilizes corporation size and debt ratio as control variables in addition to independent variables that influenced the CP.

#### **3.2.6.1. The relationship between corporation size and CP**

The corporation size is considered as a control variable in many studies because it is believed that the size of the corporation plays an essential role in elevating the profitability of the Jordanian corporations. In principle, a large corporation tends to reduce WCM gaps to improve their profitability. This study employed the natural logarithm of total assets as a proxy of firm size

A positive relation between size and CP was found in several studies such as; Jakpar, et.al., 2017; Sharaf, & Haddad, 2015; Chatterjee, 2012, and Gill, et. al., 2010.

In view of this discussion the research fifth alternate hypothesis as follows:

H<sub>A5</sub>: There is a statistically significant relationship between corporation size (LTA) and JIMEC profitability.

#### **3.2.6.2. The relationship between corporation debt ratio (DR) and CP:**

The debt ratio is a financial ratio that measures the proportion of a corporation's assets that are financed by external funding. It is calculated by dividing total debt to total assets (Akindele and Odusina, 2015)., expressed as a percentage or decimal. It is prudent to know how much of the debt, in relation to total assets, would affect CP.

Based on the pecking order theory, there is a negative relationship between debt ratios and CP, due to increasing interest factor of debt which would, in turn, affect the profit. It suggests that the

firms should use the internal funds rather than external financing to pay off the company debt or obligation. At the same time, Debt ratio plays an important role in the managing the WCM of the corporations (Muya and Gathogo, 2016) Thus, the profitable firms are often relying on the retained earnings to pay off their obligation. A negative relation between debt and CP was found in several studies such as; (Jakpar, et.al., 2017; Muya & Gathogo, 2016; Sharaf & Haddad, 2015; Chatterjee, 2012, and Gill, et. al., 2010). This ratio is expected to have a negative relationship with the profit on one hand and the measures of WCM denoted by CCCP, ARCP, AICP, and APP) on the other hand.

In view of this discussion the research sixth alternate hypothesis as follows:

H<sub>A6</sub>: There is a statistically significant relationship between corporation debt ratio (DR) and JIMEC profitability.

At the end, the overall from this review of the literature, which provides a solid foundation on the basis of which the current research is based on, it is concluded that there might be ambiguity in the relationship between WCM components and CP.

#### **4. Research Methodology**

##### **4.1. Data:**

The study is primarily based on secondary data, and therefore the data for the corporations in the sample is derived from the ASE databases during the period 2000 – 2016. The financial data of those firms include firm's total asset, account receivable, inventory, account payable, net sales, cost of sold goods, net income, return on asset.

##### **4.2. Study population and sample:**

The study population consists of all corporation included in (MEIS) based on (ASE) database, this sector comprises of 13 industrial corporations listed in ASE at the end of 2016 (ASE annual report 2016).

The sample of this study consists of all corporations that have available data over the period of study which is 9 corporations. The sample represents about 69% of this sector at the end of 2016. This number is considered big enough to reach meaningful statistical results.

The corporations included in this study are: Jordan Phosphate Mines, The Arab Potash, The Jordan Cement Factories, General Mining Company PLC., Arab Aluminum Industry /ARAL, International Silica Industrial, Jordan Steel, National Steel Industry and National Aluminum Industrial

##### **4.3. Statistical methods (data analysis)**

The relationship between WCM and CP were assessed through relevant Statistical analysis such as partial correlation coefficients and Panel data methodology. Panel data methodology has specific benefits such as it assumes that different firms are heterogeneous in nature i.e. have widely dissimilar elements, it also considers the variability in data, it provides more instructive data and more degree of freedom, hence it provides more efficiency than cross-sectional data methodology (Baltagi, 2001).

Panel data models are usually estimated using either pooled ordinary least squares (OLS), fixed effects or random effects regression model.

Hausman test must be conducted to determine which model is the most appropriate to study data. Furthermore, the models' specifications could potentially suffer from a real issue related to the existence of multicollinearity, variance inflation factor (VIF) and Tolerance test were employed. Additionally, descriptive statistics (mean, median, Max, Min, and S.D), Pearson's correlation



statistics was also performed.

In this research, the results are too compiled and get through Excel program and also the use of E-Views 7 software package for further analysis

#### 4.4. Model Specification

To address study hypotheses, and in line with prior studies the study used the following general model:

$$\text{Profitability}_{it} = f(\text{WCM}_{it}, \text{Corporation Size}_{it}, \text{Corporation Debt Ratio}_{it}) \dots(1)$$

This model suggests that the profitability (ROA) of the corporation i at time t is a function of its WCM and control variables (corporation size and corporation debt ratio). So, the linear regression model can be estimated by converting equation 1 as follows:

$$\text{Profitability}_{it} = \alpha + \beta_1 \text{WCM}_{it} + \gamma_1 \text{TA}_{it} + \gamma_2 \text{DR}_{it} + \varepsilon_{it} \dots(2)$$

The Econometric model used for the regressions analysis is displayed in the basic form in equation 1, 2 and the WCM will be changed with the natural logarithm of its elements ARCP, AICP, and APP except for CCCP, in turn resulting in four basic models as follows:

$$\text{ROA}_{it} = \alpha + \beta_1 \text{CCCP}_{it} + \gamma_1 \text{DR}_{it} + \gamma_2 \text{TA}_{it} + \varepsilon_{it} \dots(3)$$

$$\text{ROA}_{it} = \alpha + \beta_1 \text{ARCP}_{it} + \gamma_1 \text{DR}_{it} + \gamma_2 \text{TA}_{it} + \varepsilon_{it} \dots(4)$$

$$\text{ROA}_{it} = \alpha + \beta_1 \text{AICP}_{it} + \gamma_1 \text{DR}_{it} + \gamma_2 \text{TA}_{it} + \varepsilon_{it} \dots(5)$$

$$\text{ROA}_{it} = \alpha + \beta_1 \text{APP}_{it} + \gamma_1 \text{DR}_{it} + \gamma_2 \text{TA}_{it} + \varepsilon_{it} \dots(6)$$

Where;

profitability<sub>it</sub> is the ROA for i<sup>th</sup> cross-sectional corporation for the t<sup>th</sup> time period, with i =1,2,3,...,9, t = 1,2,3,...,17, α is constant, WCM is the independent variable used as a vector of the natural log of ARCP, AICP, and APP except for CCCP. LTA is the natural logarithm of the corporation total asset and DR is the debt ratio. γ's unknown parameters of the LTA and DR included in the model to be estimated, and ε is the error term.

### 5. Results and discussion:

#### 5.1 Descriptive Statistics:

Table 2 shows the descriptive statistics of the study's variables for 9 ASE listed companies in MEIS over a period of 17 years from 2000 to 2016, resulting in 153 firm-year observations. Descriptive statistics depict the mean, median, maximum, minimum and the standard deviation for the chosen variables.

	<b>ROA</b>	<b>CCC</b>	<b>ACP</b>	<b>ICP</b>	<b>APP</b>	<b>LTA</b>	<b>DR</b>
Mean	0.0499	128.3	59.9	130.5	59.3	17.244	0.286
Median	0.049	118.8	58.1	119	47	16.715	0.281
Maximum	0.439	422.7	270.8	537	279	20.92	0.772
Minimum	-0.287	-43.6	2.8	10	3	12.89	-0.003
Std. Dev.	0.106	83.4	38.3	83.2	46.3	2.16	0.171

**Source:** Research Findings

The return on assets (ROA) has a mean of 4.99 percent (median is 4.9 percent), and it ranges from -28.7 percent as the minimum value to 43.9 percent as the maximum value, while the standard deviation is 10.6 percent.

The result from descriptive statistics also shows that the average of CCCP is (128.3) days (median is (118.8) days, with a standard deviation of 83.4. The maximum value of CCCP (422.7) days shows that these firms store their inventory for longer time period with a maximum value of (537) days and take more time in the collection of payments from their customers with a maximum value of (270.8) days, these results indicate that the firms take around 2 years to convert its capital into cash. However, the minimum value of CCCP is (-43.6) days. This may sound illogical, this happens when the APP is greater than the combined days for the AICP and ARCP; negative CCCP means that there were firms have very much efficient by collecting its receivables from customers before paying to suppliers but this policy of strict collection and relax payments is not always sustainable.

It can also be deduced that the firms collect credit sales from clients (ARCP) after (59.9) days on average (median is (58.1) days, Correspondingly, while they paid their creditors (APP) in (59.3) days on average (median is (47) days, and it takes on average (130.5) days (median is 119 days) for firms to convert their inventories (AICP). Further, besides that, the average of firm size measured by the logarithm of total asset came to 17.244 MJD, with a minimum value of 12.89 MJD, and the maximum value of 20.92 MJD in a year.

Finally, results show that the sample firms utilized a small amount of debt to total assets during the period of study were the mean of debt ratio is 28.6 percent. Although some of the firms did not make use of debt while others showed high debt, with a maximum of .77.2 percent. The mean standard deviation of debt is 17.1 percent.

These results relatively reasonable comparing with similar studies such as; Almazari, (2014) in Saudi Arabia, who reported the average of ARCP, AICP, APP, and CCCP is: 46.12, 200.73, 241.08, -41.03 respectively; Mawutor, (2014) in Ghana, who found that the average of ARCP, AICP, APP, and CCCP is: 45.25, 13.95, 68.32, 24.96 respectively, and Napompech, (2012) in Thailand, who found that the average of ARCP, AICP, APP, and CCCP was: 61.18, 124.31, 52.15 and 133.73 respectively.

## **5.2 Correlation coefficient results**

Correlation coefficients measure the degree to which two variables are linearly related. There are basically two different types of correlations namely Bivariate and Partial correlation. The Bivariate correlation does not give a purely linear relationship between variables as it does not filter out the influence of other variables present. This paper shall work with Partial Correlation Coefficients as these filter out the influence of other variables in coming up with a pure relationship between two variables. The pure linear relationships together with their probability values shall be shown in a Pearson Partial Correlation Matrix. The correlations will help in deciding the different variables that should go into a model as it may be possible to estimate simultaneous equation model. If some variables are highly correlated then using both of them in a model may cause the problem of multicollinearity (Raheman et al, 2010: 157). Table (3) present partial correlation results.

Control Variables	Var.	ROA	CCCP	ARCP	AICP	APP
<b>DR&amp;TA</b>	<b>ROA</b>	1.00				
	<b>CCC</b>	-0.30**	1.00			
	<b>ACP</b>	-0.28**	0.40**	1.00		
	<b>ICP</b>	-0.38**	0.72**	0.20**	1.00	
	<b>APP</b>	-0.28**	-0.14*	0.26**	0.26**	1.00

Source: Research Findings

**a. The correlation between firm ROA and independent variables:**

From the correlation matrix table 3 above, the first glance indicates of the first column indicates that there is a strong negative correlation between CP and all WCM elements of the JIMEC. It can be inferred that an increase in average CCCP, AICP, ARCP, and APP would increase ROA and the reverse is also true. These results conclude that the managers might increase the shareholder's value by shortening the length of CCCP, ARCP, AICP, and APP to a minimum level.

These results are also in line with the several studies such as: Sharaf, and Haddad, 2015; Jayarathnea, 2014; Ponsian, et.al, 2014; Napompech, 2012, and Rezazadeh and Heidarian, 2010.

**b. The correlation between independent variables:**

CCCP has expected significant a positive relationship at a coefficient of (0.40 and 0.72) with ARCP and AICP respectively at the 0.01 level. This result implies that if corporations take more time to collect cash against the credit sale, and more time to convert inventory the CCCP will be increased and CP will be decreased. However these results also reflect highly importance of inventory in this sector, inventory represents 0.23 from total assets of firms in JIMEC at the end of 2016 as researchers calculated.

Regarding ARCP, it has a significant positive relationship with AICP, and APP with a coefficient of (0.20, and 0.26) respectively, at the 0.01 level. It implies that delaying collecting debt quicker related to an increase the length of ICP and APP.

Finally, the results of Correlation between APP and AICP show a significant positive relationship with a coefficient of (0.26) respectively. It implies that delaying paying debt related to an increase the length of AICP and APP.

In summary, it can be concluded that manager in JIMEC must take in the consideration the mutual effect between all WCM policies because the efficient credit policy leads to shortage AICP and CCCP and length of APP, as a result, increase CP.

These results of correlation analysis also indicate an absence of multicollinearity problems, as the correlations between independent variables are relatively low (except the coefficient between AICP and CCCP). As according to Gujarati (1995), multicollinearity problems exist when the correlations value exceeded 0.80. However, the study used each of WC components proxies in the separate model.

**5.3 Econometric analysis results and discussion:**

The panel model of regression analysis has been used in this study, in an attempt to further investigate the relationship between the WCM elements and CP. To run the data, the E-Views 7 Software was used to analyze the panel data for the total number of 153 firm-year observations,

which represents the sample size of 9 listed firms from Jordanian M&E industry sector over a 17 year period from 2000 to 2016.

The first step, in addition to correlation analysis results which conclude the absence of multicollinearity problems, test for multi-collinearity were performed for all four models, VIF and Tolerance test results in table (4) support correlation results.

Var.	Model 1		Model 2		Model 3		Model 4	
	Tol.	VIF	Tol.	VIF	Tol.	VIF	Tol.	VIF
CCCP	0.72	1.38						
ARCP			0.91	1.10				
AICP					0.56	1.78		
APP							0.94	1.06
LTA	0.66	1.53	0.87	1.15	0.51	1.97	0.84	1.19
DR	0.89	1.13	0.85	1.18	0.87	1.15	0.89	1.13

Source: Research Findings

\* The variables in the table have been defined earlier.

Table (4) show that all the variance inflation factor (VIF) coefficients are less than 2 and tolerance coefficients are greater than 0.5 (Gill, et. Al., 2010). thereby demonstrating that no multicollinearity exists between independent variables in the regression models, (Gujarati, 2003).

The second step is conducted Hausman Specification test to a choice between estimating a fixed or random effects model. The null hypothesis is that the preferred model is random effects. Table (5) presents the results of this test.

Model	Chi-Sq. Statistic	Prob.
M1-CCCP	6.119	0.106
M2-ARCP	3.65	0.30
M3-AICP	9.705	0.08
M4-APP	4.320	0.22

Source: Research Findings

The results of Hausman test shows that all Statistic value of Chi-Sq. are insignificant (P. value > 0.05), therefore, the null hypothesis failed to be rejected in all models, which states that a random effect model is the more suitable to our data.

### 5.3.1. Hypotheses test results and discussion:

The following are the random effect model results of the four regression models of the study, where CP measured by ROA is regressed against each component (CCCP, ARCP, AICP, and APP) and control variables individually. Table 6 reports the results of random effect model.

Based on the random effect model results in Table 7, it can be observed that the overall explanatory power of all models is relatively high and statistically accepted for all models, the R-square is approximately equal (26, 28.5, 27.7 and 25.8) in model 1, 2, 3 and 4 respectively. This means that the independent variables of model 1, 2, 3 and 4 explain about 26, 28.5, 27.7 and 25,8

percent respectively of the variation in ROA. However, the estimated regressions are efficient for predictions. Furthermore, according to Fischer's results in all model, the F-statistic (17.31, 19.96, 18.98 and 17.14) in model 1, 2, 3 and 4 respectively), are statistically significant at ( $\alpha \leq 0.01$ ) level. This means that the overall significance of these models results is valid. In other words, independent variables are important factors in determining the firm's CP with high precision in JIMES. So, we can conclude that the results are valid and reliable.

After proving that all models are accurate and dependable models to predict ROA with high precision, the estimation of the regression coefficients as shown in the table below (6) as follows (note that, Appendix 1 represent Cross section effect for all section in each model):

<b>Table (6) Hypotheses test results</b>				
<b>Variable</b>	<b>M1</b>	<b>M2</b>	<b>M3</b>	<b>M4</b>
CCCP	-0.0003**			
ARCPLG		-0.029*		
AICPLG			-0.042**	
APPLG				-0.022**
LTALG	0.018*	0.021*	0.014*	0.021*
DR	-0.275*	-0.280*	-0.255*	-0.251*
C	-0.147	-0.119	0.069	-0.157
R-squared	26	28.5	27.7	25.8
Adj. R-squared	24.5	27.1	26.3	24.3
F-statistic	17.31	19.96	18.98	17.14
Prob.(F-statistic)	0.00	0.00	0.00	0.00
*Sig. at0.01,* at0.05				

i) **First hypothesis test results:**

Model (1) examines the relationship between CP (ROA) and the length of the CCCP taking into consideration the two control variables; firm size and debt ratio.

The coefficient of CCCP is a small and near zero because we cannot transform this variable to natural logarithm as other because of the existence of a negative value of it, however the coefficient ( $\beta = -0.00039$ ) shows the expected highly significant negative sign ( $t = -2.218$ ;  $p < 0.01$ ). That is, the increase or decrease in average CCCP will significantly affect the CP. It simply means that a one percent decrease in the length of CCCP would increase ROA by 0.0003 percent in ROA and vice versa. The estimation output of this model as follows:

$$ROA = -0.147 - 0.0003*CCCP - 0.275*DR + 0.018*LTA$$

t.stat.      (-1.49)      (-2.218)\*\*      (-6.02)      (3.36)

In essence, the study accepts alternative hypothesis ( $H_{a1}$ ) which states that there is a significant relationship between the length of CCCP and ROA in JIMEC.

This result is supported by correlation analysis result as mentioned above in table (4). This result is in agreement with the Trade-off theory and confirms the notion that a shorter CCCP may lead to enhance CP. Thus the study concludes that managers of corporations need to be careful of their CCCP in order to stimulate their financial performance.

Moreover, This result in line with several prior studies such as; Akindele & Odusina, 2015 in Nigeria; Sharaf, & Haddad, 2015 in Jordan; Upadhyay, et., al, 2015 in USA; Jayarathnea, 2014 in Sri Lanka; Darabi & Yousef, 2012; Napompech, 2012 in Thailand, and Rezazadeh & Heidarian , 2010 in Iran.

However, this finding is inconsistent with rare studies that conclude absence of such relationship as Sharma and Kumar (2011) in India

#### **ii) Second hypothesis test results**

Model (2) aims at examining the second hypothesis. The result indicates that the ARCP is highly significant and shows the expected negative sign while the coefficient of (ARCP) is ( $\beta = -0.029$ ) and ( $t = -3.23$ ;  $p < 0.01$ ).

That is, the increase or decrease in average ARCP will significantly affect the CP. It simply means that a one percent decrease in the length of log ACP would increase ROA by 0.029 percent in ROA and vice versa.

The estimation results of this model as follow:

$$\text{ROA} = -0.119 - 0.029*\text{LACP} + 0.021*\text{LTA} - 0.280*\text{DR}$$

t.stat. (-1.291) (-3.23)\* (-6.19)\* (4.36)

Thereby, the second alternative hypothesis ( $H_{A2}$ ) is therefore failed to reject at 1 percent significant level..

Based on that, the study concludes that the managers in JIMEC can improve profitability by shorting the credit payment period granted to their customers.

The results concurred with the findings of a studies conducted by; Sharaf & Haddad, 2015 in Jordan; Jayarathnea, 2014 in Sri Lanka; Ponsian, et.al, 2014 in Tanzania; Chatterjee, 2012 in India; Napompech, 2012 in Thailand; Al-Debi', 2011 in Jordan; Mekonnen, 2011 in Ethiopia; Gill, et. al., 2010 in the USA; Mathuva, 2010 in Kenya, and Rezazadeh & Heidarian, 2010 in Iran.

#### **iii) Third hypothesis test results:**

Regarding the AICP Model (3) examines the third hypothesis. The estimation results of this model as follow:

$$\text{ROA} = 0.069 - 0.042*\text{AICP} + 0.014*\text{LTA} - 0.255*\text{DR}$$

t.stat. (0.495) (-2.93) (2.67) (-5.67)

The result indicates that the AICP is highly significant and shows the expected negative sign while the coefficient of AICP is ( $\beta = -0.042$ ) and ( $t = -2.93$ ;  $p < 0.01$ ). It simply means that one percent decrease in the length of log ICP would increase ROA by 0.042 percent and vice versa.

This negative relationship confirms the negative correlation between ROA profits and the AICP in a table (4).

Thus, the third null hypothesis ( $H_{A3}$ ) is therefore accepted. Therefore study can conclude that the managers can create value and increase CP by decreasing the AICP.

This result is in line with several prior studies such as Sharaf & Haddad, 2015 in Jordan; Jayarathnea, 2014 in Sri Lanka; Ponsian, et.al, 2014 in Tanzania; Napompech, 2012 in Thailand, and Rezazadeh & Heidarian, 2010 in Iran.

#### **iv) Fourth hypothesis test results:**

Regarding the APP model (4) examines the relationship between (ROA) and (APP) with all control variables included in the regression model. The estimation output of this model as follow:

$$\text{ROA} = -0.157 - 0.0218*\text{LAPP} + 0.0201*\text{LTA} - 0.251*\text{DR}$$

t.stat (-1.62) (-2.09)\* (4.31)\* (-5.40)\*

The coefficient of APP is significant negative ( $\beta=-0.218$ ) and ( $t = -2.09$ ;  $p < 0.05$ ), this implies that fourth alternative hypothesis ( $H_{A4}$ ) of existence significant relationship between the (APP) and ROA is accepted at 0.05 significant level.

This result is in line with the Trade-off theory, and it is also consistent with Ruichao (2013) point view that the holding high account payables may prevent the benefit of early payment discount.

The result is in agreement with previous research done by Sharaf & Haddad, 2015 in Jordan; Jayarathnea, 2014 in Sri Lanka; Ponsian, et.al, 2014 in Tanzania.

#### **V) Fifth hypothesis test results:**

Regarding the firm size, the results indicate that there is a highly significant positive relationship between the firm size and ROA in all models, the coefficients of corporation's size LTA ( $\beta= 0.039, 0.021, 0.014,$  and  $0.021$ ) at 0.01 significant level in model 1, 2, 3 and 4 respectively. Thus, the null hypothesis ( $H_{05}$ ) is therefore rejected at 1 percent significant level, indicating accepts the alternative hypothesis ( $H_{a5}$ ) which shows that there is a significant relationship between the corporation's size and ROA.

These results confirm the notion that a large organization enjoys the benefits of the economies of scale and organizations benefit from good economic conditions. This result suggesting that firm with big size has a chance to control markets and supplier chain for its own benefit and reap competitive edge. Several previous studies in line with this result such as; Sharaf and Haddad, 2015, and Chatterjee, 2012.

#### **V) Sixth hypothesis test results:**

Finally, the result illustrates that there is a significant negative relationship between the debt ratio and ROA in all models, the coefficients of DR is highly significant negative sign, ( $\beta= -0.30, -0.28, -0.255,$  and  $-0.251$ ) at 0.01 significant level in model 1, 2, 3 and 4 respectively. These results imply that for every one percent decreases in debt ratio would result in a percent growth in JIMEC profitability.

Thus, the null hypothesis ( $H_{06}$ ) is therefore rejected at 1 percent significant level, indicating a accept the alternative hypothesis ( $H_{a4}$ ) which shows that there is a significant relationship between the debt ratio and ROA

This result is agreement with the pecking order theory which suggests that the debt ratio should be negatively correlated with the CP. This finding also proving by earlier research study such as; Jakpar et al., 2017; Sharaf, & Haddad, 2015; Chatterjee, 2012; and Al-Debi'e, 2011.

### **6. Conclusion and Recommendations**

This study aims to investigate whether there is a statistically significant relationship between different variables of WCM including the (CCCP, ARCP, AICP, and APP) with two control variables (corporation size and debt ratio) and CP in term of return on assets ROA, for a sample of 9 listed corporation on Amman burse, represent the mining and extraction industry sector in Jordan, over a period of 17 years from 2000 to 2016, resulting in 153 firms - year observations.

In this paper, four models were developed to perform an empirical study to examine the postulated hypotheses related to test the existence of the relationship between WCM variables and profitability of MEISC. According to partial correlation and random effect model results, there were prolific enough evidence of agreement with Trade-off theory and Pecking Order theory in JIMEC.

The results conclude that there is a significant negative relationship between all WCM variables and CP.

Random effect model results also prove that the explanatory power of all models is relatively high and statistically accepted for all models, the overall significance of these models results are reliable and valid. Descriptive statistics show that the corporations included in this study collect credit sales from clients after (59.9) days on average (median is (58.1) days, while they paid their creditors in (59.3) days on average (median is (47) days, and it takes on average (130.5) days (median is 119 days) for corporations to convert their inventories. Finally, the average of CCCP is (128.3) days (median is (118.8) days).

The practical implications of this study are that the corporation manager in mining and extraction industry corporation must consider the importance of shortening length of WCM and its components (especially inventory) to a minimum level in formulating their policies, in order to operate efficiently and effectively because the length of WCM is closely and significantly related to CP.

Finally, further researchers could usefully test and verify the points raised in this study across a greater set of sectors of the economy.

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<b>Appendix (1) Cross section effect</b>				
	M1	M2	m3	M4
1	0.017729	0.022140	0.014438	0.019298
2	0.007251	0.006967	0.006322	-0.002107
3	-0.009161	-0.000494	-0.000362	0.004753
4	-0.034156	-0.030445	-0.033136	-0.031846
5	0.006546	-0.003296	0.007452	-0.000131
6	-0.001198	-0.007530	0.008223	0.011375
7	0.007485	-0.002918	0.008352	0.000656
8	-0.002269	0.007657	-0.016524	7.27E-05
9	0.007774	0.007919	0.005235	-0.002071



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