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**THE INTERACTION EFFECTS OF WORKING CAPITAL  
MANAGEMENT ON THE RELATIONSHIP BETWEEN  
KEY DETERMINANTS OF WORKING CAPITAL AND  
FIRM PERFORMANCE**



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Othman Yeop Abdullah Graduate School of Business,  
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## ABSTRACT

The current global economy uncertainties have led to the reduction in the accessibility to trade credit facilities imposed on firms by banks and financial institutions. Critically, firms are keen to look internally to working capital management as a key source of finance. Among the main goal of this research is to evaluate the moderating role of the working capital management on the relationship between key determinants of working capital and firm performance. The population for this study covers manufacturing firms listed on the main market of Bursa Malaysia Securities Berhad. This study covers eleven sectors classification based on the criteria established by Malaysia Investment Development Authority. All data is extracted from Bloomberg database. The multivariate analysis of this study is carried out using Statistical Package for the Social Sciences in order to test the hypotheses. The findings have shown that the relationship between key determinants of working capital and firm performance are moderated by working capital management and they form a contemporary working capital management model. Likewise, days sales outstanding and net liquid balance serves as alternative measures of a firm efficiency and liquidity position. Also, it was found that working capital requirements moderate all the relationships between the key determinants of working capital and firm performance. Except for firm size, it was also found that net liquid balance moderates the relationships between the key determinants of working capital and firm performance. This study concludes that the interaction effects of working capital management in listed manufacturing firms as modifying either the strength or direction of relationships between predictors and criterion. Therefore, it provides a comprehensive research framework for listed manufacturing firms to gain competitive advantage in terms of operational analysis, resource management and profitability.

**Keywords:** working capital management, working capital requirements, net liquid balance

## ABSTRAK

Ketidaktentuan ekonomi global semasa telah membawa kepada pengurangan dalam akses kemudahan kredit berdagang yang dikenakan ke atas syarikat oleh bank-bank dan institusi kewangan. Secara kritikal, syarikat berminat untuk mengkaji dari dalaman kepada pengurusan modal kerja sebagai sumber utama kewangan. Di antara matlamat utama kajian ini adalah untuk menilai pengaruh pengurusan modal kerja kepada hubungan antara penentu utama modal kerja dan prestasi firma. Populasi bagi kajian ini merangkumi syarikat pembuatan yang tersenarai di saham utama Bursa Malaysia Securities Berhad. Kajian ini meliputi klasifikasi sebelas sektor berdasarkan kriteria yang ditetapkan oleh Lembaga Pembangunan Pelaburan Malaysia. Kesemua data diekstrak dari pangkalan data Bloomberg. Analisis multivariat untuk kajian ini dijalankan dengan menggunakan SPSS untuk sains sosial untuk menguji hipotesis. Hasil kajian telah menunjukkan bahawa hubungan antara penentu utama modal kerja dan prestasi firma disederhanakan oleh pengurusan modal kerja dan mereka membentuk satu model kerja pengurusan modal kontemporari. Begitu juga, jualan hari tertunggak dan baki kecairan bersih berfungsi sebagai pengukuran alternatif kecekapan syarikat, dan kedudukan mudah tunai. Juga, didapati bahawa keperluan modal kerja menyederhanakan semua hubungan antara penentu utama modal kerja dan prestasi syarikat. Kecuali saiz firma, ia juga didapati bahawa baki kecairan bersih menyederhanakan hubungan antara penentu utama modal kerja dan prestasi firma. Kajian ini menyimpulkan kesan interaksi pengurusan modal kerja di syarikat pembuatan disenaraikan sebagai mengubah samada kekuatan atau arahan hubungan antara peramal dan kriteria. Oleh itu, ia menyediakan rangka kerja penyelidikan yang komprehensif bagi syarikat pembuatan tersenarai untuk mendapatkan kelebihan daya saing dari segi analisis operasi, pengurusan sumber dan keuntungan.

**Kata kunci:** pengurusan modal kerja, keperluan modal kerja, baki kecairan bersih

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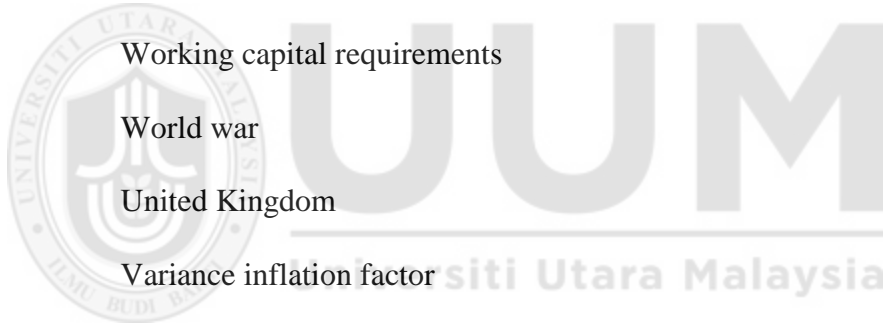
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## LIST OF ACRONYMS AND ABBREVIATIONS

A	Age
ACP	Average collection period
AFC	Asian financial crisis
AR	Accounts receivable
AP	Accounts payable
BMSB	Bursa Malaysia Securities Berhad
BS	Balance sheet
C	Cash and short-term marketable securities
CA	Current assets
CAPM	Capital asset pricing model
CCC	Cash conversion cycle
CF	Cash flow
CL	Current liabilities
CT	Configurational theory
DPO	Days payable outstanding <sup>4</sup>
DSO	Days sales outstanding
EBITA	Earnings before interest, tax and amortization
FST	Fisher separation theorem
GDP	Gross domestic product
GFC	Global financial crisis

GOI	Gross operating income
GOP	Gross operating profit
GWC	Gross working capital
HMR	Hierarchical multiple regression
HHB	Hexagon Holdings Berhad
ICAEW	The institute of Chartered Accountants England and Wales
INV	Inventories
ITO	Inventory turnover ratio
LV	Leverage
MIDA	Malaysian Investment Development Authority
MR	Multiple regression
NA	Short term net accrual
NLB	Net liquid balance
NOP	Net operating profit
NTC	Net trade cycle
NWC	Net working capital
OC	Operating cycle
OCF	Operating cash flow
OLS	Ordinary least square
PN	Practice note
PLS-SEM	Partial least square – structural equation modeling
PWC	Price Waterhouse Coopers
ROA	Return on assets

ROE	Return on equity
ROS	Return on sales
S	Size
SG	Sales growth
SME	Small and medium enterprise
SPSS	Statistical package social sciences
STB	Short term borrowings
WACC	Weighted average cost of capital
WC	Working capital
WCM	Working capital management
WCR	Working capital requirements
WW	World war
UK	United Kingdom
VIF	Variance inflation factor
US	United States



## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

Firstly this chapter starts by capturing the background of this study in terms of the evolution of working capital management (WCM), the contemporary understanding of WCM, the importance of WCM, WCM in non-crisis period, and finally WCM influence on Malaysia manufacturing industry. It is then followed by problem statement, research questions, and research objectives respectively. Subsequently, it presents the scope and limitations of the study, definition of key terms and organization of the thesis.

#### **1.2 Background of the Study**

##### **1.2.1 The evolution of working capital management (WCM)**

The concept of working capital (WC) was probably first coined by Karl Marx (1818-1883), even though it was used at that time to describe a different meaning (Bhattacharya, 2009). In its infancy, WC was termed as ‘variable capital’ in order to describe payment of wages advanced to workers prior to the goods/products ‘work-in-progress’ completion (Bhattacharya, 2009; Lukkari, 2011). Later, the concept of WC was further developed as a firm ‘safe deposit’ to ensure that a firm was able to

meet its obligation in the event when it is liquidated. Here, the objective of WC is to control a firm business financial obligation to guarantee the short term assets match the short term liabilities (Faden, 2013).

In the mid 20<sup>th</sup> century, the business practice had moved towards the going concern concept of an entity and away from the idea of immediate liquidation of business. This had resulted in a new paradigm of working capital concept to maintain a business operating cycle and simultaneously maximize its profitability (Faden, 2013).

Under the Accounting discipline, Brown and Howard (1975) had suggested that the usage of the term WC was categorically discarded by The Institute of Chartered Accountants England and Wales (ICAEW) in their statutory reporting of Statement of Financial Positions (or Balance Sheet). Instead, it had adopted the term current assets less current liabilities (Guthman, 1953). Consequently, this lead to absence of any uniformity or understanding of the term WC as it does not appear in any account form in financial statements of a firm ever since (Vataliya, 2008).

In the context of finance, WC consists of current assets and current liabilities components of an entity. The quantum of a company investment in WC is the difference between the total current assets and total current liabilities (Moradi, Salehi, & Arianpoor, 2012). The finance terminology used to describe this difference is net working capital [NWC] (Brealey, Myers, Partington & Robinson, 2000). Traditionally, NWC has been identified in finance as a measurement of firm

liquidity position (Appuhami, 2009). Therefore, the higher the investment in current assets, the higher will be the liquidity position a firm, while the higher reliance of current liabilities will lead a firm to lower liquidity (Keown, Petty, Scott & Martin, 2001).

Generally, WC represents the amount of funds required to sustain the daily expenses incurred by the operational activities of a firm. According to Mandal, Mahavidyalaya and Goswami (2010) it metaphors 'oil lubricant' required to ensure the smooth running wheels of a business. Basically, WC is a circulating or revolving capital and it is contemporary relevant to management decision making (Pushpakumar & Yadhav, 2014). It is similar with a river which is there from day to day, but the water volume in it is constantly changing (Brown & Howard, 1975; Padachi, 2006). It could be said as the life blood and nerve centre of a firm (Scherr, 1989; Yusuf & Idowu, 2012; Quayyum, 2012; Pushpakumar & Yadhav, 2014). Any mismanagement of the company working capital could lead to liquidity problems and eventually corporate collapse in the extreme case (Kargar & Bluementhal, 1994; Appuhami, 2008; Ramachandran & Janakiraman, 2009; Sen, Kosal & Oruc, 2009; Zariyawati, Annuar, Taufiq & Abdul Rahim, 2009; Moradi et al., 2012).

Currently, numerous studies (Lamberson, 1995; Deloof, 2003; Howorth & Westhead, 2003; Afza & Nazir, 2007; Garcia-Teruel & Martinez- Solano, 2007; Arnold, 2008) have shown that quantifying WC of a business is an uphill task because of the different and uncertainty conditions existed in a turbulent business environment. In practice, it differs across firms in an industry and over time for a

business. Also, it was found that WC requirement differs by the nature and size of the business, production level, operating cycle, credit policy of the business and other factors (Mandal et al., 2010). Critically, any decision making made on working capital will have a direct impact on the trade off between firm profitability and risk (Ranjith, 2008; Madhou, 2011; Abbadi & Abbadi, 2013).

Ethically, there are situations when the management of a company under scrutiny of consistent performance year-on year, tends to adopt earning management to window dress its financial standing by inflating turnover and debtors value using circular cash flow (Monhemius & Durkin, 2009). This is to give the impression of increasing revenue and receivables, which might violate Act 125, Section 368, Malaysia Company Acts 1965. Briefly, this section relates to frauds by officers of a firm who has by deceitful or fraudulent or dishonest means or by means of any other fraud induced any person to give credit to the firm shall be guilty of an offence under this Act.

### **1.2.2 The contemporary understanding of WCM**

Researchers like Appuhami (2008); Mekonnen (2011); Raheman, Sohail, Zulfiqar, Rehman, Komel and Bilal (2012) have argued that in corporate finance discipline, a firm is faced with three basic decisions, namely, capital structure decisions, capital budgeting decisions and WCM decisions. Traditionally, raising and managing of long term capital falls under the ambit of capital structure and capital budgeting, while WCM covered source and application of short term capital that sustain the current operations of a firm, usually less than one year.



According to Sharma and Dhiraj (2009) WC concept is acknowledged to be one of the most challenging financial areas to be understood as the term itself means different things to different people. Notwithstanding to these challenges, it is one of the important yardsticks to measure a firm success as an on-going concern entity (Canina & Carvell, 2008; Mohamad & Mohd Saad, 2010). The success of a firm WCM could be analyzed under the following operational perspectives.

### **Measurement**

WC serves to measure a firm's financial strength position in relative to its business obligations (Gill, 2011). Prudently, if a firm acquired a substantial value of liquid assets in its balance sheet, it could fulfil its daily obligations without hassles. Reciprocally, when a firm is operating under cash deficiency as a result of insufficient cash, and difficult in recovering its debts or insufficient stocks, it will find it difficult to fulfil its products/services obligations toward its customers (Raheman et. al., 2012; Mousavi & Jari, 2012). The opportunity cost under this situation is the lost of firm' sales otherwise secured from its customers (Narendre, Menon, & Shwetha, 2009; Abbadi & Abbadi, 2013).

### **Efficiency**

WC gives a clue as how efficient a firm manages its operations especially in the speed of its current assets and current liabilities turnover (Canina & Carvell, 2008). Overtly, favouring a low level of working capital will require a firm to operate efficiently in order to keep costs down. A company management must possess the agility to avoid excessive WC which could contribute to over capitalization (Eljelly,

2004; Siddiquee & Khan, 2008). Any idle WC could lead to waste as a result of under-utilization of firm resources. Correspondingly, a firm is said to be operating liberally, usually by extending credit terms to customers. This will result in higher debtor's level and demand for higher working capital requirements. Over a period of trading, when a firm tries to maintain a level of turnover which is higher than the sufficient level of working capital than it could sustain, then it experience an overtrading or undercapitalized situation (Sharma & Dhiraj, 2009).

### **Policy**

According to recent study by Faden (2013) any excess WC does not earn the weighted average cost of capital (WACC) that maximize shareholders value. As explained by Ng (1998) as current assets increase, risk falls but profit falls as fixed assets fall, and this is explained as conservative WCM policy. In contrast, as current liabilities increase, risk increases but profit increases as well because long term liabilities fall, also known as aggressive investment policy. The rationale behind this is current assets earn less than fixed assets. For manufacturing firms, fixed assets are purchased and held over the economic life of assets, for creating production capacity and are considered as earning assets for a manufacturing firm (Yusuf, 2002). If a manufacturing firm cannot earn more money from its fixed assets investment then it will be better off in retailing business (Ng, 1998). Similarly, current liabilities is a cheap source of funds as compared to long term liabilities due to lower interest rate and the presence of spontaneous financing (Ng, 1998). So, a firm operating with an optimal working capital and minimize level of non-insurable risk and uncertainty will be able to achieve good profitability and maximize shareholders value.

### **1.2.3 The importance of WCM**

An alternative view was put forward by Faden (2013) who states that WC decisions attract little interest because they happen regularly and repetitively in the daily course of business routine. Accordingly, individual influence on WC decisions is negligible and another peculiar feature is these short term financial decisions are usually reversible over time (Gentry, Metha, Bhattacharyya, Cobbaut & Scaringella, 1979; Faden, 2013). The reversible nature of WC is due to the fact that firm WC decision making is a dynamic process which occurs in an uncertain and turbulent business environment (Gentry et al., 1979). Notwithstanding about the abovementioned nature of WCM, the importance of WCM to firms could not be underestimated and it's crucial to explore them individually.

The strong relationship between current assets and current liabilities determined the liquidity position of a firm, which in turns influence the risk and profitability of a firm and ultimately its survival. Prudent policies advocated for sustaining WC of a business is to achieve three objectives contemporaneously, namely sufficient liquidity, maximizing performance or profitability and minimizing non insurable risk and uncertainty (Smith, 1980; Mandal et al., 2010; Onwumere, Ibe, & Ugbam, 2012). Walker (1964) cited in Madhou (2011) states that the level of risk which a firm could accommodate is very much depending on its ability to pay its overdue obligations on time. These three key success factors of WCM mentioned above are universal factors which are adopted in day to day running of any business irrespective of the country of origin. Smith (1980) reaffirmed this by suggesting that

WCM has an important influence on a firm's profitability and risk, and consequently its value. It was highlighted that WCM practice can be utilized to achieve competitive advantage for businesses (Deloof, 2003; Appuhami, 2008; Mullins, 2009; Taleb, Zoued & Shubiri, 2010; Nyamao, Patrick, Martin, Odondo & Simeyo, 2012; Abuzayed, 2012).

One of the most significant current discussions is current assets are accepted by practitioners as one the crucial components of a company fixed assets. In practice, a firm may reduce its investment in fixed assets by renting or leasing plants and machinery, but the same policy treatment cannot be adopted in the components of WC (Nazir & Afza, 2009). This is because, current assets belongs to the firm with the original intention of converting them into cash as a result of the effective operating of company's fixed assets (Yusuf & Idowu, 2012). In brief, WC cannot be outsourced to any third party.

Traditionally in the manufacturing sector, current assets weighting compose more than half of the total assets, while for the distribution industry it amounts to even more (Appuhami, 2008; Noreen, Khan & Abbas, 2009; Taleb et al., 2010; Yusuf & Idowu, 2012; Valipour, Moradi & Karimi, 2012). If a firm were to pursue a conservative investment policy, it will invest less in fixed assets and more in current assets (Salawu, 2007). Any excess level of current assets could result in a firm to achieve a lower return on investment. According to Van Horne and Wachowicz (2000) any excess investment in current assets will have a negative impact on the firm profitability.

#### **1.2.4 WCM role in non-crisis period**

In a world of globalization and economic liberalization, firms growth and survival chances rely on how prudence of businesses in managing their WCM (Kesimli & Gunay, 2011). The agility of businesses to weather through global financial or economic crisis will have a direct impact on the economic well being of a nation as a whole (Mandal et al., 2010). Given the potentially adverse consequences, there is a sizeable and sustained literature that show how imprudent management of WC as one of the contributors of industrial sickness (Yadav, 1986; Bellouma, 2011).

#### **WC roles**

Wasiuzzaman and Arumugam (2013) draw our attention to the recent GFC of 2007, where large conglomerate encountered liquidity issues. This financial crisis had led to a huge increase in the spreads and restrictions on borrowing by financial institutions (Chiou, Cheng & Wu, 2006; Bellouma, 2011). It forces businesses to look internally in order to unlock the critical cash crystallized in the working capital cycle (Thuvarakan, 2013). Walker (1964) argued that an entity ability to fulfil its short term liabilities depend largely on collection from internally generated funds. Explicitly, these funds resulted from the turnover of working capital key components which release money from their own internal operations rather than profits reported in the income statement of a firm.

## **1.2.5 WCM influence on Malaysia manufacturing industry**

### **Manufacturing sector importance**

Malaysia is an open economy and it is a leading exporter of manufacturing products (e.g. electrical appliances, electrical components). The World Bank reports of 'Doing Business 2013' (The World Bank, 2013) ranked Malaysia at the 12<sup>th</sup> position out of the 185 competitive of doing business in the year 2013. Based on the new economic model introduced by Malaysian Prime Minister in 2010, he envisions the country Gross Domestic Product (GDP) growth to be driven primarily by the private sectors which will drive Malaysia economic into higher-value-added activities in both industry and services by 2020. It was reported by Chang (2012) that the manufacturing sector accounts for 20.6% of Malaysia GDP and an important economic growth driver under the 10<sup>th</sup> Malaysia plan (2011-2015). Also several economists have concluded that manufacturing sector is a wealth producing sector of an economy compared to the service sector which is wealth consuming. However, this vision may be retarded by the impact of any future global economic or financial crisis on Malaysia.

### **Relationship between GDP and WC**

In its annual review 2013 report, Smid and Cooter (2013) revealed that there is a positive correlation between GDP and WC. This is when countries are experiencing highest growth in GDP; likewise they will also witness a similar significant increase in their WC. The financial institutions are more likely to finance these higher levels of WC as this correlation is seen as an expanding market. Unfortunately, when an economy is exposed to any unexpectedly financial crisis, it will experience

contraction in GDP and firms will be under tremendous pressure to maintain a low level of working capital. This is particularly so for manufacturing firms where current assets account for more than half of its total assets (Appuhami, 2008; Noreen et al., 2009; Taleb et al., 2010; Valipour et al., 2012; Yusuf & Idowu, 2012).

### **1.3 Problem statement**

Contemporary corporate executives and members of corporate board of directors are obviously keen to understand the influence of WCM on firm performance (Deloof, 2003; Guariglia, Liu & Song, 2011; Paul, Devi & Teh, 2012; Ding et al., 2013; Kieschnick, LaPlante, & Moussawi, 2013; Banos-Caballero, Garcia-Teruel, & Martinez-Solano, 2014).

In practice, despite research literature (Moussawi, LaPlante, Kieschnick & Baranchuk, 2006; Padachi, 2006; Noreen et al., 2009) of showing chronic and alarming statistics beholding firms' WCM, the irony is there is still lack of understanding of WCM function as a firm effective life-blood and nerve centre (Sen et al., 2009; Paul et al., 2012; Yusuf & Idowu, 2012; Pushpakumar & Yadhav, 2014). In a report released in 2013 by PriceWaterhouseCoopers (PWC) (PriceWaterhouseCoopers, 2013) shows that the current trends of working capital levels have deteriorated year to year by almost 2% globally with American and Asian companies as the worst performers in their working capital increase (actually deterioration). At the same time the report highlighted the greatest working capital improvement opportunity by manufacturing companies and others estimated to be more than €250 billion. Therefore, WCM seems to have an influence on

manufacturing firm performance. However the question is the extent of its influence on firm survival and growth stability.

Gentry et al., (1979) has suggested several reasons for the discrepancy of lacking in understanding of WCM function as a firm effective life-blood and nerve centre. Firstly, WC decisions occur frequently and individual WC decision influence is insignificant. Secondly, WC decisions are routine in nature and reversible overtime. In order to measure and control WC decisions, it requires a prompt online feedback system which is expensive and costly to maintain. Moreover, in the short run since WC decisions are insignificant any investment in dynamic online analyses system is counterproductive. Thirdly, the issue of forecasting cash flows in managing WC is complicated since the tasks of managing WC are not strictly financial decision alone. Instead it overlaps marketing decisions (customers' credit) and production decisions (stocks level) which have a significant influence on a firm cash flows. Finally, WCM in a firm is either subservient to long term financial planning or it's treated separately. The resultant outcome of these discrepancies contributed to the lacking of awareness of the importance of WCM in a firm.

In an Asia magazine survey (REL/CFO Online, 2007, September) stated that Asia's 725 largest companies (excluding automakers and financial institutions) are still having an alarming \$535 billion unnecessarily tied up in working capital. Critically, Malaysia was single out as one of the countries that were downgraded in the overall WCM performance (Wasiuzzaman & Arumugam, 2013). Urgently, in the year 2007 it was reported that 850 top firms in Asia-Pacific region had \$833 billion in total



working capital that was lying idling. Thus the firm management has the responsibility and role to unlock this internally idling WC as an alternative source of funds to finance any future investments (Fazzari & Petersen, 1993). The WC sickness is real and firms shackled with surplus WC remains unproductive (Yadav, 1986; Mandal, et al., 2010).

In the case of Malaysia, statistics have shown that 99 listed firms with financial difficulties were delisted between January 1, 2003 and July 15, 2010 (Free Malaysia Today, July 2010). Deputy Finance Minister at that time, Mr. Donald Lim Siang Chai disclosed the delisted companies were among 143 companies identified as financially unstable. It is apparent that part of the contributing factors for these firms malaise could be resulted from firstly, the ambiguity and piecemeal approach in WCM studies adopted by previous WCM researchers. Secondly, there are several drawbacks in the traditional ratios to measure the financial position of a firm. Lastly, there is insufficient study in WCM role acting as a moderator in maximizing firm performance. These issues are further explored separately.

### **1.3.1 The ambiguity and piecemeal approach in previous WCM research**

From the foregoing discussion, it can be deduced that WCM is not clear in supporting corporate decision makers to adopt WCM in a more strategic, holistic and sustainable terms due to the following reasons discussed below.

## **Ambiguity**

Based on academic perspective, there are many existing literature (Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Regupathi & Zainudin, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Samiloglu & Demirgunes, 2008; Falope & Ajilore, 2009; Ujar, 2009; Zariyawati et al., 2009; Mathuva, 2010; Dong & Su, 2010; Karaduman, Akbas, Caliskan & Durer, 2011; Quayyum, 2012) which emphasized on the significant drivers of low or high of the components of WC. But there was contradictory premise put forth by Palombini and Nakamura (2012) whereby researchers focus only on WCM relationship with firm performance instead and ignored the components of WC. On the other hand, in another research, Faden (2013) suggested that existing literature overlook the relationship between WCM and firm performance and focus on the key components of working capital.

While from a commercial perspective, the traditional approach practiced and adopted by firms where, WCM is an activity which firms overlooked during economy boom but rush to revive it when the economy conditions are hit by financial crisis (Appuhami, 2008; Zhao, 2011; Baveld, 2012).

## **Piecemeal approach**

According to Taleb et al., (2010) many researchers on WCM have focused on examining on two key areas, firstly research to determine the relationship between WCM and firm performance (Jose, Lancaster & Stevens, 1996; Shin & Soenen, 1998; Deloof, 2003; Padachi, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman &

Nasr, 2007; Samiloglu & Demirgunes, 2008; Falope & Ajilore, 2009; Zariyawati et al., 2009; Dong & Su, 2010; Karaduman et al., 2011; Sharma & Kumar, 2011), and secondly the development of models to improve the efficiency performance of WCM (Besley & Meyer, 1987; Lazaridis & Tryfonidis, 2006).

Also, Taleb et al., (2010) further elaborated that when there is a sudden change in the industry context (e.g. financial crisis), the existing WCM models failed to reflect the characteristics and challenges of firms operating in their current organizational settings. This has led to what the researcher coined as 'relevant loss' of the existing WCM models (Taleb et al., 2010). This has given the need to develop a conceptual framework to explain the current WCM practices in the industry.

The existing literature supports the background for this research study of WCM. A considerable amount of literature (Hawawini, Viallet & Vora, 1986; Chiou et al., 2006; Appuhami, 2008; Hill, Kelly & Highfield, 2010) has been published and they help to identify variables in this research framework and firm WCM classification of NWC into WCR and NLB respectively. Recent evidence by Wasiuzzaman and Arumugam (2013) suggests that firm specific factors such as leverage, growth, assets tangibility, age, and firm size have a significant influence on the investment of operating working capital. Complementary to this, there has been published literature (Lou & Homburg, 2008; Faden, 2013; Lindow, 2013) that highlights the relevancy of configurational theory in WCM study, where it establishes the moderating role of WCM influence on the relationship between key determinants of WC and firm performance.

Therefore, there is an opportunity to propose a contemporary WCM model in explaining the current WCM practices in the industry. It also complements the existing WCM models in supporting corporate decision makers to adopt WCM in strategic, holistic and sustainable terms.

### **1.3.2 The drawbacks in the traditional ratios**

For firm stakeholders to measure its financial strength against its business obligations, the existing measurements method using traditional ratios may be compromised due to several weaknesses.

For example, numerous researchers (Gitman, 1974; Skomp & Edwards, 1978; Richards & Laughlin, 1980; Shulman & Cox, 1985; Gentry, Vaidyanthan & Lee, 1990) have casted doubts on the adequacy revealed by the traditional ratios and formula (e.g. net working capital, current assets to total assets ratio, current ratio and quick ratio) as indicators to measure the short term liquidity of financial assets. This inadequacy arises because originally, these traditional ratios are calculated by matching current assets and current liabilities and they are more related to the solvency issue of a company under liquidation situation (Faden, 2013).

These traditional ratios do not show nor reveal the firm liquidity position as a result of the efficiency management of its financial assets and operations from the going concern perspective (Canina & Carvell, 2008). In other words, according to Shulman and Cox (1985) these traditional ratios disregard the influence of changes in

operating cycle on firm liquidity and the results of changes in capital investment on operating cycle.

Similarly, balance sheet items are influenced by the operating cycle and financial strategy of a firm. But those balance sheet items that are affected by financial triggers are usually shown as aggregate values, which make any differentiation between different categories of financial triggers even more remote (Faden, 2013).

### **Shulman and Cox (1985) 'new' paradigm approach**

Shulman and Cox (1985) made a differentiation between the operating cycle and changes in liquid financial assets of a firm by reclassifying net working capital (NWC) into two separate categories, namely working capital requirements (WCR) and net liquid balance (NLB). With this reclassification for a firm on going concern basis, WCR represents the operating cycle of working capital category, while NLB as liquidity of working capital category (Faden, 2013). The influence of WCM on firm performance can be measured through WCR and NLB respectively. Complement to this, the constituents of WCR covered all aspects of operating cycle, procurement, production and sales of a firm value chain.

Like other researchers (Hawawini et al., 1986; Chiou et al., 2006; Appuhami, 2008; Hill, et al., 2010) who have used the classification of WCM pioneered by Shulman and Cox (1985), it opens the opportunity to investigate the measurements of WCR components and NLB, as alternatives to the traditional ratios which are rather important to the practitioners.

### **1.3.3 The moderating role of WCM**

The researcher motivation to examine the WCM link to the relationship between key determinants of WC and firm performance stems from the insight provided by previous researchers like Luo and Homburg (2008). They have highlighted the moderating role of a firm's WCM on the relationship between independent variables and its stock value gap. Stock value gap is the shortfall of an entity's actual market value from its optimal market value, measured using the best performing competitors in the market.

Luo and Homburg (2008) are the pioneer researchers in identifying the moderating role of WCM. They revealed that customer satisfaction (predictor) influence of the firm' stock value gap (criterion) is stronger when a firm has a higher working capital (moderator) than firms with lower working capital (moderator). Likewise, in the same study it was found that impact of customer complaint (predictor) on the stock value gap (criterion) will be weaker for firms with higher working capital (moderator) than those with lower working capital (moderator).

Best to the researcher knowledge, although so far only one study was carried out on the moderating role of a firm WCM under past research results, it creates an opportunity to examine the moderating roles of WCM. As highlighted by Henseler and Fassott (2010) any attempt to ignore the interacting effects could result in a model to be lacked of relevance.

#### **1.4 Research questions**

Subservient to the descriptions of the different facets of issues experience by WCM under the Malaysian context, there is an inclination to reconcile these issues in order to integrate the importance of WCM into the contemporary mainstream of finance.

Bearing in mind of the existing weaknesses in WCM literature especially on the ambiguity and piecemeal approach, this study aim to seek answers to the following research question:

1. Does the relationship between key determinants of WC and firm performance, is moderated by WCM?

In the same way, in order to address the issue of the drawbacks in the traditional ratios, this study intends to find remedy to the following research question:

2. Does WCM provide alternative measures of a firm operating efficiency and liquidity position?

Another essential aspect is on the moderating role of WCM, this study determined to ascertain answer to the following research question:

3. What are the moderating roles of WCM influence on the relationship between key determinants of WC and firm performance?

## **1.5 Research objectives**

In view of globalization and economic liberalization, any market imperfection, like financial crisis, experience by any economy blocs in the world have a direct bearing on the economic well being of a country like Malaysia. Likewise, for growth and survival stability of any firm, it needs to pay more attention to the efficiency and liquidity of existing short term assets and the resources used with maturities of under one year in order to improve their WCM. In reality, a business needs to formulate effective policies to monitor and control WC so as to meet any financial crisis which may emerge in the future (Luther, 2007 cited in Mandal et al., 2010). This is because any financial crisis will weaken the economy and result in insufficient funding for WC assets. This could eventually lead to firm performance constraints in firms.

Therefore, the study objectives are:

1. To evaluate the influence of WCM on the relationship between key determinants of WC and firm performance,
2. To investigate WCM as alternative measures of a firm efficiency, and liquidity position, and
3. To examine the moderating roles of WCM influence on the relationship between the key determinants of WC and firm performance.

## **1.6 Scope and limitations of the study**

This section describes the scope and the limitation of this study. This is further elaborate under the following headings, namely,



## **Scope**

This study is focus on four main types of literature, namely firms WCM operating efficiency (WCR) and liquidity position (NLB), key determinants of WC, components of WCR and firm performance.

The research framework established in this study is supported by two fundamental theories, i.e. Fisher separation theorem (FST) and configurational theory (CT) respectively.

Malaysia is used as a setting to address the research proposition and it covers manufacturing firms listed on the main market of Bursa Malaysia Securities Berhad (BMSB). The data collection in this study includes secondary data drawn from Bloomberg database. The period of the study will cover a five years of non crisis period, starting from 2010 to 2014.

The unit of analysis covers subsectors or different industries within the manufacturing industry established by Malaysian Investment Development Authority (MIDA). The method of analyses of this study uses multiple regression and hierarchical analysis.

## **Limitations**

By and large this study has accomplished the objectives set out in this dissertation. It has been proven that the key determinants of WC adopted in this research does

influence firm performance, under the interaction of WCM. Despite the significant contributions there are few limitations that were observed during the course of completing this dissertation.

Firstly, the firm performance of listed manufacturing companies has diversified business on one end, while the predictors on the other end are five variables, moderated by WCM are determining the consequences of business as a going concern. In the actual business environment, the business model is much complex and complicated than envisage where multiple factors from both internal and external are influencing firm performance.

Secondly, this research focus on manufacturing companies listed on Bursa and results could not be generalized to cover all the manufacturing companies in Malaysia including small and medium enterprise (SME) companies. Research has shown that manufacturing firms with listed status are treated differently from those who do not enjoy this status (Afrifa, 2013).

This has resulted in the relationship among the key determinants of WC, WCM and firm performance of listed manufacturing firms may be different from unlisted SMEs. In particular, the unlimited access (to a certain extent) to funding and the premium reputation may position listed manufacturing firms to influence their relationship between customers and suppliers alike. In short, the status of listed manufacturing firms may impose changes in the relationship among key determinants of WC, WCM and firm performance as compare to the unlisted SMEs.

The third limitation is related to the data availability. This study only limited to data collected from listed manufacturing firms during the non crisis period from 2010-2014. The recent ripple of the 2007 global financial hits Malaysia shore in the year 2009 and fizzled off in the following year. During the non crisis period, increase in business activities may respectively influence the increase in the components of WCM and vice versa. Also, during crisis period, financial institutions impose a 'credit crunch' on a business and this will definitely put pressure on firms NLB position. This triggers the management of a firm to cut back on its investment including WCR and fixed assets respectively. It shows that the results of this dissertation could not be generalized to cover firms operating in crisis period.

According to Afrifa (2013) past literature have revealed that the sample size varies from sample size of 14 to the maximum of 8,872 samples size. This study only covered 282 samples size which is considered small and it is recognized as a limitation in this study. It is acknowledged that any increase in sample size will lead to favourable and reliable regression results (Afrifa, 2013).

Lastly, one of the popular key determinants of WC variables is GDP but it was not included as an independent variable in this study because GDP is more related to economic conditions of the country where firms operate in, while the rest of the popular key determinants of WC are localized within the characteristics of a firm itself. Moreover, GDP factor covers both the non crisis and crisis periods, while this study is solely based on the non crisis period.

## **1.7 Definition of key terms**

In order to facilitate readers to have a better understanding of the key technical terms used throughout this research, it is crucial to explain their meaning within the context of this research respectively.

### **The key determinants of working capital**

The key determinants of WC are factors that influence a firm decision on the size of its investment in the net operating working capital (Wasiuzzaman & Arumugam, 2013). Previous studies have shown the key determinants of WC can be deduced from business indicator (e.g. GDP), industry type (e.g. manufacturing sectors) and firm characteristics which include operating cash flow, leverage, sales growth, firm size, and firm age, which may influence a firm WCM (Chiou et al., 2006 ; Appuhami, 2008; Appuhami, 2009; Nazir & Afza, 2009; Taleb et al., 2010; Ali & Khan, 2011; Gill, 2011; Moradi et al., 2012; Raheman et al., 2012; Saarani, & Shahadan, 2012; Valipour et al., 2012).

### **Net liquid balance (NLB)**

NLB is pioneered by Shulman and Cox (1985) where it represents the surplus of the total of cash, cash equivalents and short term investment/marketable securities which remains after deducting all liquid financial obligations including short term notes payable and the current portion of long-term debts (illustrated in equation 4 under item 2.2.3, see [page 35](#)). It is a measure of financial indicator due to its components and purely financial in nature and not directly related to a business investment in its current operations (Le Roux, 2008). A positive NLB shows that a

firm financial flexibility in honouring its WCR, while a negative NLB will indicate that a firm is totally dependent on external financing to fulfil its WCR (Kleiman, 1992).

### **Operating cycle**

Operating cycle (OC) of a firm shows how funds are used to purchase raw material inventory which is processed into finished goods inventory, sold at a profit to create debtors and collect as cash once again. The cash is then used to pay the creditors upon the mature of creditors' term or any short term loan, with profits left in the business (Sharma & Dhiraj, 2009). It could be measured as the average time between the purchase of materials or services input into the firm value chain and the final cash collection (Fees, 1978). Broadly, OC could be classified in four distinct stages, firstly the raw materials storage stage, secondly the work-in-progress stage, thirdly, the finish goods/inventory stage, and finally, the receivables collection stage (Mandal et al., 2010).

### **Firm performance**

The expression 'performance' indicates the competence of a business to make profit on its fixed resources (invested capital). Thus it shows there is a link between profits and capital. In practice, a business is called successful if its operational profit earned is in surplus over the weighted average cost of capital (WACC) of a firm. Profitability is a barometer to a measure of operating efficiency of a business which means a firm is operating in an optimal mixture effect of liquidity, assets management and debt management. A greater profitability also shows investment in

extra cash, minimization of stocks, efficient in collecting from debtors and minimizes any short term financing by a business. So profitability is a fundamental measure of the success and survival of a business in the long run and measurement of assets efficiency.

### **Working capital (WC)**

WC is also known as ‘circulating capital or ‘current capital’. It represents the quantum of funds required by a firm to sustain its day-to-day expenses on operational activities. In simple term, it is the fund that is actually needed to run the wheels of the business and it could metaphor as the life blood of the human body (Mandal et al., 2010). WC can be measured as a ratio of a company’s current assets over its current liabilities, which is considered a good measure of both a company’s efficiency and its financial health. The higher the ratio, the better the efficiency of the company and the current assets are able to pay off their short-term liabilities. WC also gives investors an idea of the company’s underlying operational efficiency.

### **Working capital management (WCM)**

WCM was pioneered by Sartoris and Hill (1983) where it is an integrated approach of working capital requirements (WCR) and net liquid balance (NLB). WCR combines the management of accounts receivable, inventories, and accounts payable (Sartoris & Hill, 1983), while NLB involves the management of firm liquidity for daily operations and changes in global business environment (Chiou et al., 2006). These components are usually turnover within a year or less. An efficient WCM involves planning and controlling of current assets and current liabilities that remove

and eliminate the risk of inability to meet short term obligations when due and at the same time minimize the investments in these assets (Eljelly, 2004; Mohamad & Mohd Saad, 2010). An inefficient WCM could cause a firm to bankruptcy, even though the firm is reporting profit year on year (Kargar & Bluementhal, 1994).

### **Working capital requirements (WCR)**

WCR approach is based on the balance sheet concept of WC (illustrated under item 2.2.3 above, see [page 33](#)) developed by Shulman and Cox (1985). WCR represents the total of the cycles of accounts receivable and inventories after accounts payable and other payables are deducted, all expressed as a percentage of sales (Hawawini et al., 1986; Correia, Flynn, Uliana, & Wormald, 2000; Ding et al., 2013). WCR provides an easy accounting measure of the quantum of capital of a company invested in its operating cycle (Le Roux, 2008). When WCR is low, it shows that the firm is more efficient in managing its working capital.

### **1.8 Organization of the thesis**

In this study, chapter 1 lay down the background and highlight the main focus area. Likewise, chapter 2 shows the concepts, evolvement and related history of WCM. Next, chapter 3 lay down the comprehensive literature review and the underpinning theory. Then, chapter 4 identify the methodology and framework of this research. While chapter 5 details the findings and discussion of this study. Lastly, chapter 6 summarize the implication and their related theoretical and practical implications. It ends by recommendations for future research.

## **CHAPTER 2**

### **WORKING CAPITAL MANAGEMENT**

#### **2.1 Background**

This chapter starts with the concepts of working capital (WC), which can be classified under three broad approaches namely the operating cycle approach, the balance sheet approach and Shulman and Cox (1985) 'new' paradigm approach to WCM. It then followed by the worldwide history in WCM research and research in WCM. This chapter is concluded by the research in WCM.

#### **2.2 Concepts of working capital**

Previous studies in WCM have shown that in general the concept of WC could be interpreted either using the balance sheet (BS) approach (Shin & Soenen, 1998; Smith, & Begemann, 1997; Erasmus, 2010) or the operating cycle (OC) approach (Geoffrey & Elliot, 1969; Deloof, 2003; Garcia-Teruel & Martinez-Solano, 2007; Charitou, Elfani & Lois, 2010). The two approaches are explained as follows.

##### **2.2.1 Operating cycle approach**

One recent development in WC literature is the use of operating cycle (OC) approach by contemporary researchers (Hawawini et.al., 1986; Chiou et al., 2006;



Appuhani, 2008; Nazir & Afza, 2008; Hill et al., 2010) in business scenario. Based on this approach, working capital requirements are related to the OC of a business and the respective expenditures incurred by operational supply chain of a firm.

In short, OC relates to the duration whereby a firm investment in one unit of money value which remains idle in the business cycle until the eventual recoupment from sales (Zariyawati et al., 2009; Banerjee 1973 cited in Mandal et al., 2010) Therefore OC is the mean lead time between the firm's procurements of materials or services (less the period of credit taken from suppliers), plus wages and other expenditures incurred in the operating cycle and the eventual collection from debts (Fees, 1978, cited in Mandal et al., 2010). The stages in OC generally consist of raw materials storage stage, work-in-progress stage, finished goods stage and debtors' collection stage. Using the same key WC components, the common terminologies that are used to describe OC of a business are cash conversion cycle (Richards & Laughlin, 1980), and net trade cycle (Shin & Soenen, 1998).

### **2.2.2 Balance sheet approach**

In the financial reporting process under balance sheet (BS) approach, the WC of a firm can be categorized either as gross working capital (GWC), also known as the quantitative concept, or net working capital (NWC), also named as the qualitative concept which represents the quality of the data (Geoffrey & Elliot, 1969 cited in Mandal et al., 2010). According to the quantitative concept, it defines WC as the sum of current assets, so much so that the total current asset is named as GWC.

Likewise, the qualitative concept refers WC as excess of current assets over current liabilities and it provides an answer as to the extent to which WC is finance by the long term funds. Both concepts have their own merits. If the user objective is to measure the size and extends to which current assets are utilized, then quantitative concept is relevant. Separately, if the user objective is to evaluate the liquidity position of a firm, then the qualitative concept is applicable instead.

In the first approach, GWC relates to the business investment in the current assets or what Smith (1937) cited in Mandal et al., (2010) called it 'circulating capital' that change from one physical shape to another in the daily operations of a business. In another words it's referring to the total items which made up the firm's current assets within a time frame which is usually less than one year. These current assets include cash and bank balances, debtors, stocks, prepaid expenditures, loans and advances, short term marketable securities etc. GWC views that a firm will accumulate working capital just enough to accommodate the firm's operating cycle.

This will avoid any investment in surplus cash or excess liquidity which will lead to loss of revenue and/or profit and will not maximize shareholders wealth.

The second approach in NWC, also known as 'operating capital' (Taleb et al., 2010) is concerns with the difference between current assets (CA) and current liabilities (CL).

According to Darun (2011) NWC could be traced as one of the earliest definition of WC as suggested by Mann (1918). NWC can furnish an idea regarding the source of financing capital. It focuses on the continuous liquidity of firm by adopting permanent sources of fund and a mixture of long term and short term sources of finance (Wassertein, 2010; Taleb et al., 2010; Sunday, 2011). The NWC variance can be manifested into three separate categories, namely positive variance (where  $CA > CL$ ), negative variance (where  $CA < CL$ ) and zero variance (where  $CA = CL$ ).

Therefore, the positive variance refers to the surplus of CA over CL. Under this category, part of CA is funded by a firm's long term capital. Adversely, a negative variance refers to the deficit of CA under CL. It means the part of CL is used to finance investment in long term capital instead. Interestingly, the surplus and deficit categories of WC are applied in the interpretation of trade off among liquidity, profitability and risk of a firm (Mandal et al., 2010).

The normal trend for any business is to sustain a surplus WC by juggling between liquidity and profitability at an acceptable level of risk exposure (Mandal et al., 2010). In business, any deficit of WC coupled with sales growth is generally categorized as undercapitalized or overtrading and if persists it could lead to business failure (Platt & Platt, 1995; Churchill & Mullins, 2001).

In any crisis period, zero variance WC is aggressively pursued by firms where CA is equal to CL. The reason is to avoid any surplus investment in current assets where the firm will pay off their due current liabilities with current assets. Over time this

will improve the value of the CA and at the same time smoothen the operation of WC.

The third approach highlights the extent which long term assets of the firm are covered by the long term capitals. Positive working capital shows the extent in which long term capital is available to finance the company's WC. The availability of this long term capitals financing reduces the company's risks when short term financing are maximized or recalled.

Briefly, the three different balance sheet approaches can be shown as in Figure 2.1, using the various boxes to represent the components of balance sheet, one of the important major financial statements used by the finance manager and business owners of a firm. The balance sheet shows a company's financial position at the end of a specified date, usually the financial year end of a firm.

It mirrors a "snapshot" of the company's financial position at a point (a moment or an instant) in time. In the present accounting practice, the balance sheet is also referred to as the statement of financial position.

From application perspective, the first approach is used to measure the size and extent of the component of current assets are being utilized, while the second approach studied the ability of a firm to survive in the event it losses all short-term financial support. The third approach focuses on the extent of long term assets of a firm is covered by its long term capital.

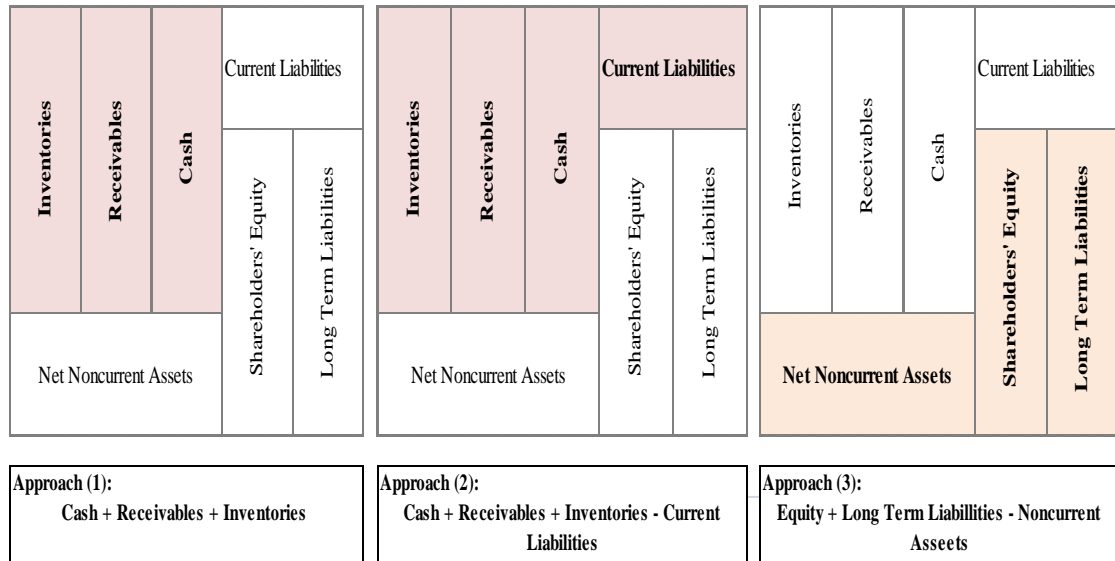


Figure 2.1  
*Approaches to Working Capital*  
Source: Adapted from Ding, Entwistle and Stolowy (2007)

### 2.2.3 Shulman and Cox (1985) 'new' paradigm approach to WCM

Revisiting the second approach, a business investment in WC is measured by the difference between its current assets and its current liabilities. In our earlier discussion, this is known as net working capital (NWC). Accordingly, current assets will consist of cash and short-term marketable securities (C), accounts receivable (AR), and inventories (INV). Likewise, current liabilities are related to short term borrowings (STB), accounts payable (AP), and short term net accrual (NA).

When we represent these relationships in mathematical formula, it can be written as;

$$NWC=(C+AR+INV)-(STB+AP+NA) \quad (\text{eq.1})$$

where NWC is the net working capital, C is the cash and short term marketable securities, AR is the accounts receivable, INV is inventories, STB is short term borrowings, AP is accounts payable and NA is short term net accrual.

The purpose of classification of these short-term items is to provide a measure of a firm's investment in working capital which is closely linked to a firm's operating cycle. But this approach of WC was disapproved by Shulman and Cox (1985) as some of the variables of NWC are not connected to the business operating cycle and logically cannot be considered as a part of the business investment in working capital.

In general, variables such as cash and marketable securities (C) and overdrafts and notes payable to the banks (STB), should be classified as decision items which are related to financial perspective and, should not be directly linked to a business investment in its existing operations. The significant of this difference could be shown when a firm increases its long term borrowing in order to finance future capital investment, where it will temporarily increase the business cash position and falsely inflate its NWC and may be misleading to readers.

Shulman and Cox (1985) proposed the theoretical bases for the development of the new paradigm of WCM, when the equation 1 (eq. 1) is rearranged as;

$$NWC = (AR+INV)-(AP+NA) + (C-STB) \quad (\text{eq. 2})$$

Obviously, we can deduce that the four variables within the first set of brackets in equation 2 (eq. 2) are directly linked to a business operating cycle, while the remaining two variables within the last brackets are importantly the results of purely financial decisions .When we reclassify the difference between the total value of accounts receivable and inventories (AR+INV) and the total value of accounts payable and net accruals (AP+NA) it is known as a business working capital requirements or WCR (Shulman & Cox, 1985; Hawawini et al., 1986). This results in the following equation;

$$\text{WCR} = (\text{AR}+\text{INV})-(\text{AP}+\text{NA}) \quad (\text{eq. 3})$$

Likewise, the variance between cash and marketable securities (C) and short term borrowing (STB), the two last items related to the firm's financial decision is known as the net liquid balance or NLB (Shulman & Cox, 1985), which is shown as follows;

$$\text{NLB} = \text{C}-\text{STB} \quad (\text{eq. 4})$$

Pioneering this 'new' paradigm approach, Hawawini et al., (1986) argued that the evaluation of WCM based on NLB and WCR is a better measure of the firm's investment in the operating cycle than any based on traditional concept of net working capital.

In summary, the relationship between the two measures of working capital follows directly from equation 2 (eq. 2), which can be rewritten as;

$$\text{NWC}=\text{WCR}+\text{NLB} \quad (\text{eq. 5})$$

or,

$$\text{WCR}=\text{NWC}-\text{NLB} \quad (\text{eq. 6})$$

Alternatively, we can conclude that working capital requirements (as per equation 6) is thus the difference between the traditional net working capital and net liquid balance. Similarly, a business net working capital will equal its working capital requirements only if firm's net liquid balance is zero, i.e. if its cash holdings equal its short term borrowing.

In summary, Shulman and Cox (1985) 'new' paradigm approach of using WCR and NLB are used throughout this research as an alternative measure of the financial position of a firm. Hawawini et al., (1986) had suggested that WCR is an easy accounting measure that reveals the amount of capital invested by a firm in its operating cycle (OC). . If WCR is positive, the excess must be financed by either free cash flow or debt (Faden, 2013). Likewise, if WCR is negative, a firm's operating cycle becomes the permanent source of firm financing rather than a use of funds instead (Hawawini et al., 1986). The positive WCR policy is related to conservative approach to WCM while, the negative WCR policy is more related to aggressive approach to WCM. It's an effective measure of a firm liquidity by highlighting the timing of the firm operations cash inflows and outflows (Rehn,



2012). While NLB consists of the difference between a firm cash plus marketable security and short term debts/borrowings, is related to firm financial decisions with no direct correlation to firm operations (Faden, 2013). This NLB indicator looks at these assets as a primary source of liquidity (Kleiman, 1992) and predicting any financial crisis of a firm (Chiou et al., 2006).

### **2.3 Worldwide history in WCM research**

Research insights in WCM provided by Darun (2011) have found out that the evolution of WCM around the world can be traced to basically four distinct periods as shown in Figure 2.2. They include, firstly working capital awareness era starting from 1900s-1940s, secondly the working capital in pre and post World War II period commencing 1920s to 1950s, thirdly the working capital during the industrialization period beginning 1950s to 1980s, and lastly, the working capital in the period of globalization starting from 1990 to present.

Given the progressive evolvement of WC, Darun (2011) has shown WC started in the awareness era (1900s - 1940s), where WC was in an infancy stage with arguments among stakeholders in WC over its definitions, category, characteristics, and also between its theory and practice (Mann, 1918; Swartz, 1947).

Overlapping this period was the pre & post World War II (WW II) era (1920s-1950s) where both era lies in the same operating environments and development in WC. Apparently, the controversies were on the levels (Benjamin, 1939) and financing methods of WC (Ketchum, 1942; Carey, 1949; Chandler, 1994) and its

link to firm's liquidity position. Ketchum (1942) cited in Darun (2011) pointed out that during the WWII there was a surge in demand for WC as to finance army related products. Post WW II also shown that conglomerate and advanced technology firms were dominating the emerging markets. This alteration in organizational focus has lead the practice of WC to be more complicated and researchers were developing new techniques, for example NWC approach, current ratio and quick ratios.

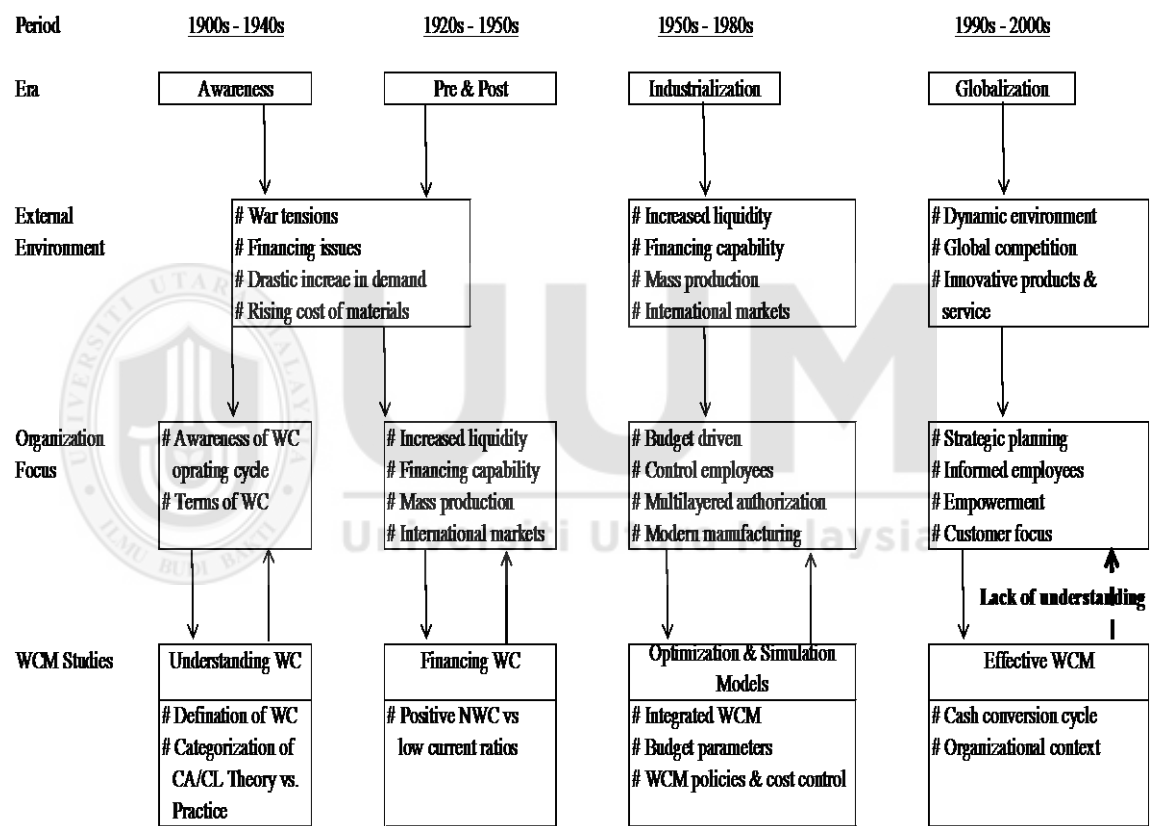


Figure 2.2  
*The Chronology of Evolution of WCM*  
 Source: Adopted from Darun (2011)

In the industrialization era, firms evolved in size and complexity which caught middle managers off guard in the knowledge and experience to manage the performance of 'new' & different business activities (Chandler, 1994). Subservient to the development of mathematical models to assist these managers, WC

researchers had developed variety of mathematical and simulation models to assist WCM decision making for these middle managers (Beranek, 1963; Shapiro, 1973; Thompson, 1975; Kim & Chung, 1990). The usefulness of these models to practitioners was recognized by Gitman, Moses and White (1979) in their research even though some of them lack flexibility in facing the turbulent business environment (Trahan & Gitman, 1995).

Followed by the globalization era starting from the 1990s to present, WCM practice is focused on profitability and liquidity (Pass & Pike, 1984; Shin & Soenen, 1998; Moyer, McGuigan & Kretlow, 2009) by squeezing WCM items (Richards & Laughlin, 1980; Shin & Soenen, 1998; Johnson & Soenen, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Vishnani & Shah, 2007; Zariyawati et al., 2009; Mohamad & Mohd Saad, 2010; Mathuva, 2010). Another approach suggested by researchers is by disbursing creditors early or within discount period to enjoy the savings for early disbursements (Deloof, 2003; Raheman & Nasr, 2007).

With such an abundance, sizeable and sustained literature that investigates the evolution of WCM research, Darun (2011) pointed out that the existing WCM research on organizational perspective is presently limited and ‘lack of understanding’ as highlighted in Figure 2.2. As such it is not assisting middle managers in their decision making in the era of globalization (Harrison & McKinnon, 2007).

## 2.4 Research in WCM

It was claimed that Sagan (1955) was the pioneer who lay out the platform for WCM research (Madhou, 2011), where he stressed the management of debtors, creditors, stocks and cash as an operational tools for a business. Later, Walker (1964) cited in Madhou (2011) proposed an innovative way of using quantitative approach in testing the risk-return trade off in WCM, where it complements the earlier works carried out by Sagan (1955).

In details, Walker (1964) cited in Madhou (2011) proposed three WC theories which stipulate that, firstly if the amount of WC changes in relative to fixed capital, the amount of risk a firm is exposed to also changes. Similarly, the opportunity for gain or loss is also increase. Secondly, the type of WC adopted by firm to finance its working capital will vary directly with the amount of risk that a firm is exposed to. Correspondingly, the chances for gain or loss will also be increased. Lastly, the more the gap between the maturities of a firm's leverage and its internally generated cash flow, the greater is the firm risk and vice versa.

But over time, beleaguered with insufficient theory to sustain the WCM research, researchers like Van Horne (1969) and Pringle and Cohn (1974) had proposed the usage of probabilistic cash budgets models and capital asset pricing model (CAPM) in WCM decision making. Basically, according to Van Horne (1969) the function of probabilistic cash budget is to evaluate the risk trade-off between the firm level of

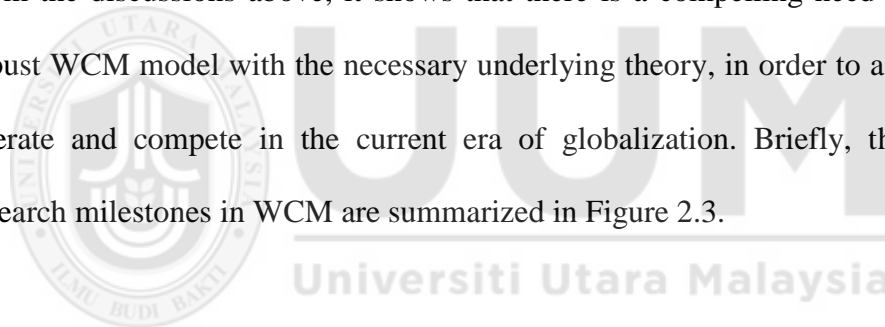
liquid assets and the maturity of debts. Likewise, Pringle and Cohn (1974) stressed that a firm active WCM policy is linked to CAPM. This linkage will enable the firm shares to reflect the appropriate level of unsystematic risk at any point in time which it is exposed to.

The qualitative research of WCM was pioneered by Gentry et al., (1979). The researchers observed that the most important objective of any firm is to equip cash, debtors, stocks and short term trade credit in order to support forecasted turnover of a firm. Subsequent qualitative researchers were Belt and Smith, (1991); Kim, Rowland and Kim, (1992); Ricci and Morrison, (1996); Maxwell, Lawrence and Smith, (1998); Khoury, Smith and Mackay, (1999); Ricci and Di Vito, (2000); Darun, (2011); Zhao, (2011). Basically, investigation under the qualitative approach has shown that in order for a business to thrive, it must supply sufficient cash, receivables, inventory and short terms credits in order for it to support the forecasted sales in the stipulated planning period.

Researchers adopting quantitative research approach primarily investigated the influence of WC on firm profitability (Smith, 1980) and also the investigation into the determinants of WCM (Moussawi et al., 2006; Chiou et al., 2006; Nazir & Afza, 2008; Banos-Caballero, Garcia-Teruel & Martinez-Solano, 2010). Generally, we can conclude that the quantitative approach tends to study the influence of working capital on firm performance and the effects of key determinants of working capital respectively.

It was shown by Sartoris and Hill (1983) that starting from 1900s until the 1980s the practice of management of working capital was compartmentalized into three different organization levers, which covered cash, accounts payables, and accounts receivables. Each of these levers was managed separately and independently by different managers. Acknowledging these weaknesses and deficiencies, Sartoris and Hill (1983) suggested the requirement for an integrated method of combining the management of accounts payable, accounts receivables and stocks. This integrated method of planning and controlling is now known as working capital management (WCM).

From the discussions above, it shows that there is a compelling need to develop a robust WCM model with the necessary underlying theory, in order to assist firms to operate and compete in the current era of globalization. Briefly, the numerous research milestones in WCM are summarized in Figure 2.3.



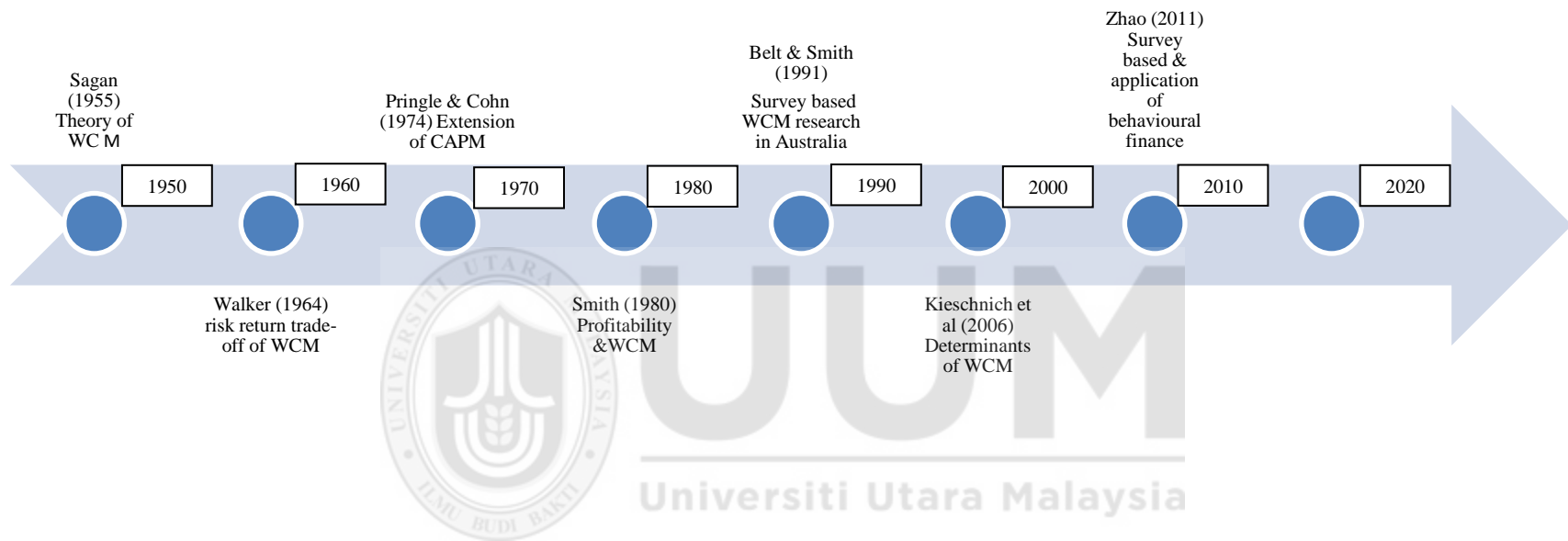


Figure 2.3  
*Timeline of pioneering studies in WCM*  
 Source: Adapted from Madhou (2011)

## **CHAPTER 3**

### **LITERATURE REVIEW**

#### **3.1 Introduction**

This chapter reviews literature which is related to variables measurement of the key determinants of WC, WCM and firm performance. It starts with ambiguity and piecemeal approach, adequacy of traditional ratios, lack of study on moderating role of WCM and WCM influence on firm performance during non crisis period. The review then continues with the variables of the key determinants of WC, and measurement variables in firm performance respectively. It will then explore the underpinning theory which explains the research framework of this study and the moderating effects of WCM. Subsequently it looks into the limitations of existing research and the need for further research. The chapter ends with a summary.

#### **3.2 Ambiguity and piecemeal approach**

In the academia perspective, the ambiguity situation arises when many of the contemporary literature (Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Regupathi & Zainudin, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Samiloglu & Demirgunes, 2008; Falope & Ajilore, 2009; Ujar, 2009; Zariyawati et al., 2009; Mathuva, 2010; Dong & Su, 2010; Karaduman, Akbas, Caliskan & Durer, 2011; Quayyum, 2012) emphasized on



significant drivers of low or high working capital requirements, there was contradictory claim by Palombini and Nakamura (2012) that researchers only focus on WCM relationship with the firm's profitability and ignoring the key components of the working capital. Interestingly another researcher Faden (2013) suggested that existing literature instead overlooks the relationship between WCM and firm performance. Similarly, from the commercial perspective the traditional practice adopted by firms where they overlook WCM during boom time but rush to revive it when hit by financial crisis (Appuhami, 2008; Zhao, 2011; Baveld, 2012).

As explained by Taleb et al., (2010) practitioners feel that sophisticated financial decision making techniques are not practical as they contain unrealistic assumptions, cannot be explained to top management, and are difficult to implement. So much so that when there is a sudden change in industry context, the existing models failed to reflect the characteristics and challenges of firms operating in their environment.

Separately, Taleb et al., (2010) have highlighted many researchers on WCM research have focused on examining on 2 key areas, namely; (1) research to determine the relationship between WCM and firm performance (Jose, Lancaster & Stevens,1996; Shin & Soenan,1998; Deloof, 20013; Padachi, 2006; Garcia-Turuel et al., 2007; Raheman & Nasr, 2007; Samiloglu & Demirgunes, 2008; Zariyawati et al., 2009; Falope & Ajilore, 2009; Dong & Su, 2010;Sharma & Kumar, 2011; Karaduman, Akbas, Calislan & Durer, 2011), (2) the development of models to improve the efficiency performance of WCM (Lazaridis & Tryfonidis, 2006; Besley & Meyer, 1987).

Also, Taleb et al., (2010) further elaborated when there is a sudden change in the industry context (e.g. financial crisis), the existing WCM models failed to reflect the characteristics and challenges of firms operating in their current organizational settings. This has led to what the researcher coined as 'relevant loss' of the existing WCM models. This has given the needs to develop a conceptual framework to explain the current WCM practices in the industry.

In light of these ambiguity and piecemeal approach, there exists a gap where there is a deficiency in existing WCM frameworks in explaining the current WCM practices in the industry.

### **3.3 Adequacy of traditional ratios**

Based on current literature, numerous researchers (Gitman, 1974; Skomp & Edwards, 1978; Richard & Laughlin, 1980; Shulman & Cox, 1985; Gentry, Vaidyanathan & Lee, 1990) have casted doubts on the adequacy reveal by the traditional ratios (e.g.net working capital, current assets to total assets ratio, current ratio and quick ratio) as indicators to measure the short term liquidity of financial assets. This adequacy is because, firstly originally, these traditional ratios are more related to the solvency issue of a company in relation to liquidation situation. These traditional ratios do not show the firm liquidity position as a result of the efficiency management of its financial assets and operations from the going concern perspective (Canina & Carvell, 2008). In other words, according to Shulman and Cox (1985) the traditional ratios disregard the influence of changes in operating cycle on firm liquidity and the results of changes in capital investment on operating cycle. Secondly, balance sheet items are influenced by

the operating cycle and financial strategy of a firm, but their reported values are usually shown as aggregate (Faden, 2013), which make any distinguishment between these categories even more remote.

In a later study, Shulman and Cox (1985) make a distinguishment between the operating cycle and changes in liquid financial assets by reclassifying net working capital (NWC) into two (2) separate categories namely working capital requirements (WCR) and net liquid balance (NLB). With this reclassification for a firm on going concern basis, WCR represents the operating cycle of working capital category, while NLB as liquidity of working capital category respectively (Falden, 2013). The influence of WCM on firm performance can be measured through WCR and NLB respectively. The constituents of WCR cover all aspects of operating cycle, procurement, production and sales of a firm value chain.

More importantly, WCR represents the amount of firm's money that is invested in the operating cycle of an entity. If WCR is positive, the excess must be financed either free cash flow or debt (Falden, 2013). Likewise, if WCR is negative, a firm's operating cycle becomes the permanent source of firm financing rather than a use of funds instead (Hawawini, Viallet & Vora, 1986). The earlier is related to conservative approach to WCM while the later is more related to firm which adopts an aggressive WCM. The components of NLB consist of cash and short-term borrowings. These are financial decision variables with no direct correlation to firm operations (Falden, 2013). Since NLB components consist only of highly liquid assets, it represents a measure of the

company liquidity position and predicting the financial crisis of a firm (Chiou, et al., 2006).

The drawbacks in the traditional ratios to measure the financial position of a firm operating as a going concern basis, has acknowledged the gap of the inadequacy in explaining, on a going concern, the measurement of a firm WCM efficiency in managing its operating assets and liquidity position.

### **3.4 Lack of study on the moderating role of WCM**

The present literature has indicated the limited study on the moderating role of WCM. The contemporary results of Luo and Homburg (2008) have revealed that customer satisfaction (independent variable) influence of the firm' stock value gap (dependent variable) is stronger when a firm has a higher working capital (moderating variable) than firms with lower working capital (moderating variable). Likewise, in the same study it was found that impact of customer complaint (independent variable) on the stock value gap (dependent variable) will be weaker for firms with higher working capital (moderating variable) than those with lower working capital (moderating variable).

As explained by Henseler and Fassot (2010) any attempt to ignore the interacting effects in any study could result in a model to be lacked of relevance. Considering this, the current gap identified is that there is an insufficient study on the moderating role of WCM even though it exhibits a strong influence on the relationship between variables.

### **3.5 WCM influence on firm performance during non crisis period**

In the study of WCM effects on firm's profitability during non-crisis, it is crucial to study the existing literature on the components of WCM separately and their influence on firm profitability. This section examines the past research works carried out by researchers on the relationship between components of working capital (WC) and firm performance during the non crisis period.

#### **3.5.1 Working capital requirements and firm performance**

Fundamentally, working capital requirements (WCR) as defined in equation 3 under item 2.2.3 above (see [page 35](#)), reveals how long does it takes to convert a firm resources input into its value chain system in order to generate operating cash flow (Quayyum, 2012).

Various researchers in the developed markets have established a negative relationship between WCR and firm performance (Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Samiloglu & Demirgunes, 2008; Ujar, 2009; Karaduman et al., 2011). It means a firm which adopts a WCM policy with the lowest possible of accounts receivables (AR) and inventories (INV) and the maximum amount of accounts payable (AR) will achieve the highest firm performance. The exception is the research conducted by Gill, Biger and Nigel (2010) in USA which shown a positive relation between WCR and firm performance. But in the same research they unearthed a significant negative relationship between AR and firm performance, which complies with other researchers'

findings. Gill et al. (2010) explanation for the exception results might be due to nature of the monopoly manufacturing industries position which they examined in their study.

In the emerging market, researchers found similar results like their counterparts in the developed market, i.e. there is a significant negative relationship between WCR and firm performance (Raheman & Nasr, 2007; Falope & Ajilore, 2009; Zariyawati et al., 2009; Dong & Su, 2010; Mathuva, 2010; Quayyum, 2012).

Similar to Gill et al. (2010), Sharma and Kumar (2011) also established a positive relationship between WCR and firm performance, which suggest that when firms loosen their control and monitoring of WCR, it will lead to higher firm performance.

The summary of the effect of WCR on firm performance is shown in Table 3.1.

Table 3.1  
*Effects of Working Capital Requirements on firm performance*

Independent Variable	Country	Significantly negative relation with firm performance	Significantly positive relation with firm performance	
<b>Working Capital Requirements (no. of days)</b>	<b>Developed Market</b>			
		Belgium	Deloof (2003)	
		USA	Shin & Soenen (1998)	Gill et. al. (2010)
		Greece	Lazaridis & Tryfonidis (2006)	
		Spain	Garcia-Teruel & Martinez-Solano (2007)	
		Turkey	Samiloglu & Demirgunes (2008)	
		Turkey	Karaduman, Akbas & Caliskan (2011)	
		Turkey	Ujar (2009)	
		Taiwan	Wang (2002)	
		<b>Emerging Market</b>		
		Pakistan	Raheman & Nasr (2007)	
		Malaysia	Zariyawati et al. (2009)	
		Nigeria	Falope & Ajilore (2009)	
		Vietnam	Dong & Su (2010)	
		Kenya	Mathuva (2010)	
	Bangladesh	Quayyum (2012)		
	India		Sharma & Kumar (2011)	

Source: Adapted from Baveld (2012)

### **3.5.2 Accounts receivable and firm performance**

There were numerous studies on the effect of accounts receivable (AR) on firm performance during the non crisis period (Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Samiloglu & Demirgunes, 2008; Falope & Ajilore, 2009; Gill et al., 2010; Mathuva, 2010; Karaduman et al., 2011) . Majority of the findings, both in the developed markets and emerging markets, have shown a negative relationship between AR and firm performance. The reason is during the non crisis period firms are better off minimizing the risks by maintaining the AR to a minimum level of the firm operation.

The exception is the evidence found in the Indian market, where Sharma and Kumar (2011) showed that there is a positive relationship between AR and firm performance. This means when a firm is loosening its AR control, this will leads to higher firm performance. They put forward two explanations for this deviation. Firstly, India is an emerging market, and the firm reputation of creditworthiness is secondary in nature and majority of the firms opted to loosen their AR control. Secondly, most of the firms are operating profitably, and they tend to loosen their AR control.

The summary of the studies examining the effect of AR on firm performance is shown in Table 3.2.

Table 3.2  
*Effects of Accounts Receivable on firm performance*

Independent Variable	Country	Significantly negative relation with firm performance	Significantly positive relation with firm performance
Accounts Receivables (no. of days)	<b><u>Developed Market</u></b>		
	Belgium	Deloof (2003)	
	Greece	Lazaridis & Tryfonidis (2006)	
	USA	Gill et al. (2010)	
	Spain	Garcia-Teruel & Martinez-Solano (2007)	
	Turkey	Samiloglu & Demirgunes (2008)	
	Turkey	Karaduman et. al. (2011)	
	<b><u>Emerging Market</u></b>		
	Nigeria	Falope & Ajilore (2009)	
	Pakistan	Raheman & Nasr (2007)	
	Kenya	Mathuva (2010)	
India		Sharma & Kumar (2011)	

Source: Adapted from Baveld (2012)

### 3.5.3 Accounts payable and firm performance

Logically, in the measurement of WCR of a firm derived from equation no. 3 under item 2.2.3 above (see page 35), the value of accounts payable (AP) needs to be deducted. Majority of researches who have studied the relationship between WCR and firm performance have found a negative relation between WCR and firm performance. Therefore, it is expected that AP will have a positive relation with firm performance (Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Samiloglu & Demirgunes, 2008; Falope & Ajilore, 2009; Ujar, 2009; Zariyawati et al., 2009; Dong & Su, 2010; Mathuva, 2010; Karaduman et al., 2011; Quayyum, 2012). It was argued that the positive results are due to firstly, profitable firms take longer than the credit terms set by their creditors, to settle their bills because they utilized these trade credits as a source of short term funds, and secondly from equation 3, when firms increase



their AP value, these firms will be able to reduce their working capital to an optimum level and thus increasing the firms performance.

On the contrary, the empirical results have shown otherwise (Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Falope & Ajilore, 2009; Karaduman et al., 2011; Sharma & Kumar, 2011). They concluded, the opposite, whereby the AP has a negative effect on the firm performance.

Deloof (2003) put forward two reasons to explain this anomaly. Firstly, profitable firms pay their bills earlier and secondly, in the event if firms pay their bills late, they will not be entitled to any discount. Later, Baveld (2012) added another two more explanations for this deviation. Firms operating in developed market have higher access to capital market and they don't rely on suppliers' credit as a source of fund. Another reason of not adopting AP as a source of funds is the possibility of losing business goodwill in the event if the firms could not meet their debts obligation on the due date.

Separately, Gill et al. (2010) found no relationship between AP and firm performance.

The synopsis effect of AP on firm performance is shown in Table 3.3.

Table 3.3  
*Effects of Accounts Payable on firm performance*

Independent Variable	Country	Significantly negative relation with firm performance	Significantly positive relation with firm performance
<b>Accounts Payable</b> (no. of days)	<b><u>Developed Market</u></b>		
	USA		
	Belgium	Deloof (2013)	
	Greece	Lazaridis & Tryfonidis (2006)	
	Spain	Garcia-Teruel & Martinez-Solano (2007)	
	Turkey	Karaduman et. al. (2011)	
	<b><u>Emerging Market</u></b>		
	India	Sharma & Kumar (2011)	
	Nigeria	Falope & Ajilore (2009)	
	Pakistan	Raheman & Nasr (2007)	
	Kenya		Mathuva (2010)

Source: Adapted from Baveld (2012)

### 3.5.4 Inventories and firm performance

Like the other key components of WC, the connection between inventories (INV) and firm performance has been studied by Deloof (2003); Lazaridis and Tryfonidis (2006); Garcia-Teruel and Martinez-Solano (2007); Raheman and Nasr (2007); Samiloglu and Demirgunes (2008); Falope and Ajilore (2009); Mathuva (2010); Karaduman et al., (2011); Sharma and Kumar (2011). Their findings have shown the number of inventory days have a negative influence on firm performance. The opposite result was found by Mathuva (2010) in Kenya, which had shown a positive result. He reasoned that firms that acquired higher inventory levels in order to reduce the costs of production stoppages minimize the possible of unable to access to raw materials and protects against materials price fluctuations as a result of changing macroeconomic factors.

In contrast, Gill et al., (2010) found no relationship between INV and firm performance. The summary effect of INV on firm performance is shown in Table 3.4.

Table 3.4  
*Effects of Inventories on firm performance*

Independent Variable	Country	Significantly negative relation with firm performance	Significantly positive relation with firm performance
<b>Inventories (no. of days)</b>	<u>Developed Market</u>		
		USA	
		Belgium	Deloof (2013)
		Greece	Lazaridis & Tryfonidis (2006)
		Spain	Garcia-Teruel & Martinez-Solano (2007)
		Turkey	Karaduman et al. (2011)
	<u>Emerging Market</u>		
		India	Sharma & Kumar (2011)
		Nigeria	Falope & Ajilore (2009)
		Pakistan	Raheman & Nasr (2007)
		Kenya	

Source: Adapted from Baveld (2012)

### 3.6 The variables of key determinants of working capital

The key determinants of working capital (WC) are the factors that influence a firm decision on the size of investment in the net operating working capital (Wasiuzzaman & Arumugam, 2013). The contemporary researches in WCM have looked into WCM by consolidating the determinants, business specific characteristics and economic conditions as shown in Figure 3.1 and Table 3.5, respectively. Despite the fact that contemporary researchers have proposed various explanatory variables to examine the influence on WCM, the popular explanatory variables commonly used are cash flow, leverage, sales growth, size and age. Even though there was abundant usage of these explanatory variables, several researchers adopted different key determinants because of the identification problems since firms do not adopt one or more of these determinants (Madhou, 2011).

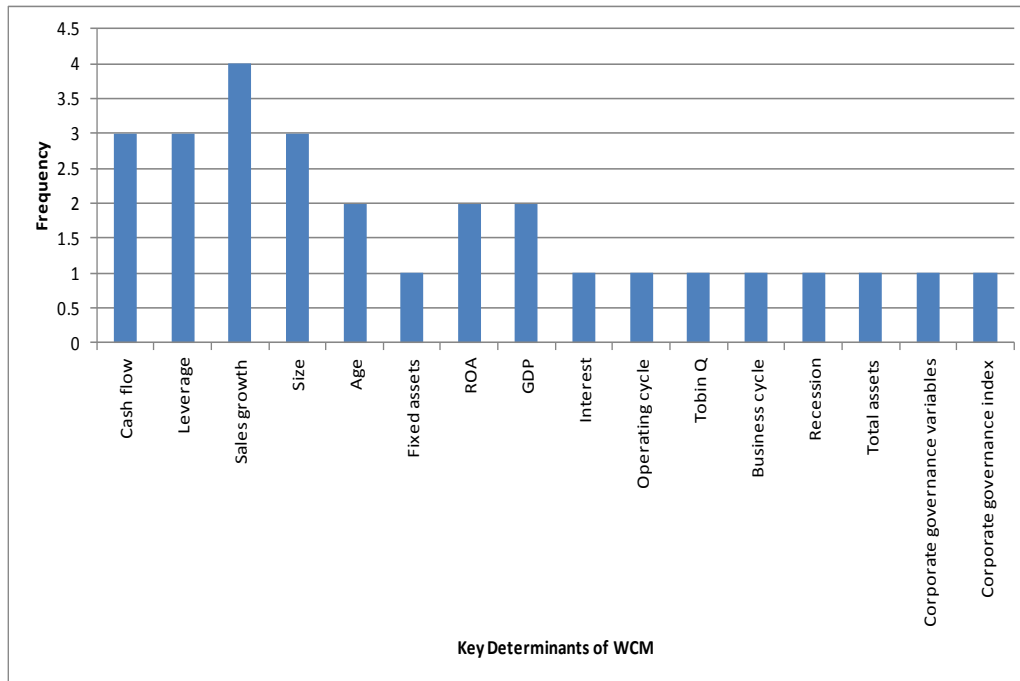


Figure 3.1  
*Explanatory variables used by researchers*  
 Source: Adapted from Madhou (2011)

Generally, there are several explanatory variables commonly used by various researchers in different countries such as cash flow, leverage, sales growth, size, and age. The researcher adopts a similar list of popular choice variables of the key determinants of WC in this research.

Many researchers in different countries and during different time periods tried to establish the relationship between the key determinants of WC and WCM, proxy by WCR and NLB (Chiou et al., 2006; Appuhami, 2008; Appuhami, 2009; Nazir & Afza, 2009; Taleb et al., 2010; Ali & Khan, 2011; Gill, 2011; Moradi et al., 2012; Raheman et al., 2012; Saarani, & Shahadan, 2012; Valipour et al., 2012). The relationship between the key determinants of WC and WCM, proxy by WCR and NLB are explored separately in the following paragraphs.

Table 3.5  
*Independent Variables Measurement Used By Previous Researchers*

Author	Year	Country	Key Determinants Of Working Capital					Age
			Cash Flow	Leverage	Sales Growth	Size	GDP	
Addin, Nayeبزاده & Pour	2013	Iran		X		X		
Ali & Akhtar Khan	2011	Pakistan	X	X	X	X	X	
Appuhami	2008	Thailand	X	X	X			
Appuhami	2009	Thailand	X	X	X			
Chiou, Cheng & Wu	2006	Taiwan	X	X	X	X		X
Gill	2011	Canada	X	X	X	X		
Moradi, Salehi & Arianpoor	2012	Iran	X	X	X	X		X
Nassirzadeh & Rostami	2010	Iran		X		X		
Nazir & Afza	2009	Pakistan	X	X	X	X	X	
Raheman, Sohail, Zulfiqar, Rehman, Komel & Bilal	2012	Pakistan	X	X	X			
Saarani & Shahadan	2012	Malaysia		X	X	X		X
Taleb, Zoued & Shubiri	2010	Jordan	X	X	X	X	X	
Valipur, Moradi & Karimi	2012	Iran	X	X	X			

### 3.6.1 The relationship between the key determinants of working capital and working capital requirements

Previous research outcomes from different countries have shown mixed relationship results between the relationship between WCR and the key determinants of WC. Table 3.6 shows an overview of the effects of the various key determinants of WC on a firm's WCR.

Table 3.6  
*Relationship between WCR and the Key Determinants of WC*

Author	Year	Country	Relationship between WCR and Key Determinants of WC					
			Cash Flow	Leverage	Sales Growth	Size	GDP	Age
Ali & Akhtar Khan	2011	Pakistan						
Fuel & energy firms			-ve. sig					-ve. sig
Sugar firms								
Engineering firms					+ve. sig			-ve. sig
Chemical firms								
Appuhami	2008	Thailand	-ve. sig					
Appuhami	2009	Thailand						
Service industry			-ve. sig		+ve. sig.			
Chiou, Cheng & Wu	2006	Taiwan	-ve. sig	-ve. sig.		+ve. sig.		+ve. sig.
Gill	2011	Canada				-ve. sig.		
Manufacturing				-ve. sig.		-ve. sig.		
Services						-ve. sig.		
Moradi, Salehi & Arianpoor	2012	Iran	+ve. sig	-ve. sig.	-ve. sig.			
Nazir & Afza	2009	Pakistan		-ve. sig.				
Raheman, Sohail, Zulfiqar, Rehman, Komel & Bilal	2012	Pakistan	+ve. sig					
Saarani & Shahadan	2012	Malaysia		-ve. sig.	-ve. sig.			
Taleb, Zoued & Shubiri	2010	Jordan		+ve. sig.	+ve. sig.			
Valipur, Moradi & Karimi	2012	Iran				-ve. sig.		

Legend: -ve (negative); +ve (positive); sig (significant)

Exploring the relationship between key determinants of WC and WCR has undoubtedly been the most popular and important area of research in WCM. The literature details of the relationship between WCR and the key determinants of WC are examined separately below.

### Cash Flow

Normally, a firm higher level of operating cash flow generation is due to efficient WCM, where payment terms for liabilities linked to day-to-day operations are delayed, while the operation link AR collections are shortened. As a result, this causes less

demand for WC (Chiou et al., 2006). Therefore, the expected operating cash flow is negatively related to WCR. This negative relationship is supported by Chiou et al., (2006); Appuhami (2008); Appuhami (2009). The positive was reported by Moradi et al., (2012); Raheman et al., (2012).

### **Leverage**

The pecking order theory suggested that in the event if a firm runs short of funds, it will consider raising them internally first before borrowing money (debt). If these two options were exhausted then only they will consider issuing new shares as the last avenue (Myers & Majluf, 1984). The rationale behind these alternative considerations is funds generated internally do not incur transaction costs, while issuing new debts will attract interest costs and monitoring. Issuing new shares may lead to the existing owners of the firm to dilute the control of the firm (Nakamura, Martin, Forte, Carvalho Filho, Costa & Amaral, 2007), outside monitoring, limitations by shareholders and issuing costs (Chiou et al., 2006; Wasiuzzaman & Arumugam, 2013).

If a firm has a high leverage level, it means that less capital allocation is available for internal daily operations because of the interest and principal repayment (Chiou et al., 2006). Therefore, firms operating under such circumstances tend not to worsen the shortage of funds. It is under this situation where the firm working capital will be utilized most efficiently as any additional WC requirements will activate external borrowing either through debt or equity. At this juncture, it can be deduced that leverage is negatively related to WCR. Chiou et al., (2006); Nazir and Afza (2009); Gill (2011); Moradi et al., (2012); Saarani and Shahadan (2012) have found a negative

effect of leverage and WCR. In contrast, Taleb et al., (2010) has found a positive effect of leverage and WCR instead.

### **Sales growth**

One of the propositions of pecking order theory is when a firm operates in an industry that experience growth; it will require more capital to operate. Otherwise it may encounter dilemma called undercapitalization or <sup>1</sup>overtrading, which a healthy firm should avoid. This may also mean that a firm needs more internal financing to commensurate the growth opportunities by building up inventories and trade accounts receivables (Moussawi et al., 2006; Wasiuzzaman & Arumugam, 2013). Therefore, researchers like Appuhami (2009); Nazir and Afza (2009); Banos-Caballero et al., (2010); Hill et al., (2010); Taleb et al., (2010) have found a positive relationship between sales growth and WCR.

In contrast, a firm which experience high growth would also like to keep its WCR at a lower level in order to be efficient. This means, we also have seen a negative relationship between sales growth and WCR (Zariyawati et al., 2009; Erasmus, 2010; Zariyawati, Taufiq, Annuar & Sazali, 2010; Moradi et al., 2012; Saarani & Shahadan, 2012; Valipour et al., 2012).

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<sup>1</sup> Overtrading happens when a firm grows beyond its funding capacity to finance the investment in inventories and debtors level that corresponds with the growth of volume of production and sales. It force the firm to borrow from creditor and financial institutions.



## **Size**

Large firm size is more exposed to monitoring by market analysts and this may result in less asymmetry in information, allowing them to easier access to funds as compared to smaller firms (Brennam & Hughes, 1991). Therefore, bigger firms size will find easier access to capital market and they can relax their trade credit and inventories policy. Under this circumstance, it can be assumed that a positive relationship between firm size and WCR (Chiou et al., 2006; Banos-Caballero et al., 2010).

On the contrary, bigger firms have greater bargaining power with their suppliers and customers. Also, bigger firms tend to diversify in their business and less often to fail as compared to smaller size firm. In this respect, the relationship between firm size and WCR is negative (Zariyawati et al., 2009; Erasmus, 2010; Zariyawati et al., 2010; Gill, 2011).

## **Age**

Firm age serves as a proxy to measure the growth opportunities in the business environment (Chiou et al., 2006). Generally, firms in their infancy stage will tend to experience higher growth rates due to the higher growth opportunities and also risk taking by the entrepreneur owners. As the industry matures, the growth rate will be constant and subsequently will decline. Over time, the firms will accumulate sufficient capital (Chiou et al., 2006) with good relationships with its suppliers and customers. They will also gain experience of administrating their inventory efficiently and this may results in firms to reduce their investment in working capital. Therefore, it can be

deduced that there is a negative relationship between firm age and business growth opportunities (Wasiuzzaman & Arumugam, 2013).

In contrast, Chiou et al., (2006) found a positive relationship between firm age and WCR, because as older firms loosen their management, their WCM became less efficient. As discussed, the results of sales growth and WCR have shown mixed results, we expect a mixed relationship between age and WCR.

### **3.6.2 The relationship between the key determinants of working capital and net liquid balance**

Shulman and Cox (1985) in its classification of NWC have classified NLB as a measure of firm management capability of raising and allocating capital. Accordingly, the firm NLB will be influenced by the key determinants of working capital. A summary of the relationship between NLB and key determinants of WC is summarized under Table 3.7 (see [page 63](#)).

#### **Cash flow**

Past researches have revealed that the more variations in a firm future cash flow, it will tend to increase its cash holdings and short term investments (Kim, Mauer & Sherman, 1998; Opler, Pinkowitz, Stulz & Williamson, 1999; Wu, 2001). Therefore, operating cash flow is expected to be positively related to NLB (Chiou et al., 2006; Appuhami, 2008; Raheman et al., 2012).

Table 3.7  
*Relationship between NLB and the Key Determinants of WC*

Author	Year	Country	Relationship between NLB and Key Determinants of WC					
			Cash Flow	Leverage	Sales Growth	Size	GDP	Age
Ali & Akhtar Khan	2011	Pakistan						
Fuel & energy firms								
Sugar firms			-ve. sig.	-ve. sig.				
Engineering firms				-ve. sig.				
Chemical firms				-ve. sig.				
Appuhami	2008	Thailand	+ve. sig.					
Appuhami	2009	Thailand						
Service industry					+ve. sig.			
Chiou, Cheng & Wu	2006	Taiwan	+ve. sig.	-ve. sig.		-ve. sig.		-ve. sig.
Gill	2011	Canada				-ve. sig.		
Moradi, Salehi & Arianpoor	2012	Iran		-ve. sig.	-ve. sig.	-ve. sig.		
Nazir & Afza	2009	Pakistan		-ve. sig.				
Raheman, Sohail, Zulfqar, Rehman, Komel & Bilal	2012	Pakistan	+ve. sig.	-ve. sig.				
Saarani & Shahadan	2012	Malaysia		-ve. sig.	-ve. sig.			
Taleb, Zoued & Shubiri	2010	Jordan		+ve. sig.	+ve. sig.			
Valipur, Moradi & Karimi	2012	Iran		-ve. sig.	+ve. sig.			

### Leverage

Like WCR relationship with firm leverage position, NLB is also expected to be negatively related to firm leverage (Chiou et al., 2006; Nazir & Afza, 2009; Ali & Khan, 2011; Valipour et al., 2012; Moradi et al., 2012; Saarani & Shahadan, 2012; Raheman et al., 2012). Expectedly, if leverage ratio is high, there will be less liquidity for daily operations. In order to manage the firm liquidity position from sliding from bad to worse, it might need to raise capital elsewhere and to manage its WCR efficiently.

### **Sales growth**

Researches to date have shown that the higher growth opportunity for a firm is exposed to the higher demand for funds to finance its growth. Under this circumstance, it's expected that sales growth is positively related to NLB (Appuhami, 2009; Taleb et al., 2010; Valipour et al., 2012). In contrast, some researchers have found a negative relationship between sales growth and NLB (Moradi et al., 2012; Saarani & Shahadan, 2012), probably when the industry has mature and the growth rate has been stabilized.

### **Size**

There is a consensus among researchers whereby firm size may have influence on WCM (Chan, 1993; Peel & Wilson, 1996; Su, 2001; Wu, 2001). Firms that are large in size gets higher credit rating and can easily get funds from financial institutions and stock exchange, giving them privilege to keep their cash level low. It can be concluded that firm size is negatively correlated with NLB (Chiou et al., 2006; Gill, 2011; Moradi et al., 2012).

### **Age**

The age factor is indirectly link to the sales growth variable, where it's expected that young firms would have rapid sales growth. As the market matures, the firms' growth rate will become stable and more capital retained in the firm (Chiou et al., 2006). Moreover, the firms' cordial and trusted relationship with their respective customers and suppliers will induce the firms to invest less in WC. Therefore, there is a negative correlation between age and NLB (Chiou et al., 2006; Wasiuzzaman & Arumugam, 2013).

### **3.7 Measurement variables in firm performance**

A firm performance could be measured both financially and strategically. The dimension use in this study focus will on return on assets (ROA). Although there has been some debates concerning the use of ROA rather than return on sales (ROS) or return on equity (ROE) as a financial measure of firm performance, Markides (1995) found that no matter which of the three profitability variables are used, the result remains unchanged.

ROA was chosen instead because except for a limited number of firms publicly listed, their equity contributions for a majority of Malaysian firms are historically ambiguous, thus rendering it difficult to compute ROE. Also, ROA is a preferred measure because accounting for assets is typically more accurate than the equity and previous researchers had validated this performance measure which includes Tan and Litschert (1994); Luo (1995); Luo and Chen (1997); Peng and Luo (2000); Sina, Tsea, Heungb, and Yima (2005); Hai, Xu and Jacobs (2012); Shou, Chen, Zhu and Yang (2012).

Separately, Madhou (2011) has essentially reviewed the different type of profitability measures which have been utilized in previous WCM research. As compiled in Figure 3.2, the researcher found out that the most popular firm performance measures are return on assets (ROA) and gross operating income (GOI). In this research only ROA will be used to measure firm performance.

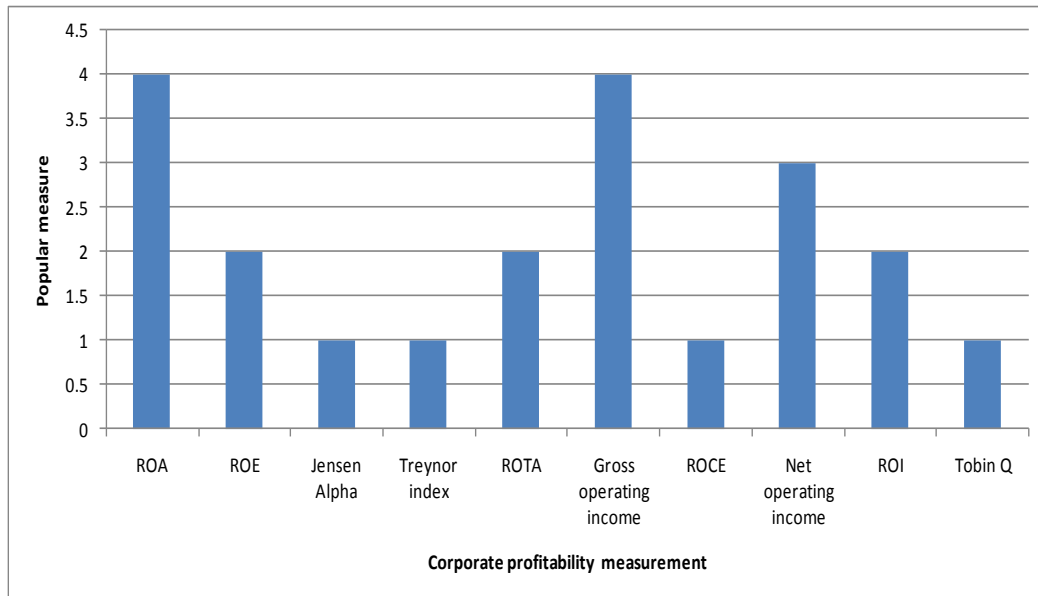


Figure 3.2  
*Popular corporate profitability measures*  
 Source: Adapted from Madhou (2011)

### 3.8 Underpinning theory

The research framework construction of this study will be developed base on two theories namely, fisher separation theorem (FST), and configurational theory (CT). FST will explain the ‘new’ paradigm approach on NWC as proposed by Shulman and Cox (1985) while CT will explain the best fit relationship between key determinants of WC and firm performance moderated by WCM.

#### 3.8.1 Fisher separation theorem (FST)

Fisher separation theorem (FST), also known as portfolio separation theorem is named after an American economist Irving Fisher (1867-1947), who was the first person who proposed and promoted this idea. It stipulates that the main aim of any business is to increase its value to maximum via the firm performance, irrespective of the preferences of the firm's owners.

Basically, FST can be broken down into three different distinguishable parts. Firstly, a business' investment decisions are independent from the preferences of the business owners. Secondly, a business investment decisions are separate from a business financing decisions. Lastly, the value of business investments is separate from the mix of methods used (equity, debt, and/or cash) to finance the investments.

When FST is adopted in WCM, it implies that during decision making a firm management is well equipped with the knowledge about the differences between operational investment and financing investment. In simple term, FST will enable a firm to segregate and determine how much resources are invested in WC and how it will be financed in order to maximize a firm's wealth. FST classified GWC as operational investment while NWC as financing investment respectively.

Shulman and Cox (1985) narrowed the NWC (or financing investment) to a micro level by examining components of WC in the balance sheet, focusing on two categories i.e. operational working capital and financial working capital (Rehn, 2012). Preferably, Shulman and Cox (1985) would use the term working capital requirements (WCR) and net liquid balance (NLB) instead. In practice, a firm needs to pay attention to these two categories when optimizing working capital and maximizing firm performance and liquidity (Brealey, Myers & Allen, 2006; Lazaridis & Tryfonidis, 2006). The overview of these interaction relationships could be shown in Figure 3.3.

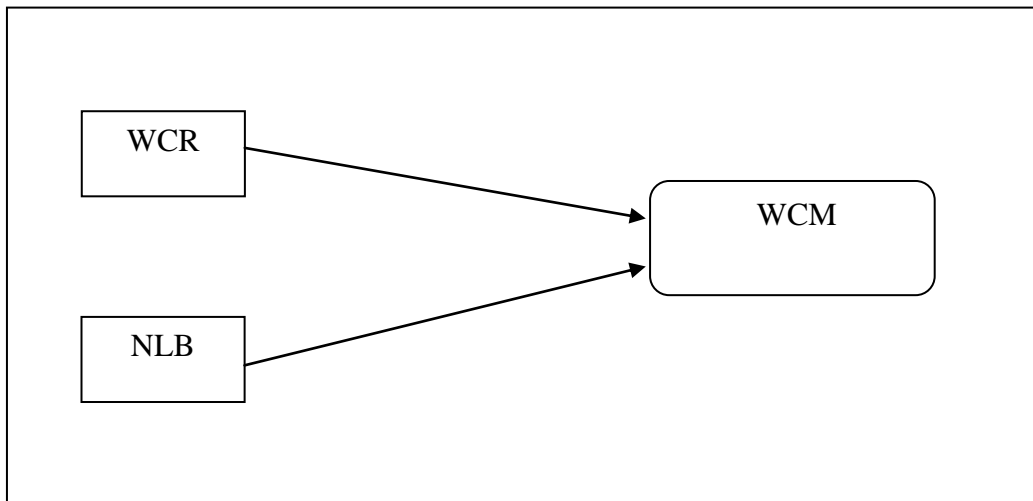


Figure 3.3  
*Fisher Separation Theorem*  
 Source: Adapted from Rehn (2012)

Under local context, WCR is an excellent source of cash, when properly managed. In most manufacturing firms, there is constantly to search for a ready source of inexpensive funding for the firm. One of the best sources is WCR, consisting of accounts receivable, plus inventory, minus accounts payable. These are the “float” funds required to keep the business operating from day to day.

Complement to this, cash and short-term borrowings are components of NLB and are seen as financial decision variables with no strict correlation to operations. Cash levels and liquid securities can be adjusted with no direct impact on the operations of the firm. Since the NLB comprises only of highly liquid assets, it serves as a measure of the firm's liquidity. If operational requirements change, the NLB is usually affected.



Alternatively, the illustration of the reclassification by Shulman and Cox (1985) based on FST could be shown using the components in Table 3.8. The components of WCR could be optimized and affected by the firm's operations will include receivables, inventories and accounts payable. These components are highlighted in bold in Table 3.8. In reality, WCR reflects all the facets of a firm's operating cycle which includes procurement, production and sales. In summary, it is the sum of money invested in the operating cycle of a firm.

Table 3.8  
*Example of working in a Balance Sheet*

	20xx (\$)		20xx (\$)
Cash	xx	<b>Accounts payable</b>	<b>xx</b>
Marketable securities	xx	Current maturities of long term debt	xx
<b>Receivables</b>	<b>xx</b>	Notes payable	xx
<b>Inventory</b>	<b>xx</b>	Accrued expenses	xx
Prepaid	xx	Taxes payable	xx
Other current assets	xx	Other current liabilities	xx
<b>Total Current Assets</b>	<b>Xxx</b>	<b>Total Current Liabilities</b>	<b>Xxx</b>

Source: Adapted from Strischek (2001) cited in Rehn (2012)

Separately, the rest of the components of all other current assets and all other current liabilities in Table 3.8 are classified under NLB. Clearly, NLB reflects the financial decision variables with no direct correlation with operations, but as a measurement of business liquidity instead. Ceterius peribus, when a firm increased its investment in WC assets, its liquidity position will similarly increase in par with the investment decision.

In summary, FST will ensure a prudent management of components of WC in order to ensure a firm to invest in future growth, repaying short term loans and minimizing any

financing costs. What emerges from this optimization of WC is the critical success factor of a firm to maximize shareholders wealth (Eljelly, 2004; Nazir & Afza, 2009; Madhou, 2011; Saarani & Shahadan, 2012; Abbadi & Abbadi, 2013). The firm needs to juggle the delicate balance of keeping its WC to a minimum level without jeopardizing its future growth and eventually sales. Therefore, a firm is obliged to allow to maintaining a level of debtors (by offering credit terms to customers) and stocks in order to appease customers' demand. So, an optimum level of WC of a business should enable the firm to achieve three objectives at the same time, namely sufficient liquidity, maximizing performance/profitability and minimizing non insurable risk & uncertainty (Filbeck & Krueger, 2005; Mandal et al., 2010).

### **3.8.2 Configurational theory (CT)**

There is a sizable and sustained literature by researchers (Miller, 1981; Tushman & Romanelli, 1985; Drazin & Van De Ven, 1985; Venkatraman, & Prescott, 1990; Delery, & Doty, 1996; Snow, Miles, & Miles, 2006; Donaldson, 2006) that showed configurational theory (CT) is an 'off spring' of the contingency theory which was dominant until the late 1970s. CT was formally developed by Shortell in 1977. In principle the basic fundamental assumption of both theories is the principle of 'fit' in strategic management (Lenz, 1980; Gupta & Govindarajan, 1984; Govindarajan, 1988; Tan & Litschert, 1994; Langfield-Smith, 1997; Lindow, 2013).

CT adopts the idea of 'fit'. The concept of fit is hold to exist when a firm is aligned with its environment, also called contingencies otherwise a misfit is said to exist (Miles & Snow, 2004). The basic model of fit is illustrated in Figure 3.4. This general model

consists of firm characteristics, contingencies, and firm performance. The firm characteristics in this study refer to firm WCM. The optimal level of these firm characteristics changes with the contingencies (Donaldson, 1996). The contingencies include internal and external environments. But in this study the contingencies include only the firm internal environment which is specific characteristics in nature. They cover key determinants of WC variables like cash flow, leverage, sales growth, size and age.

The firm characteristics of a firm consists the segregation of the net working capital into two parts, the operational working capital and the financing working capital. The operational working capital is an effective measure of a firm liquidity using WCR, while the financing of working capital reveals the source of liquidity measure by NLB.

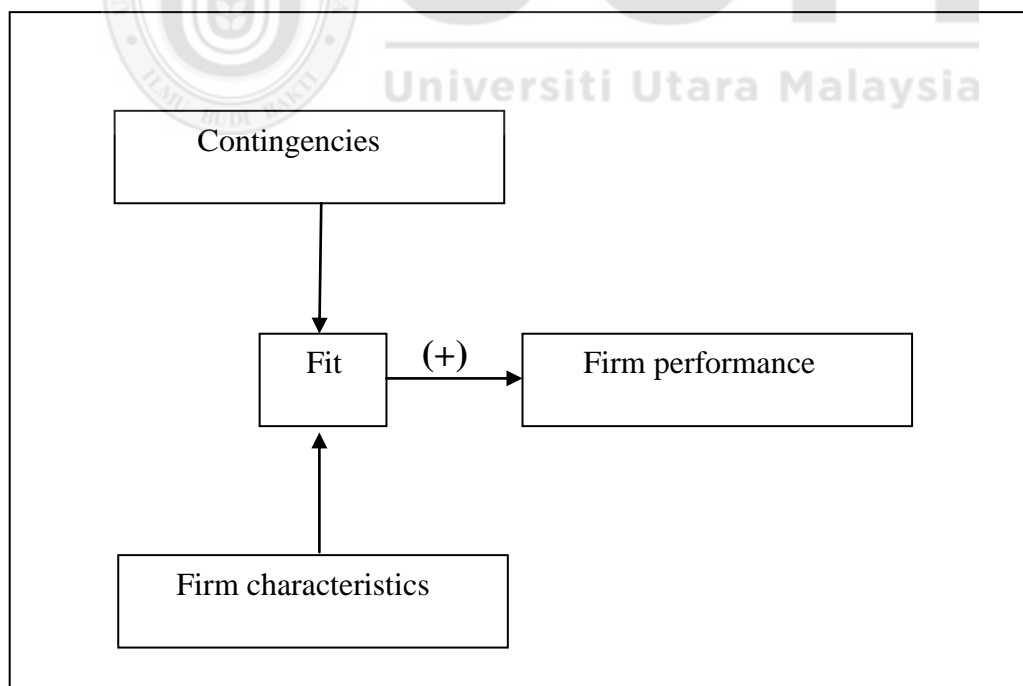


Figure 3.4

*The Basic Fit Model*

Source: Adapted from Donaldson (1987)

In summary, as postulated by CT, an organization's performance in effectiveness and efficiency is thus a function of the degree of “fit” achieved between a firm contingencies and characteristics (Lindow, 2013). By adopting a CT approach to WCM research, the theory maintains that in order for a firm to maximize its firm performance, WCM must be aligned to key determinants of WC in order to achieve a strategic fit. Once these requirements are achieved and in equilibrium (strategic fit), the overall firm performance will naturally be maximized as predicted by CT (Faden, 2013). This theory as shown in Figure 3.5, layout a model that simultaneously take into account the correlation between the key determinants of WC, and firm performance moderated by WCM.

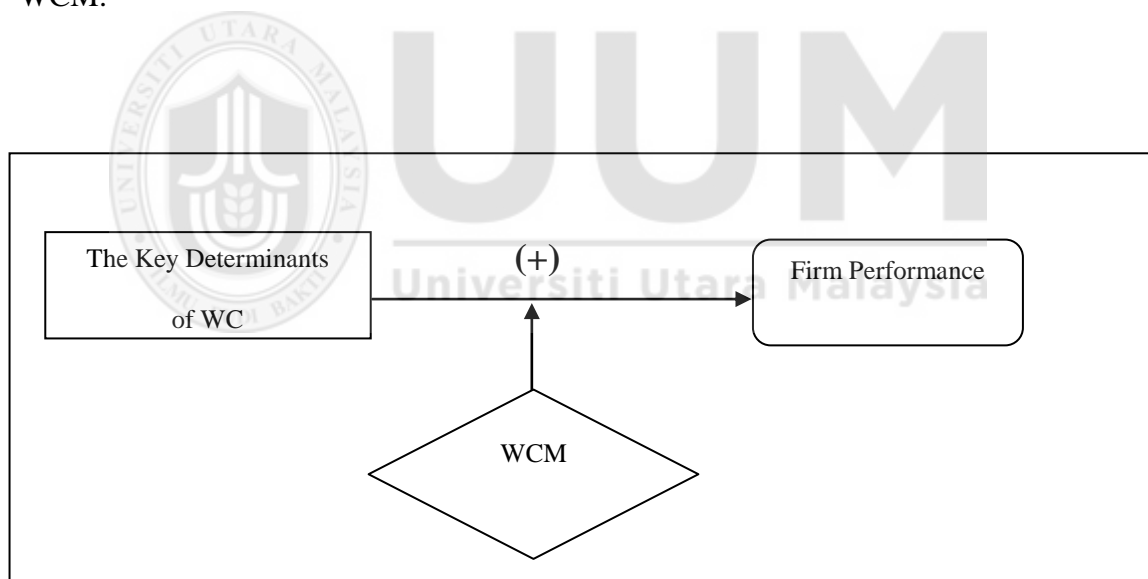


Figure 3.5  
*Configurational Theory adopted in WCM study*

### 3.9 Moderating effects of WCM

Most of the studies available and discussed so far do not open the ‘black box’ of WCM, especially on its roles as moderating variable on the relationship between the key

determinants of WC and the firm performance. This study applies the configurational theory (CT) that explains the link between the key determinants of WC, and business performance, moderated by WCM as shown in Figure 3.5 above. In addition, WCM, proxies by WCR and NLB segregation is supported by Fisher separation theorem (FST) separately.

The presence of the moderator has a strong influence on the existing relationship between the dependent and independent variables (Sekaran & Bougie, 2010). It means that with the presence of moderator, it changes the initial relationship between the dependent and independent variables. Baron and Kenny (1986) further clarified that the moderator roles either modify the strength and/or the direction of the relationship between dependent and independent variables. So far, all the literature reviews have established separately, the relationship among independent, dependent and moderator variables, even though some of the outcomes were inconclusive. Interestingly the effects of WCM acting as a moderator on the relationship between the key determinants of WC and firm performance in a single model, remains unexplored best to the author knowledge.

### **3.10 Limitations of existing research**

Recent evidence suggested by Darun (2011) where one of the major limitation of existing research lies in the current understanding of WCM, which is still in its infancy as it was unable to furnish much contribution towards the managerial issues of WC faced by managers, in particular when the firm management is faced with complex

optimization model (Trahan & Gitman, 1995) compartmentalized WCM decision making processes (McInnes, 2000) and complex financial systems (Fairchild, 2005).

Specifically, the existing literature on WCM is not clear in supporting corporate decision makers to adopt WCM in strategic, holistic and sustainable terms because of the ambiguity and piecemeal approach. This gap has led to a deficiency in existing WCM frameworks in explaining the current WCM practices in the industry. This situation is further aggravated when academicians, instead of developing new WCM decision models, limit their research in WCM by admitting that there exist few theories related to financial resources management (Bellouma, 2011).

Based on current literature, numerous researchers (Gitman, 1974; Skomp & Edwards, 1978; Richards & Laughlin, 1980; Shulman & Cox, 1985; Gentry et al., 1990) have casted doubts on the adequacy revealed by traditional ratios. The gap is researchers acknowledged the traditional ratios are found to be inadequate in explaining on a going concern, the measurement of a firm WCM efficiency in managing its operating efficiency and liquidity position separately.

Furthermore, a firm balance sheet items are influenced by operating cycle and financial strategy but the reported values are usually shown as aggregate (Faden, 2013) which makes any distinction between firm liquidity and operating cycle even more remote.

It was revealed by Baveld (2012) where there were limited researchers who have attempted to carry out any study on the influence of WCM on firm performance during

crisis period. Even though we noticed that Regupathi and Zainudin (2003) had examined the average collection period (ACP) during different economic conditions (crisis and non crisis) in Malaysia listed companies but it can be considered as a compartmentalized WCM research focusing on one component of working capital i.e. accounts receivable. It is believe that academic research treats WCM as self evident but fails to answer its usefulness during financial crisis.

In contrast, some researchers (Meltzer, 1960; Brechling & Lipsey, 1963; Schwartz, 1974; Yang, 2011, Baveld, 2012) have found evidence that firms which are large and have access to capital market during recession will extend their borrowing capacity to finance their customers through longer credit terms than normal.

According to Henseler and Fassott, (2010) any attempt to ignore the interacting effects could result in a model to be lacked of relevance. The gap is currently, there is an insufficient study on the moderating role of WCM even though it exhibits a strong influence on relationship between independent and dependent variables.

### **3.11 The need for further research**

From the foregoing studies, there are clearly gaps established in the literature which this study intends to identify and try to fill. Basically, this study intends establish the interaction of WCM on the relationship between the key determinants of WC and firm performance.

The first aim of this research is to test whether the key determinants of WC and WCM have influence on firm performance. This enables us to determine the robustness of the proposed WCM model. Secondly, the aim of this research is to use measurement indicators like days sales outstanding (DSO), days payable outstanding (DPO), inventory turnover ratio (ITO), working capital requirements (WCR), and net liquid balance (NLB) as alternative measures of firm efficiency and liquidity position.

Finally, the aim of this research is to examine the moderating effects of WCM influence on the key determinants of working capital and firm performance.

But both of the influence of WCM on firm performance during crisis period and large firm size which have access to capital market during recession and extend their borrowing capacity to finance their customers through longer credit terms than normal, are beyond the scope of coverage of this dissertation.

### **3.12 Summary**

The literature supports the problem statement by examining the ambiguity and piecemeal approach, adequacy of traditional ratios, and the lack of study on the moderating of WCM. The research in WCM revealed that the current studies is compartmentalized whereby researchers have focused their research on firstly, the relationship between WCM and firm performance, secondly on the relationship between key determinants of WC on WCM, and thirdly on the measurement variables in firm performance. There have yet an attempt to consolidate these compartmentalized researches into a single model. The key determinants of WCM regularly used by



previous researchers are cash flow, leverage, sales growth, size, and age, while the firm performance measurement covered ROA.

This chapter includes two underpinning theories that support the basic framework of this study. They include Fisher separation theorem (FST) and configurational theory (CT). FST serves to explain the rational of segregating WCM into WCR and NLB respectively. The configurational theory is based on the concept of fit and it acts as the 'backbone' theory linking the three parts into a single all inclusive models. This chapter will discuss the moderating role of WCM influence on the relationship between the key determinants of WC and firm performance. This chapter ends by highlighting the limitation of existing research and the need for further research.



## **CHAPTER 4**

### **METHODOLOGY**

#### **4.1 Introduction**

This section presents an overview of concepts, designs and methods use in this study in order to examine the working capital management (WCM) influences on the relationship between the key determinants of WC and firms performance for firms incorporated and listed in Malaysia. The term of reference will include the research framework, hypotheses development, research design, operational definition, measurement of variables, data collection, sampling, data collection procedures and technique of data analysis. The chapter concludes with a summary.

#### **4.2 Research framework**

A research framework is deduced as a result of the combination of concepts, theories and models after sieving through the literature (Hussey & Hussey, 1997). It is used by researchers to hypothesize, test and eventually improve the logical relationship among different variables, identified as significant in the problem statements. Taylor and Todd (1995) developed this suggestion whereby in order to establish a robust research framework, two prior conditions need to be satisfied. The first condition is the framework must have the strengths and capabilities to predict outcomes and fulfil expectations. The second condition is it must be able to provide contribution in terms of

understanding of the variables under investigation. Capitalizing on these two criteria, the development of this research framework is supported, firstly by the rigorous literature reviews on the relationship between WCM and firm performance during crisis and non crisis period, the relationship between the key determinants of WC and WCM, and the components of WC and firm performance. Secondly, the research framework is strengthened by two underpinning theories, which include Fisher separation theorem (FST) and configurational theory (CT) respectively.

The variables that are identified and consolidated into the framework include, firstly the popular measurements of the key determinants of WC which are commonly used as independent variables and they include cash flow, leverage, sales growth, size, and age, Secondly, WCM acting as moderator is proxies by WCR and NLB. Lastly the firm performance which acts as the dependent variable is measure by ROA.

Therefore, the proposed outline of the research framework is adequately nuanced and empirically observable, that in our empirical research may, in due course, hypothesize about model fit among the independent variables and dependent variable, as well as any influence outcomes between the independent variable and dependent variable as a result of the moderating effects.

Figure 4.1 shows the diagram representations of the proposed research study. From the research framework diagram, the independent variables will consist of the key determinants of WC which include the popular explanatory variables commonly used by previous researchers like cash flow, leverage, sales growth, size, and age. While, the

dependent variable is firm performance, measure both the financially and strategically importance of the research framework using ROA. Next WCM is hypothesized to moderate the relationship between the key determinants of WC and firm performance.

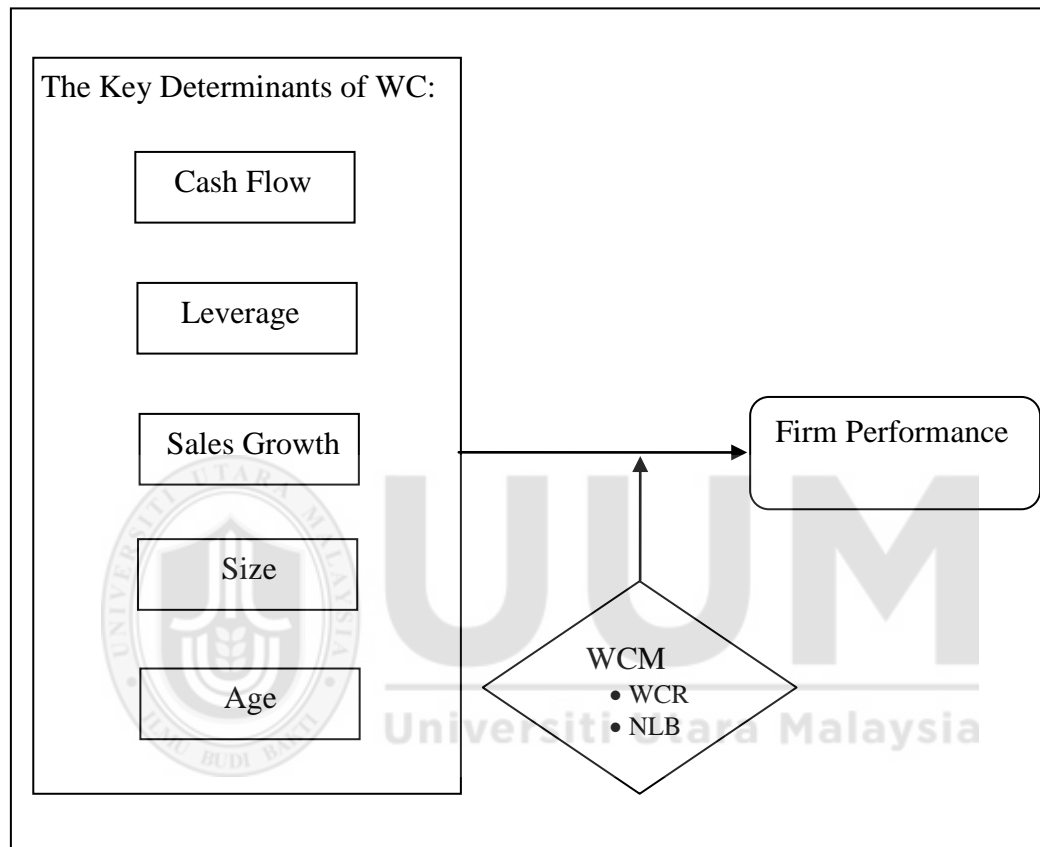


Figure 4.1  
*Research Framework*

### 4.3 Hypotheses development

The hypotheses are based on a research framework which is empirically testable in nature, and together using an appropriate methodology, it proposed an answer to the problem statement originally established in the study (Sekaran & Bougie, 2010; Zikmund, Babin, Carr & Griffin, 2010; Khair, 2013). Likewise, all the problem

statement proxies by research objectives identified in Chapter 1 are assigned with the respective hypothesis or hypotheses separately and will be discussed here on.

#### **4.3.1 A contemporary WCM model**

One of the objectives of this study is to propose a contemporary WCM model in supporting corporate decision makers to adopt WCM in strategic, holistic and sustainable terms. This can be realized by providing a WCM model in explaining the current WCM practices in the industry.

The model adopts Fisher separation theorem (FST) and configurational theory (CT) as the underlying theories in supporting the WCM research. In simple form, CT maintains that the basic idea of fit holds when WCM is aligned to the key determinants of WC. This fit leads to firm performance (Lindow, 2013), because when a firm that is strategic fit, it is more effective in adopting any one of the ideal types of strategic choices of whether <sup>2</sup>defender, <sup>3</sup>prospector, or <sup>4</sup>analyzer in order to achieve <sup>5</sup>competitive advantage (Miles and Snow, 2004).

Separately, based on FST the net working capital (NWC) of a firm is segregated into two parts i.e., operational working capital and the financial working capital (Rehn, 2012). The operational working capital is an effective measure of a firm liquidity using

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<sup>2</sup> Defender refers to firms like low risks, secure markets and tried and trusted solutions. Decision taking is relatively formalized. There is emphasis on efficiency.

<sup>3</sup> Prospector refers to organizations that beliefs in results i.e. effectiveness rather than efficiency. They seek to expand and to move into new areas.

<sup>4</sup> Analyzer refers to firms that try to balance risk and profits. They used a core of stable products and markets as a source of earnings. They usually follow change, but do not initiate it.

<sup>5</sup> Competitive advantage means a firm way of employing its skills are applied and resources utilized to interact with the environment. In the short run these skills and resources are not easily duplicated, giving the firm a competitive advantage over its rivals.

WCR, while the financing of working capital reveals the source of liquidity measure by NLB. Both WCR and NLB measurements are recognized and optimized into a consolidated approach in order to equal to the requirements of the key determinants of WC of a firm (Shulman & Cox, 1985). Once these sub-systems requirements are achieved and in equilibrium, the overall organizational performance will naturally be maximized as predicted by the CT (Faden, 2013). Therefore, the following hypotheses that are developed are:

Hypothesis 1: The relationship between key determinants of WC and firm performance is moderated by WCR.

Hypothesis 2: The relationship between key determinants of WC and firm performance is moderated by NLB.

#### **4.3.2 Alternative measurement of a firm efficiency position**

Previous researchers like Gitman (1974); Skomp and Edwards (1978); Richards and Laughlin (1980); Shulman and Cox (1985); Gentry et al., (1990), have recognized the weaknesses of the traditional ratios or indicator such as net working capital, current assets to total assets ratio, current ratio and quick ratio, which are normally used as indicators to measure the short term liquidity of a firm financial asset. These traditional ratios are more related to solvency position of a firm and are aggregate in nature. These traditional ratios do not show the firm liquidity position based on the efficiency management of its financial assets and operations from the going concern perspective (Canina & Carvell, 2008).

Gitman (1974) cited in Faden (2013) and Ding et al., (2013) have proposed several measurement indicators to measure the liquidity of a firm as a result of their efficiency in managing their working capital operating cycle.

Firstly, the days sales outstanding ratio (DSO) measurement indicator shows that a rising DSO indicates that the firm management does not manage and control its WC efficiently. A high DSO highlights that a firm takes longer to collect its payments. This may result in firm not able to fulfill its short term obligations as a result of the lengthening in cash operating cycle (Ding et al., 2013).

Thus, the hypothesis drawn from here is:

Hypothesis 3: DSO is negatively related to firm performance.

Secondly, the days payable outstanding (DPO) measurement indicator highlights that a high DPO shows that the firm is getting a good credit terms from its suppliers, which will benefit the firm. But it could also send a signal to the market that the firm is slow to paying its suppliers. Moreover, it could also signal poor WCM efficiency as the management is not taking advantage of earlier discounts offered by supplier for paying earlier (Ding et al., 2013).

Therefore, it can be hypothesized that:

Hypothesis 4: DPO is negatively related to firm performance.

Thirdly, the inventory turnover ratio (ITO) measurement indicator shows how many times a firm converts its stocks into actual sales in a year. A high conversion ratio will mean that not many products are unsold and remain idle on shelves (Ding et al., 2013).

Thus, the hypothesis developed is:

Hypothesis 5: ITO is positively related to firm performance.

Fourthly, the working capital requirements (WCR) measurement indicator measures the time lag between the moments the firm receives payment for the products it sold to customers. In short, WCR is the components of inventory, accounts receivable and accounts payable. A low WCR means an efficient WCM by a firm (Ding et al., 2013).

Thus, the hypothesis can be stated as:

Hypothesis 6: WCR is negatively related to firm performance.

Finally, the net liquid balance (NLB) measurement ratio shows that a positive NLB indicates that a firm is flexible in meeting its WCR while a negative NLB shows that the firm is totally depending on outside financing in order to fulfil its WCR (Kleiman, 1992) .

Therefore, the hypothesis is stated as:

Hypothesis 7: NLB is positively related to firm performance.



### **4.3.3 The moderating effects of WCM on key determinants of working capital and firm performance**

Based on literature it has shown that previous researchers have examined either the relationship between WCM and firm performance (Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Samiloglu & Demirgunes, 2008; Falope & Ajilore, 2009; Ujar, 2009; Zariyawati et al., 2009; Dong & Su, 2010; Mathuva, 2010; Karaduman et al., 2011; Quayyum, 2012), or, the relationship between key determinants of WC on WCM (Chiou et al., 2006; Appuhami, 2008; Appuhami, 2009; Nazir & Afza, 2009; Taleb et al., 2010; Ali & Khan, 2011; Gill, 2011; Moradi et al., 2012; Raheman et al., 2012; Saarani & Shahadan, 2012; Valipour et al., 2012).

Capitalizing on the study conducted by Luo and Homburg (2008), this study examines the possible interacting effect of WCM on the relationship between the key determinants of WC and firm performance in a single model. Therefore, this attempt is considered as an exploratory research in nature. Sekaran and Bougie (2010) have suggested that in the event if a relationship has not been explored or undertaken to date, the hypothesis should be formulated as non-directional since there is no basis to demonstrate the direction.

In this study WCM consists of firstly, the operational working capital which is an effective measure of a firm liquidity using WCR. Secondly, the financing of working capital reveals the source of liquidity and is measured by NLB.

It is therefore posited in the manufacturing industries whereby for moderator WCR, the hypotheses are:

Hypothesis 8: WCR moderates the relationship between cash flow and firm performance,

Hypothesis 9: WCR moderates the relationship between leverage and firm performance,

Hypothesis 10: WCR moderates the relationship between sales growth and firm performance,

Hypothesis 11: WCR moderates the relationship between size and firm performance, and

Hypothesis 12: WCR moderates the relationship between age and firm performance.

While for moderator NLB the hypotheses are,

Hypothesis 13: NLB moderates the relationship between cash flow and firm performance,

Hypothesis 14: NLB moderates the relationship between leverage and firm performance,

Hypothesis 15: NLB moderates the relationship between sales growth and firm performance,

Hypothesis 16: NLB moderates the relationship between size and firm performance, and

Hypothesis 17: NLB moderates the relationship between age and firm performance.

#### 4.3.4 Summary of the hypotheses

After a rigorous review of the research framework and literature, the alternative hypotheses were deduced and Table 4.1 summarizes them accordingly.

Table 4.1

*Hypotheses Summary*

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- Hypothesis 1: The relationship between key determinants of WC and firm performance is moderated by WCR.
- Hypothesis 2: The relationship between key determinants of WC and firm performance is moderated by NLB.
- Hypothesis 3: Days sales outstanding (DSO) is negatively related to firm performance.
- Hypothesis 4: Days payable outstanding (DPO) is negatively related to firm performance.
- Hypothesis 5: Inventory turnover ratio (ITO) is positively related to firm performance.
- Hypothesis 6: Working capital requirements (WCR) is negatively related to firm performance.
- Hypothesis 7: Net liquid balance (NLB) is positively related to firm performance.
- Hypothesis 8: WCR moderates the relationship between cash flow and firm performance,
- Hypothesis 9: WCR moderates the relationship between leverage and firm performance,
- Hypothesis 10: WCR moderates the relationship between sales growth and firm performance,
- Hypothesis 11: WCR moderates the relationship between size and firm performance, and
- Hypothesis 12: WCR moderates the relationship between age and firm performance.

Hypothesis 13: NLB moderates the relationship between cash flow and firm performance,

Hypothesis 14: NLB moderates the relationship between leverage and firm performance,

Hypothesis 15: NLB moderates the relationship between sales growth and firm performance,

Hypothesis 16: NLB moderates the relationship between size and firm performance, and

Hypothesis 17: NLB moderates the relationship between age and firm performance

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#### **4.4 Research design**

The basic guidelines of research design involves laying down the foundation for a researcher on the methods and procedures to collate, processing and analyzing the relevant data into the needed information so the results could be interpreted and conclusion can be drawn from it (Murugiah, 2011).

This will assist in proposing answers to the research questions (Mustapha, 2012). According to Darun (2011) majority of the research in WCM is using the quantitative approach while only few researches are using the qualitative methods (Belt & Smith, 1991; Kim et al., 1992; Ricci, & Morrison, 1996; Maxwell et al., 1998; Khoury et al., 1999; Ricci & Divito, 2000; Darun, 2011; Zhao, 2011). The main contributing factor for this discrepancy lies in the difficulties nature of accessing to firms management accounting information in WCM, which is regarded as an industry trade secret.

According to Madhou (2011) while researchers (Chiou et al., 2006; Appuhami, 2008; Appuhami, 2009; Nazir & Afza, 2009; Taleb et al., 2010; Ali & Khan, 2011; Gill, 2011; Moradi et al., 2012; Raheman et al., 2012; Saarani, & Shahadan, 2012; Valipour et al., 2012) have employed numerous explanatory variables to test their effects on working capital, the most popular key determinants of WC variables are cash flow, leverage, sales growth, size and age.

Supporting this popular key determinants selection is the results in a regression analysis of key determinants of WC policy, Taleb et al., (2010) have shown that the key determinants of WC variables like cash flow, leverage, sales growth and size have shown a significant R square individually. It can be concluded that a sizeable proportion of firm performance can be predicted from each of the popular key determinants of WC. Table 4.2 shows the result findings of the significant R square for each of the popular key determinants of WC as reported by Taleb et al., (2010) from the year 2005 to 2007. The dependent variables which can be predicted from the independent variables are cash flow (1%), sales growth (3%), leverage (22.9%) and size (0.4%) respectively. These strength is significant at  $p < 0.01$ . This study adopts these popular independent variables as the key determinants of WC.

Table 4.2  
*Popular key determinants of WC R Square results*

Year	Key determinants of WC	R Square	F Test
2005 to 2007	Cash flow	1.0%	***
	Sales growth	3.0%	***
	Leverage	22.9%	***
	Size	0.4%	***

\*\*\* significant at  $p < 0.01$

Source: Adapted from Taleb et al., (2010)

#### **4.5 Operational definition**

This section covers the operational definition of variables used throughout this study. The dependent variable is firm performance, while the independent variables include cash flow, leverage, sales growth, size, and age. The intervening factor is WCM. Therefore, in order to serve the purpose of this research, the variables measurement is defined as follows:

##### **Firm performance**

Numerous researchers in WCM studies (Jose et al., 1996; Shin & Soenen 1998; Deloof 2003; Lazaridis & Tryfonidis 2006; Padachi 2006; Falope & Ajilore, 2009; Ganesan 2007; Garcia-Teruel & Martinez-Solano 2007; Samiloglu & Demirgunes, 2008; Sen et al., 2009; Ujar, 2009; Gill et al., 2010; Mohamad & Mohd Saad, 2010; Mansoori & Muhammad, 2012; Raheman, 2012) have used return on assets (ROA), also known as net operating profitability (NOP), in their studies as an accounting based measure of firm financial performance or profitability.

ROA is a ratio used to measure how efficiently and effectively a firm manages its operation and uses its assets to generate profits (Raheman, 2012). A high ROA ratio indicates an effective and efficient use of firm assets in maximizing shareholders wealth. Also, ROA ratio is an effective measure of firm's performance since it overcomes the issue of firm size which makes this ratio easier for comparison across firms (Lev & Sunder, 1979). ROA ratio is measured by dividing firm earnings before interest, tax and amortization (EBITA) with firm total assets (Mohamad & Mohd Saad,

2010; Mansoori & Muhammad, 2012; Raheman, 2012). EBITA measures the raw earning power of the firm's assets (Helfret, 2001).

### **Cash flow**

Traditionally, a firm cash flow is generated in three ways, which covered operations, selling assets and borrowers (borrowing monies) and investors (selling shares/ issuing bonds). The cash flow from operations is the most important, since it is the main indicator used to test the quality of firm profits (Kremer, Rizzuto, & Case, 2000). Operating cash flow (OCF) is calculated based on firm actual transactions of cash going in and cash going out and it is slightly different from accounting cash flow. Many researchers (Chiou et al., 2006; Appuhami, 2008; 2009; Ali & Khan, 2011; Moradi et al., 2012; Raheman et al., 2012 ; Wasiuzzaman & Arumugam, 2013) have used operating cash flow in their studies. OCF signals the competency to create internal resources (Banos-Caballero et al., 2010). Operating cash flow (OCF) is calculated as EBITA plus depreciation and amortization and deducts interest expenses, tax and common dividends (Wasiuzzaman & Arumugam, 2013). Then a firm operating cash flow is divided by its total assets in order to be converted into ratio for this study (Palombini & Nakamura, 2012).

### **Leverage**

A number of extensive theoretical and empirical literature (Modigliani & Miller, 1963; Myers & Majluf, 1984; Rajan & Zingales, 1995) have recognized that in the real world, a firm's capital structure can have an impact on its value or profitability. Previous WCM researchers (Rajan & Zingales, 1995; Shin & Soenen, 1998, Titman & Wessels,

1998; Bevan & Danbolt, 2002; Deloof, 2003; Padachi, 2006; Abor & Biekpe, 2009; Mansoori & Muhammad, 2012; Saarani & Shahadan, 2012) have used leverage ratio in their studies. Leverage ratio is one of the most fundamental concepts in financial management and it measures the financial strength of a firm (Walsh, 2006). As explained by Walsh (2006) it does not matter which methods of calculation we use in calculating leverage. Different methods just revealed different numbers that mean the same thing. Leverage ratio in this study is measured by dividing a firm total debt with its total assets (Titman & Wessels, 1998; Abor & Biekpe, 2009; Mansoori & Muhammad, 2012; Saarani & Shahadan, 2012)

### **Sales growth**

Firms with higher growth opportunities tend to require more capital in order to grow relatively faster (Durnev & Kim, 2005). In theory, fast growing firms tend to receive higher valuation, as they are expected to have better future performance (Klapper & Love, 2004) but it needs to increase its cash holdings and short-term investment (Wasiuzzaman & Arumugam, 2013). Sales growth is measured in this study by dividing the incremental sales growth (current year sales minus previous year sales) with previous year sales (Mansoori & Muhammad, 2012).

### **Size**

As identified by Serrasqueiro and Nunes (2008) researchers in the fields of finance and accounting, industrial economics and strategic management have unanimously agreed that firm size is considered to be a fundamental variable in explaining company profitability. The size of the firm is measured by value of its total assets. The impact of



firm size is measure by the natural logarithm of total assets (Titman & Wessels, 1998; Jairo, 2008; Mansoori & Muhammad, 2012; Saarani & Shahadan, 2012; Wasiuzzaman & Arumugam, 2013).

### **Age**

A firm age shows the number of years a firm has been in existence and operating on a going concern basis. According to previous researchers (Bertrand & Mullainathan, 2003; Loderer & Waelchli, 2010), firm age is a determinant of company profitability. The variation of age of the firms in this study is wide, and in this study the age of the firm is determine since the date of incorporation until 2014 (Abor & Biekpe, 2009; Saarani & Shahadan, 2012; Wasiuzzaman & Arumugam, 2013).

### **Working capital requirements (WCR)**

WCR is rigorously and thoroughly discussed under item 2.2.3 (see [page 33](#)) earlier. Based on ideas of Ding et al. (2013); Chiou et al., (2006), WCR ratio is a comprehensive indicator of WCM efficiency and it is defined as:

$$\{(\text{Accounts receivable} + \text{inventories}) - (\text{accounts payable} + \text{other payable})\} \div \text{total assets}$$

### **Days sales outstanding (DSO)**

According to Bhattacharya (2007) the debtors item in the balance sheet of a firm is often the single largest value of all current assets of a firm. Moreover, it's also the second most liquid asset of all operating current assets, which is next only to cash and bank balances. It metaphors cash-in-waiting and it is usually the main contributor to any firm funding requirements (Bull, 2008). It can be defined as days sales outstanding

(DSO) and it could be measured using:  $(\text{Accounts receivable}/\text{sales}) \times 365 \text{ days}$  (Mansoori & Muhammad, 2012; Ding et al., 2013).

### **Inventory turnover (ITO)**

In the manufacturing environment, this ratio measures the performance of the operating function in scheduling the production and the eventual disposal of finished goods. At the same time it also measures the performance of WCM in particular the monitoring the funding operation (Bhattacharya, 2007). The wider the range of products range, the greater will be the desire for stocking up inventories and the larger is the demand for funds but it will be constrained by a fund crunch and increasing cost of financing (Bhattacharya, 2007). Inventory turnover (ITO) could be measured as:  $\text{Cost of goods sold}/\text{inventories}$  (Mansoori & Muhammad, 2012; Ding et al., 2013).

### **Days payable outstanding (DPO)**

In trade, credit facilities are usually extended to firms by suppliers and this may be translated as an advantage to firm where inventories may be available 'free' but there are real costs involved in carrying these inventories. This is when suppliers are demanding faster payment and shortening of credit lines especially when the market is hit by shortage of materials and entry of other competitors in the field (Bhattacharya, 2007). The days payable outstanding (DPO) could be defined as:  $(\text{Accounts payable}/\text{costs of goods sold}) \times 365 \text{ days}$  (Mansoori & Muhammad, 2012; Ding et al., 2013).

### **Net liquid balance (NLB)**

Chiou et al., (2006) defined NLB ratio as a measure of a firm management capability of raising and allocating capital. It can be measured as:

$$[(\text{Cash \& cash equivalent} + \text{short term investment}) - (\text{short term debt} + \text{commercial paper payable} + \text{long term debt in a year term})] \div \text{total assets.}$$

### **4.6 Measurement of variables**

After a rigorous review of the measurement and operationalization of variables, Table 4.3 below summarizes them accordingly.



Table 4.3  
*Measurement and operationalization of variables*

Variable	Proxy	Literature
Firm Performance	ROA = EBIT/Total Assets	Mohamad & Mohd Saad (2010); Mansoori & Muhammad (2012); Raheman (2012); Palombini & Nakamura (2012)
Cash Flow	Operating Cash Flow/Total Assets	Palombini & Nakamura (2012)
Leverage	Total Debt/Equity	Titman & Wessels (1998); Abor & Biekpe (2009); Mansoori & Muhammad (2012); Saarani & Shahadan (2012)
Sales Growth	Investment/Total Assets	Abor & Biekpe (2009); Saarani & Shahadan (2012)
Size	Log Assets	Titman & Wessels (1998); Jairo (2008); Mansoori & Muhammad (2012); Saarani & Shahadan (2012); Wasiuzzaman & Arumugam (2013)
Age	From the date of incorporation until 2014	Abor & Biekpe (2009); Saarani & Shahadan (2012)
WCR	$\{[(\text{inventories}-\text{accounts payable})/\text{cost of goods sold}] + (\text{accounts receivable}/\text{sales})\}/365$	Ding, Guariglia & Knight (2013)
	Accounts Receivable/ (sales/365)	Mansoori & Muhammad (2012); Ding, Guariglia & Knight (2013)
	Inventories/ (Cost of Sales/365)	Mansoori & Muhammad (2012); Ding, Guariglia & Knight (2013)
	Accounts Payable/ (Cost of Sales/365)	Mansoori & Muhammad (2012); Ding, Guariglia & Knight (2013)
NLB	$[(\text{Cash \& cash equivalent} + \text{short term investment}) - (\text{short term debt} + \text{commercial paper payable} + \text{long term debt in a year term})]/\text{total assets}$	Chiou, Cheng & Wu (2006)

Separately, Cyllid Cymru Finance (2004) has argued that in practice there exist standard ratios which will assist a firm to identify, manage and benchmark their working capital ratios as ‘rough guide to acceptable ratios’ where the firm can assess itself in terms of efficiency in managing their WCM. A summary of the ‘rough guide’ to acceptable ratio is as per Table 4.4 below:

The rough guide to acceptable ratio will be used as the guiding benchmark of a firm DSO and DPO analyses in subsequent chapters.

Table 4.4  
*Rough guide to acceptable ratio*

No	Ratio	Category 1 Low	Category 2 Average	Category 3 High
1	Debtors' days outstanding = total of accounts receivable x 365/annual sales	<55 days	55 -85 days	>85 days
2	Creditors' days outstanding = total of accounts payable x 365/annual sales	<45 days	45-60 days	>60 days

Source: Adapted from Cyllid Cymru Finance (2004)

#### 4.7 Data collection

The method used in this research study is based on quantitative cross-sectional research, and it is using secondary data. All data sources are extracted from the Bloomberg database and it covers all the eleven sectors classification in the manufacturing industry established by the Malaysian Investment Development Authority (MIDA).

According to Sekaran (1992) secondary data source in terms of accuracy and precision is equivalent to other channels of soliciting data through interviews or questionnaires. In this research, the financial data obtained cover variables like EBITA, total assets, cash from operations, sales, total debt (short term and long term debts), accounts & notes receivable, inventories, accounts payable, cost of goods sold, cash & near cash items, other current assets, short term borrowings and other short term liabilities . All data is collected from the period 2010 to 2014.

The sample size is collected for five years period, starting from 2010 to 2014. There are two reasons for doing so. The first reason according to Baltagi (2005) cited in Yaacob (2011) highlighted that a 5-year annual data is adequate for short dimension of panel data study. Other researchers (Abdul Wahab, Mat Zain, James, & Haron, 2009; Yaacob, 2011) in different studies using panel data have also used 5-year period data in their research study respectively. The second reason is this WCM study covers only the non crisis period. The recent ripple effect of the 2007 financial crisis hits Malaysia shore in the year 2009 and fizzled off on the following year. The annual data starting from the year 2010 onward covers the non crisis period and it complies with the prerequisite of this study.

#### **4.8 Sampling**

The research method adopted in this study involves secondary data analysis. The secondary financial data is opted because it has been captured into respective categories of revenue, expenses, assets and liabilities classifications by professional accountants appointed by the listed companies. Moreover, it's credible and reliable since it is

audited by professional external auditors at its sources. Such data is cheaper and more quickly obtainable than the primary data and also may be available when primary data cannot be obtained at all (Sekaran & Bougie, 2010; Saarani & Shahadan, 2012). Accordingly, it was revealed by Sekaran (1992) cited in Yaacob (2011) advocated that secondary source ensures accuracy and precision of data other than via interviews or questionnaires.

The population for this study covers manufacturing firms listed on the main market of Bursa Malaysia Securities Berhad (BMSB) in order to measure variables identified in the research framework (Neuman, 1997). The sample covers 11 sectors classification in the manufacturing industry which was made in accordance to the criteria established by Malaysian Investment Development Authority (MIDA). The category classifications of firms are summarized in Table 4.5.

Table 4.5  
*Manufacturing sectors according to Malaysian Investment Development Authority (MIDA)*

No	Manufacturing sector	No of firm
1	Non-metallic mineral industry	55
2	Aerospace	1
3	Textiles and textile product	36
4	Basic metal products	33
5	Electrical and electronic	46
6	Engineering support	9
7	Food & sustainable resources	105
8	Machinery and equipment	103
9	Medical devices	13
10	Petrochemical	48
11	Pharmaceuticals	8
Total		457

Source: Adopted from Malaysia Investment Development Authority (MIDA)

#### **4.9 Data collection procedures**

There are 813 firms listed on BMSB in 2015, after excluding financial sectors. These entities are excluded from our sample selection because they are regulated by Bank Negara Malaysia and the Banking and Financial Act 1989 (Yaacob, 2011). Based on industry classification benchmark guideline, listed companies are allocated to manufacturing sector based on the nature of their revenue or majority of their revenue. So, out of 813 firms listed on BMSB, 457 firms are identified and classified in the manufacturing sectors. Following this, Table 4.6 shows how the final sample selection procedures are observed. To date there are 17 manufacturing firms classified under PN 17 status by BMSB and they are automatically excluded. Thereafter, each firm main activity is reviewed based on the annual reports downloaded from BMSB webpage and it was found that 129 firms main activity did not fall under the manufacturing category and they were removed. In order to further strengthen the sample credibility, an audit was carried out on to review the annual reports for each firm, starting from 2010 - 2014, where each year contains a consolidated 12 months accounting data and consistent year end. It was found, 8 firms which have changed their accounting year and another 21 firms who were without data between any of the period 2010 – 2014 were dropped. The consolidated final sample consist only 282 (or 62%) manufacturing firms out of the initial 457 firms categorized under manufacturing activities based on industry classification benchmark.



Table 4.6  
*Sample Selection Procedure*

No	Description	No. of firm	No. of firm	Percentage
1	Firms categorized under manufacturing activities based on industry classification benchmark Less:		457	100 %
1.1	Firms classified under PN17 category	17		
1.2	Firms main activity which is not manufacturing	129		
1.3	Firms found to change their accounting year in any year between 2010-2014	8		
1.4	Firms found with data not available in any year between 2010-2014	21	175	38%
2	Final sample size		282	62%

This study adopted a balanced panel data which is preferable than an unbalanced panel (Greene, 2003 cited in Yaacob, 2011). It implies the same firms will appear every year for the five years study period (2010-2014). This balanced panel data allows equal observation for each unit of observation for every period (Afrifa, 2013).

#### **4.10 Technique of data analysis**

The multivariate analysis of this study covers panel or longitudinal data analysis which involves consolidating of observations on a cross section over several times (Baltagi, 2005 cited in Yaacob, 2011). Cross section observation covers households, countries, firms or individuals. In summary, panel data is a hybrid of two dimensions, namely time series and cross sectional data structures. As such the data sets are able to furnish

quality source of information for accurate analysis over one dimensional regression (Afrifa, 2013).

The uniqueness of panel data is, firstly it enable researchers to study the dynamics and patters of change over short time series. Secondly, it can improve the quantity and quality of data which is not possible under a cross sectional or a time series stand alone (Greene, 2003 cited in Yaacob, 2011). Thirdly, panel data could control variables that are not included in the model (Hendersen & Kaplan 2000; Tarling, 2009). These advantages are important for the study of WCM and firm performance, which are dominated by cross section observations and time-series (Afrifa, 2013).

#### **4.10.1 Preliminary analyses**

The panel data analysis is carried out using Statistical Package for the Social Sciences (SPSS) version 20.0 through a rigorous preliminary analyses in order to ensure data and variables quality that will assist the researcher to examine the strength of regression analyses being carried out.

The major preliminary analyses which a researcher needs to carry out are the common diagnostic tests like normality, linearity, homoscedasticity, correlation, multicollinearity, and auto-correlation before carrying any further analysis and economic modelling. These common diagnostic tests are a prerequisite in order to ensure that there is a high possibility that econometric assumptions are not breached and the test results are valid and truthful (Yaacob, 2011).

## **Normality**

In many statistical analyses, the normal data distribution assumption is very important and it is a common preliminary analysis that researchers need to be conducted before regression analyses are further undertaken (Jabar, 2012). A normal distribution is closely associated with a symmetrical, bell shaped curve. It has the most concentration of scores in the middle and with declining scores at both ends (Jabar, 2012; Pallant, 2007; Gravetter, & Wallnau, 2004; Cavana, Delahaye, & Sekaran, 2001). The normality test undertaken in this study includes skewness and kurtosis test, distribution shape test and outliers test.

## **Linearity**

The linearity test is carried out in order to determine that the relationship between the two variables is linear. This linearity assumption is said to exist if there is a fair distribution of the scatterplot of scores when a straight line (roughly), not a curve passed through (Jabar, 2012; Pallant, 2007). While in a P-P plot, all the scores are neatly arranged in a narrow cigar shape along a straight diagonal line starting from the bottom left to the top right (Jabar, 2012; Pallant, 2007).

## **Homoscedasticity**

The homoscedasticity test is used to ensure the homogeneity of the residual variance of the predicted firm performance (dependent variable) scores should be the same for all predicted scores. It enables the regression model ability to predict firm performance is consistent across all values of firm performance. It could be examined using scatter plot diagram. When the scores are clustered in a semi-regular shape then it can be confirmed

that homoscedasticity assumption is not violated (Jabar, 2012; Pallant, 2007; George, & Mallery, 2007).

### **Correlation**

Correlation test is carried out to examine the strength of the relationship between two continuous variables. It is measured by coefficient of correlation ( $r$  value) and the strength of the relationship could vary from -1.00 to 1.00. A correlation of 0 shows there is no relationship (or zero correlation) between the two continuous variables. On the extreme end correlation of +1 indicates a perfect positive correlation while a correlation of -1 displays a perfectly negative correlation (Jabar, 2012; Pallant, 2007). For example  $r = -1$  means the two continuous variables are perfectly opposite, where one goes up another goes down.

Cohen (1988) has suggested guidelines when interpreting the value of coefficient of correlation ( $r$  value) between 0 and 1, by checking on the Table 4.7. The guidelines stated in Table 4.7 are applicable irrespective of the  $r$  sign. According to Pallant (2007) sign only indicates the direction of the relationship and not the strength of the continuous variables. The rule of thumb as suggested by Benny and Feldman (1985) is correlation coefficient ( $r$  value) should not be greater than 0.8 or else it would risk multicollinearity among variables.

Table 4.7  
*The strength of correlation using r value*

No	r value	Strength of correlation
1	0.10 – 0.29	small
2	0.30 – 0.49	medium
3	0.50 – 1.00	large

Source: Adapted from Pallant (2007)

### **Multicollinearity**

According to Baltagi (2005) the nature of panel data is able to mitigate the multicollinearity issue. Multicollinearity test is a commonly used diagnostic checker in order to detect issue of multicollinearity when independent variables are showing sign of being significantly correlated with one another. This could result in massive variance bias (Yaacob, 2011) and causing estimation results to be unreliable (Gujarati & Porter, 2009). According to Hair, Anderson, Tatham and Black (1998) there are several methods to detect multicollinearity. The most common two methods include correlation matrix, and value of tolerance and variance Inflation Factor (VIF) values (Jabar, 2012; Pallant, 2007). Under extreme multicollinearity, the generalization of results could be hampered (Gujarati & Porter, 2009 cited in Yaacob, 2011). This study employs the use of these two methods to detect the presence of multicollinearity among the independent variables.

### **Autocorrelation**

Autocorrelation refers to the lag correlation between series of observations in time series data or in cross-sectional data. In this research the cross sectional data is collected from the year 2010 to 2014, where regression model assumes that the error

term relating to an observation between these periods is not influenced by the disturbance term relating to any other observation (Gujarati, 2004). Gujarati (2004) cited in Ghazali (2008) has suggested the Durbin-Watson d-test to be used in order to detect for autocorrelation. If the regression model includes lagged variables of d-value which is less than 2.0, then we can conclude that there is no autocorrelation in the model.

#### **4.10.2 Descriptive statistics**

Pallant (2007) suggested several uses of descriptive statistics. They include to describes the characteristics of the sample, to check if any of the variables violated any of the assumptions underlying the statistical techniques use to address the research questions and finally, to address specific research questions.

Likewise in this research study, descriptive statistics is used to provide general information on the characteristics of the sample in terms of cash flow, leverage, sales growth, size, age and firm performance. Secondly, descriptive statistics is used to describe many aspects of measurements used to evaluate whether the research sample adhered to the econometric assumptions. These include mean, median for location measurement, standard deviation as measure of scale and skewness and kurtosis as measurement of normality.

Lastly, this study uses descriptive statistics to examine the indicators of WCM efficiency observed by firms in different sectors of the manufacturing industry. This

information addresses the research objective no. 2, i.e. WCM provides an alternative measure of a firm operating efficiency and liquidity position.

#### **4.10.3 Hypotheses testing**

##### **Multiple regressions**

The run of multiple regressions (MR) is to reveal the degree of variance in the firm performance (dependent variable) which can be explained or predicted by DSO, DPO, and ITO respectively. In addition, it explains how much unique variance each of the DSO, DPO and ITO can explain the firm performance (Pallant, 2007). This is an effort to address research objectives no. 2.

##### **Hierarchical multiple regression**

In an attempt to address research objective no. 1 and 3, hierarchical multiple regression analysis is carried out in order to determine the moderating effects of WCM on the relationship between the key determinants of WC and firm performance.

The hierarchical regression sets the mechanics order of entry of variables for testing the moderating effects in multiple regressions. Cohen and Cohen (1983) states that F tests are commonly used to compute the significance of each added variable or a set of variables, to the explanation reflected in R-square changes. This procedure provides an alternative to comparing betas for the purpose of assessing the importance of the independent variables (Al-Ebel, 2012).

It is suggested in the research framework where the interacting variables in this study are WCR and NLB. They moderate the relationship between the key determinants of WC and firm performance. In other words, the relationship between the key determinants of WC and firm performance is contingent on WCR and NLB variables.

According to researchers (Baron & Kenny, 1986; Frazier, Tix & Barron, 2004) the variables in the research framework are regressed in several stages. In first stage, the control variable/s and firm performance are supposed to be regressed but this stage is skipped since there is no control variable identified in the research framework. In the second stage, all the key determinants of WC (independent variables) are regressed against firm performance (dependent variable) and it is named Model 1. In the third stage, WCR or NLB (moderator) is regressed separately against firm performance (dependent variable) and it is identified as Model 2.

In the final stage, all of the <sup>6</sup>‘standardized’ key determinants of WC (independent variables) are multiplied with the ‘standardized’ WCR or NLB (moderator) in order to form interaction variables. Standardization involves centering the predictors and scaling their terms of their sample using median. Centering is very often a useful thing to do in moderated multiple regression.

Subsequently, they are regressed against firm performance (dependent variable) and it is called Model 3. It has been suggested by Hair, Black, Babin, Anderson, and Tatham

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<sup>6</sup> Standardizing variable is carried out in order to avoid any multicollinearity problem between interaction terms with their component terms. Also makes it easier to interpret the effects of the predictor and moderator and help to provide a meaningful interpretation (Frazier et al., 2004; Aguinis, H., Sturman, M. C., & Pierce, C. A., 2008)



(2006); Pallant (2007) that any observe changes in R Square Change and Significant F Change ( $p < 0.01$  or  $P < 0.05$ ) from Model 2 to Model 3 would show the existence of a moderator, if any.

Ahmad Zaidi (2014) has highlighted that the hierarchical multiple regression results do not identified the types of moderation, which is important as WCR and NLB (moderator) can either changes the strength of the relationship or modify the relationship between the key determinants of WC (independent variables) and firm performance (dependent variable).

Accordingly, the representation of moderation effects can be best explained using graphical method because it is more meaningful (Ahmad Zaidi, 2014). Moreover, understanding the types of moderation is important since it could either influence the strength of relationship or modify the form of relationship between the criterion and predictor. Typically, there are four commonly used category of specification variables used in the investigation of moderation effects. They include determinant, homologiser, quasi moderator and pure moderator. This can be shown in Table 4.8 below.

Table 4.8

*Typology of specification variable*

	Related to independent variable and/or dependent variable	Not related to independent variable and dependent variable
No interaction with dependent variable	<b>Quadrant 1</b>	<b>Quadrant 2</b>
	Determinant (Not Moderator)	Homologiser (Moderator)
Interaction with dependent variable	<b>Quadrant 3</b>	<b>Quadrant 4</b>
	Quasi Moderator (Moderator)	Pure Moderator (Moderator)

Source: Adapted from Bontis and Serenko (2007)

Based on the 4 quadrants identified in the Table 4.8, a specification variable can be associated as a homoligiser if it does not interact with the dependent variable and also not related to the independent variable and dependent variable (Quadrant 2). Likewise, a specification variable will be classified as a pure moderator if it interacts with the dependent variable but it is not related to the independent variable and dependent variable (Quadrant 4). A specification variable is considered as a quasi moderator if it interacts with the dependent variable and it is related to the independent variable and/or dependent variable (Quadrant 3).

Finally, a specification variable is identified as a determinant (not a moderator) if it does not interact with the dependent variable but related to the independent variable and/or dependent variable (Quadrant 1).

In summary, a homoligiser influences the strength of relationship between the independent variable and the dependent variable, while pure and quasi moderators modify the form of relationship between independent variable and dependent variable (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma, Durand & Gur-Arie, 1981).

#### **4.11 Summary**

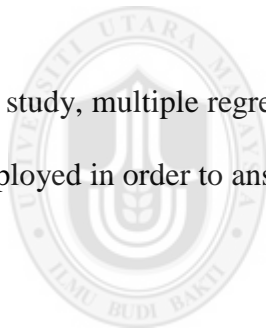
The development of research framework is based on two underpinning theories of Fisher separation theorem (FST) and configurational theory (CT) in order to validate the 17 hypotheses set out in this study. The independent variables adopted in this study include cash flow, leverage, sales growth, size and age, while the dependent variable is firm performance. The model takes into consideration the moderation effects of WCM

influence on the relationship between the key determinants of WC and firm performance.

The population covers the manufacturing firms listed in the main market of Bursa Malaysia Securities Berhad (BMSB). The data collection covers 11 sectors based on the criteria established by Malaysian Investment Development Authority (MIDA).

The measurement and operationalization in this study is represented by ratios popularly used in previous studies. Then, the diagnostic tests that are applicable for panel data regression are presented and they include normality, linearity, homoscedasticity, correlation, multicollinearity, and auto-correlation.

In this study, multiple regression analysis and hierarchical multiple regression approach are deployed in order to answer the research questions identified in this study.



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## **CHAPTER 5**

### **FINDINGS AND DISCUSSION**

#### **5.1 Introduction**

This chapter presents the results output as a result of using Statistical Package for the Social Sciences (SPSS) version 20.0. This chapter starts by carrying preliminary analyses for data and variables quality. The next stage is to carry out descriptive statistics analysis of the econometric assumptions data. Then, the hypotheses testing are carried out using the multiple regression analysis (MR), and hierarchical multiple regression (HMR). Subsequently, the major findings are discussed. Lastly, this chapter ends with summary results of the chapter findings.

#### **5.2 Preliminary analyses for data and variables quality**

The initial stage of data analysis involves carrying preliminary analyses tests in order to filter the secondary data collected from the Bloomberg database. The data screening allows the researcher to ensure quality and credibility of the data so that it is suitable for regression analysis (Mertler & Vannatta, 2005; Pallant, 2007; Mcmanus, 2009; Jones, 2010; Wahab, Al-Momani, & Noor, 2010; Jabar, 2012). It starts by testing the important assumptions underlying regression analysis and they include normality test, linearity test, homoscedasticity test, correlation test, multicollinearity test and autocorrelation test.

### 5.2.1 Normality test

The most common normality tests are skewness and kurtosis values, distribution and checking for outliers value (Jabar, 2012).

#### **Skewness and kurtosis values measurement**

Table 5.1 shows the skewness and kurtosis values for the research data. From the face value, it shows that the data is not normally distributed. The skewness value of the non-symmetry of distribution variables ranges from -1.4310 to 6.5840, while the Kurtosis, which provides information about the 'peakedness' of the distribution ranges from -0.6690 to 55.0070. Several of the variables value have shown skewness and kurtosis which is above the value of two.

Data that is classified as not normally distributed needs to be transformed into normal distribution (Tabachnick & Fidell, 1996; Pallant, 2007; Jabar, 2012). A close examination of Table 5.1 shows that most of the variables exhibit positive skewness of the distribution scores. Based on the suggested transformation scale, the non normal distributed variables are transformed using natural logarithm (Tabachnick & Fidell, 1996; Pallant, 2007; Jabar, 2012). The variables that are categorized to be transformed are identified in Table 5.2 below.

Table 5.1

*The statistics of skewness and kurtosis values from research data*

Variable	N	Mean Statistic	Skewness		Kurtosis	
			Statistic	Standard Error	Statistic	Standard Error
ROA	282	8.7823	0.3570	0.1450	2.5890	0.2890
CF	282	6.6706	-1.4310	0.1450	8.3580	0.2890
LV	282	18.5097	0.5000	0.1450	-0.6690	0.2890
SG	282	9.4693	6.5840	0.1450	55.0070	0.2890
S	282	2.4165	0.8020	0.1450	1.1770	0.2890
A	282	22.9766	1.7230	0.1450	4.4570	0.2890
WCR	282	0.2576	0.4710	0.1450	0.2620	0.2890
DSO	282	81.2255	3.8250	0.1450	24.3730	0.2890
ITO	282	6.4247	3.6870	0.1450	17.0780	0.2890
DPO	282	50.4928	1.8820	0.1450	4.7670	0.2890
NLB	282	0.0004	0.2850	0.1450	-0.3200	0.2890

ROA:Return on assets; CF:Cash flow; LV:Leverage; SG:Sales growth; S:Size; A:Age; WCR:Working capital requirements; DSO:Days sales outstanding; ITO:Inventory turnover; DPO:Days payable outstanding; NLB:Net liquid balance

Table 5.2

*Transformation rule*

Non-normal distributed variable	Variable	Transformation rule
ROA	DVs	Transform to new variable using natural logarithm
CF;SG;A;DSO;ITO;DPO	IVs	Transform to new variable using natural logarithm

ROA: Return on assets; CF: Cash flow; SG: Sales growth; A: Age; DSO: Days sales outstanding; ITO; Inventory turnover; DPO: Days payable outstanding

After the identified variables have been transformed, the normality test is repeated and the revised skewness and kurtosis values are generated and they are shown in Table 5.3 below.

From the revised results output, majority of the skewness and kurtosis values fell within the  $\pm 2$  range. It indicates that the non normal data has been transformed into normal distribution data. This is consistent with the explanation given by Jabar (2012) whereby normality is said to be achieved when the skewness and kurtosis values are shown within  $\pm 2$  at 0.05 significant values.

Table 5.3  
*Skewness and Kurtosis values of the research variables after transformation*

Variable	N	Mean	Skewness		Kurtosis	
			Statistic	Standard Error	Statistic	Standard Error
ROA	256	0.9046	-1.2800	0.1520	3.8360	0.3030
CF	241	0.8259	-1.1920	0.1570	1.8370	0.3120
LV	282	18.5097	0.5000	0.1450	-0.6690	0.2890
SG	214	0.9049	-0.9540	0.1660	4.5520	0.3310
S	282	2.4165	0.8020	0.1450	1.1770	0.2890
A	282	1.2717	-0.1570	0.1450	0.1020	0.2890
WCR	282	0.2576	0.4710	0.1450	0.2620	0.2890
DSO	282	1.8268	-0.5200	0.1450	1.7770	0.2890
ITO	282	0.6602	0.2410	0.1450	0.7280	0.2890
DPO	282	1.6010	-0.3510	0.1450	0.6780	0.2890
NLB	282	0.0004	0.2850	0.1450	-0.3200	0.2890

ROA:Return on assets; CF:Cash flow; LV:Leverage; SG:Sales growth; S:Size; A:Age; WCR:Working capital requirements; DSO:Days sales outstanding; ITO:Inventory turnover; DPO:Days payable outstanding; NLB:Net liquid balance

### **Distribution shape**

Apart from examining the values of skewness and kurtosis, the expected shape of normal distribution is obtained using graphical representations, which includes histogram complemented with normal distribution curve, normal probability plots called normal Q-Q plots and the detrended normal Q-Q plots. Figure 5.1 shows the graphical representations of the shapes of normal distribution for the dependent variable, ROA under the research period of 2010 to 2014.

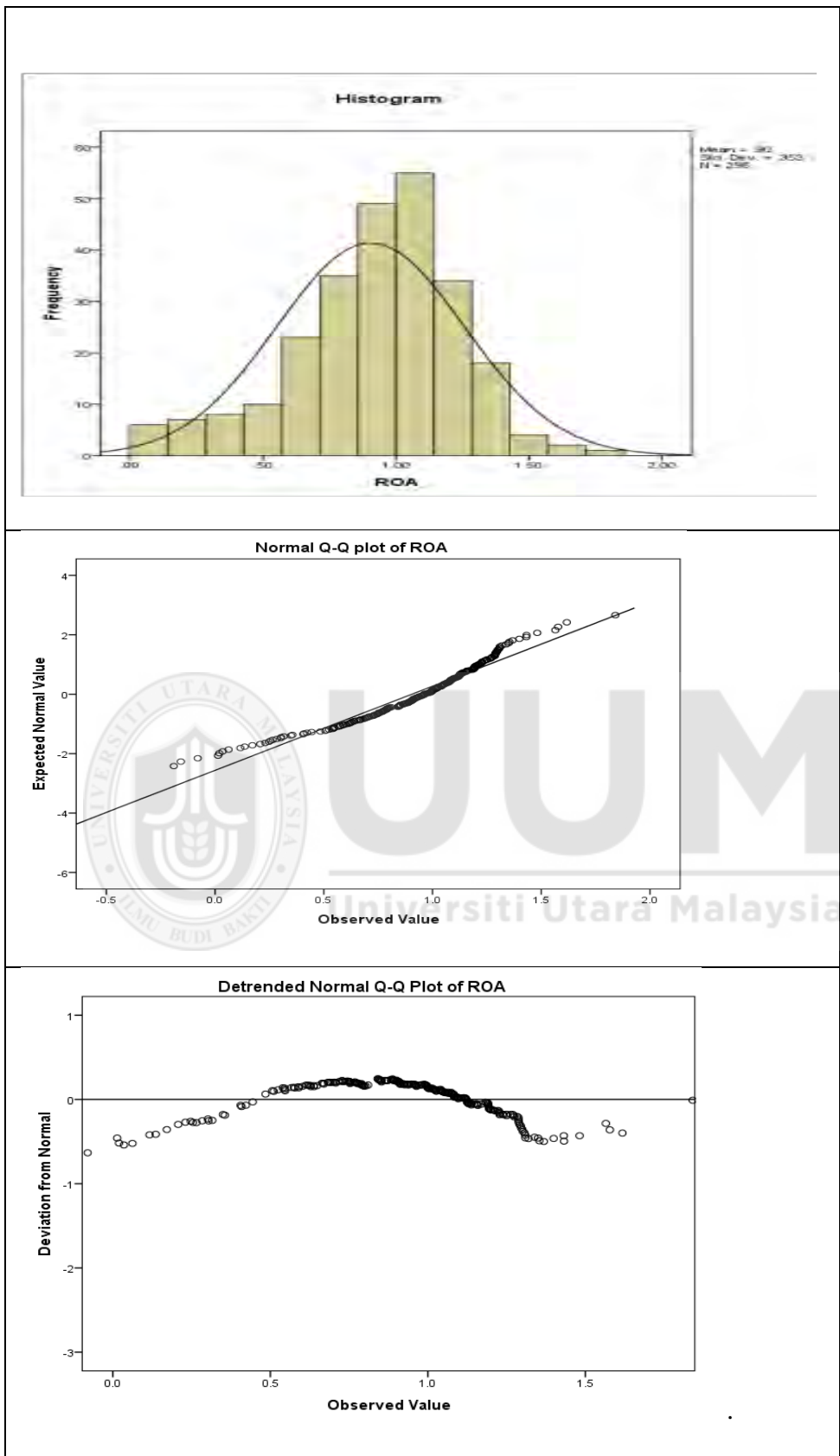


Figure 5.1  
*Normality test for dependent variable ROA*



From the histogram diagram, the variables seemed to be normally distributed with majority of the frequency variables concentrating in the middle, with smaller frequency variables spreading out towards both ends without skewing towards the left and right of the Gaussian distribution. The symmetrical bell shape curve which complements the histogram diagram further reinforced the frequency variable distribution of the dependent variable is 'normal'.

By inspecting the normal Q-Q plot diagram, the frequency of the observed dependent variable plotted against expected value from normal distribution are clustering around a straight line which indicates a normal distribution.

Finally, the detrended normal Q-Q plots of the dependent variable derived from plotting actual deviation of the frequency variables against the zero straight line shows no clustering of variables and majority of the variables concentrating around the zero straight line. This further suggests that the frequency variable distribution of the dependent variable is normally distributed.

### **Checking for outliers and extreme values**

Like many statistical methods, regression analysis is sensitive to outliers and extreme values. In this study the examination of the presence of outliers and extreme values are conducted on data which have earlier been transformed in order to achieve normal distribution variables.

There are several techniques proposed by researchers (Pallant, 2007, Jabar 2012) which can be applied to variables in order to detect outliers and extreme values. These techniques include histogram and boxplot methods.

The histogram method involves examining histogram shown in Figure 5.1 earlier. Outliers and extreme values can be easily detected by spotting and viewing the end tails of the distribution. It shows some of the variables settled on a fairly even slope until the end tails, something which is not alarming.

The second method involves boxplot method which classifies variables as outliers if they are position more than 1.5 box-lengths from the edge of the boxplot. Likewise, a value is classified as extreme value if it is located more than 3 box-lengths from the edge of the boxplot. The identified and classified outliers and extreme values are highlighted in Table 5.4 below.

The next step is to check the authenticity of these outliers and extreme values. After an investigation, the researcher found out that the values are genuine in nature when crossed reference to the annual reports downloaded from BMSB webpage. Also, these values are within the range identified for the respective variables. Under these circumstances, Pallant (2007) has suggested either to delete all the outliers and extreme values identified or to change the value into a less extreme value. According to Jabar (2012) any attempt to delete all the outliers and extreme value will reduce the sample size and influence the significant outcome of the regression analysis.

The following mitigating step is to assess the magnitude of these outliers and extreme values (Pallant, 2007; Jabar, 2012).

Table 5.4  
*Outliers and extreme value*

No	Variable	Outliers	Extreme
1	ROA	1.84, -0.19, -0.16, -0.08, 0.01	-1.06
2	CF	-0.66, -0.50, -0.48	-0.85
3	SG	2.40, 2.33, 2.17, 2.12, -0.82, -0.71, -0.62, -0.12	-1.59
4	S	4.54, 4.29, 4.20, 4.05	
5	A	0.30	
6	WCR	0.83, 0.66	
7	DSO	2.77, 2.56, 2.55, 2.48, 0.93, 1.09, 1.11, 1.14	0.69
8	ITO	1.77, 1.56, -0.25, -0.22, -0.20	
9	DPO	0.49, 0.60	
10	NLB	0.60	

ROA:Return on assets; CF:Cash flow; SG:Sales growth; S:Size; A:Age; WCR:Working capital requirements; DSO:Days sales outstanding; ITO:Inventory turnover; DPO:Days payable outstanding; NLB:Net liquid balance

The magnitude of the outliers and extreme values could be assessed by comparing the 5% trimmed mean with the mean value of the respective variables. This can be illustrated by Table 5.5 below. Past researchers (Pallant, 2007; Jabar, 2012) have suggested that if the difference between the 5% trimmed mean and mean values are significant, then further investigation needs to carry out in order to determine the source of this deviation.

Likewise, if the difference is small then it can be deduced that these variables are not much different the rest of the distribution.

Table 5.5  
*Investigating outliers and extreme values*

No.	Variable	Mean	5% Trimmed Mean	Difference
1	ROA	0.9046	0.9258	-0.0212
2	CF	0.8259	0.8580	-0.0321
3	SG	0.9049	0.9249	-0.0200
4	S	2.4165	2.3922	0.0243
5	A	1.2717	1.2761	-0.0044
6	WCR	0.2576	0.2529	0.0047
7	DSO	1.8268	1.8337	-0.0069
8	ITO	0.6602	0.6535	0.0067
9	DPO	1.6010	1.6070	-0.0060
10	NLB	0.0004	-0.0025	0.0029

ROA:Return on assets; CF:Cash flow; SG:Sales growth; S: Size; A:Age; WCR:Working capital requirements; DSO:Days sales outstanding; ITO:Inventory turnover; DPO:Days payable outstanding; NLB:Net liquid balance

From Table 5.5, it shows that majority of the difference values, irrespective of the positive or negative sign, are less than 0.09. According to Pallant (2007) a difference of 0.09 is acceptable to be very similar. We can assume that these outliers and extreme values are the same as the rest of the distribution. Based on this finding, none of the outliers and extreme values are deleted or removed from the sample.

### 5.2.2 Linearity test

The second preliminary analysis involves linearity test which examine the relationship between the key determinants of WC and WCM against firm performance using P-P plots and scatterplots of the standardized residual distribution as shown in Figure 5.2.

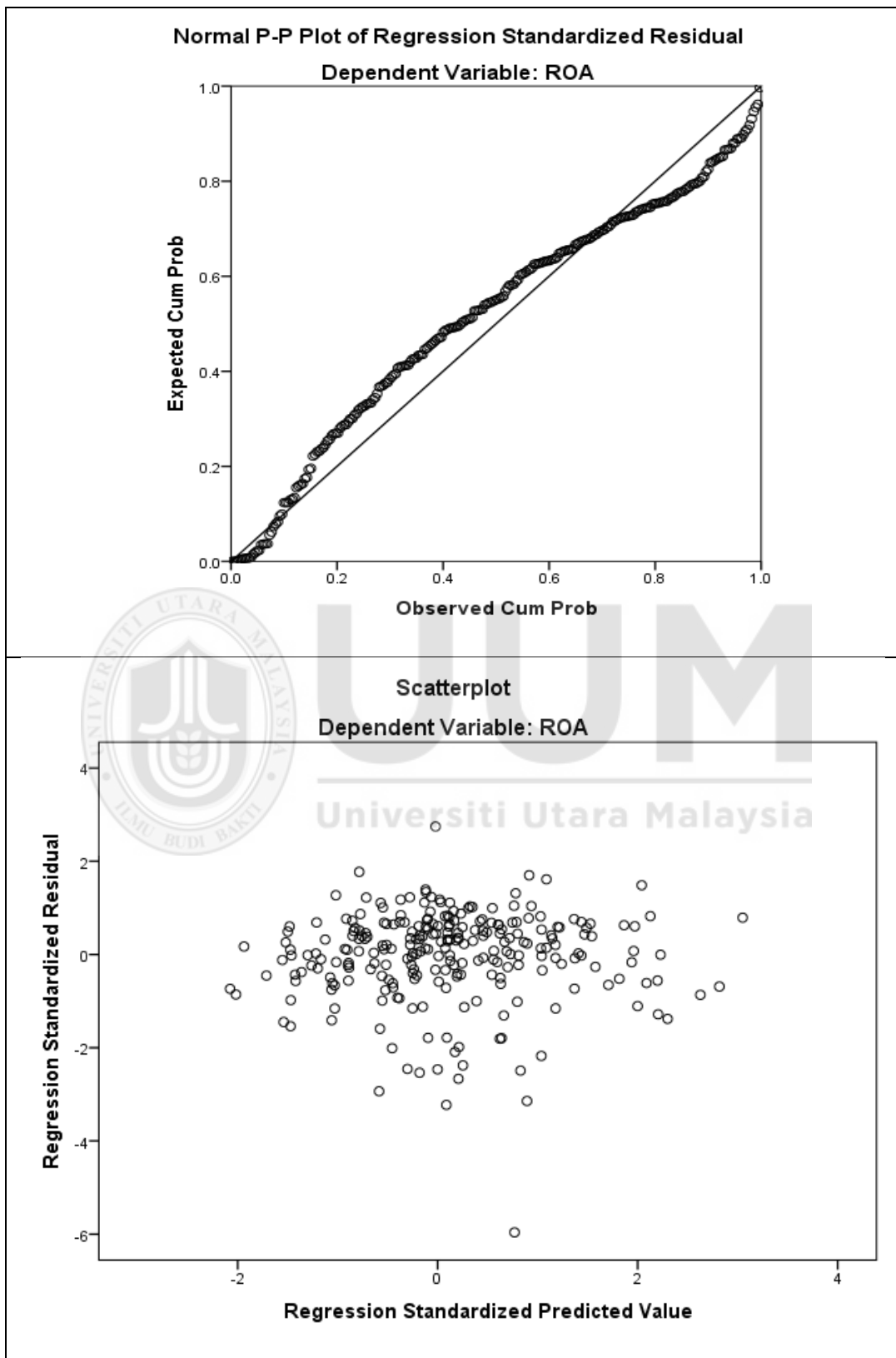


Figure 5.2  
*Linearity test for dependent variable ROA*

From the normal probability plots (P-P), it can be identified that the frequency distribution of variables concentrating in a roughly straight line, starting from the bottom left and ends towards the top right of the diagram. We can assume that the distribution deviation from linearity is minor and insignificant. Similarly, when we examine the scatterplot diagram, the frequency distribution of variables is concentrating in the centre of the diagram, with lesser frequency variables spreading out toward the ends. It shows that there is no clear relationship between the standardized residuals and the standardized predicted values, which confirms linearity assumption as suggested by Hair, Black, Babin and Anderson, (2010).

### **5.2.3 Homoscedasticity test**

Homoscedasticity test is based on the scatterplot diagram in Figure 5.2. This diagram shows that the frequency distribution variables have a semi-regular shape. It means that the “noise” or random disturbance in the key determinants of working capital is the same across all values of firm performance (Jabar, 2012).

### **5.2.4 Correlation test**

Table 5.6 shows the results output for the correlation for all the variables identified in this study. From the table, except for the outlier correlation between leverage (LV) and net liquid balance (NLB) of -0.827, it shows that the strength of the correlation coefficient ( $r$ ) ranges from medium (0.469) to small (0.002).

Table 5.6  
*Values of Correlation*

	ROA	CF	LV	SG	S	A	WCR	DSO	ITO	DPO	NLB
ROA	1.000										
CF	.469**	1.000									
LV	-.285**	-.409**	1.000								
SG	.041	0.034	0.016	1.000							
S	.095	0.059	.214**	-0.088	1.000						
A	-.173**	-0.008	0.025	-.175*	.360**	1.000					
WCR	-.034	-.396**	0.111	-0.086	-.211**	-.144*	1.000				
DSO	-.220**	-0.061	-0.094	0.104	-.395**	-.149*	.315**	1.000			
ITO	.185**	0.028	0.014	0.117	.184**	-0.012	-.519**	-.333**	1.000		
DPO	-.155*	0.006	0.002	.195**	-0.110	0.004	-.239**	.391**	-0.099	1.000	
NLB	.243**	.443**	-.827**	0.032	-.142*	-0.030	-.236**	0.069	0.094	-0.004	1.000

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

ROA:Return on assets; CF:Cash flow; LV:Leverage; SG:Sales growth; A:Age; WCR:Working capital requirements;  
 DSO:Days sales outstanding; ITO:Inventory turnover; DPO:Days payable outstanding; NLB:Net liquid balance

The overall outcome of the correlation analysis shows no problem of multicollinearity as the absolute values displayed in Table 5.6 ranges from the medium value of 0.469 to the small value of 0.002. Therefore all the values are lower than the threshold of 0.8 as suggested by Benny and Feldman (1985).

### 5.2.5 Multicollinearity test

Multicollinearity test is carried on independent variables established in the research framework using two methods.

The first method is to examining the independent variables tolerance values ranges from 0 to 1 and variance inflation factors (VIF) values have a maximum value of 10 (Marquardt, 1970; Hair et al.,1998; O'Brien, 2007).

Table 5.7  
*Multicollinearity test using tolerance and variance inflation factors (VIF)*

IV	Tolerance	VIF
CF	0.614	1.629
LV	0.327	3.060
SG	0.931	1.074
S	0.709	1.410
A	0.758	1.319
WCR	0.385	2.600
DSO	0.667	1.500
ITO	0.550	1.819
DPO	0.633	1.579
NLB	0.312	3.205

CF: Cash flow; LV: Leverage; SG: Sales growth; S: Size; A: Age; WCR: Working capital requirements; DSO: Day sales outstanding; ITO: Inventory turnover; DPO: Days payable outstanding; NLB: net liquid balance; IV: Independent variable

Based on Table 5.7, the tolerance values of the independent variables ranges from 0.312 to 0.931, while the variance inflation factors (VIF) of the independent variables ranges from 1.074 to 3.205. These results revealed that all the independent variables do not experience any multicollinearity among them.

Secondly, the test for multicollinearity of independent variables is examined using Pearson correlation, which involved the direction, strength and significance relationship among the independent variables (Sekaran, 2000).



Table 5.8  
*Multicollinearity test using Pearson correlation*

IV	Correlation coefficient	Significant (2-tailed)	N
CF	0.315	0.000	241
LV	-0.157	0.274	282
SG	0.051	0.677	214
S	0.057	0.494	282
A	-0.157	0.072	282
WCR	-0.017	0.022	282
DSO	-0.215	0.012	282
ITO	0.105	0.117	282
DPO	-0.157	0.896	282
NLB	0.131	0.546	282

CF: Cash flow; LV: Leverage; SG: Sales growth; S: Size; A: Age; WCR: Working capital requirements; DSO: Day sales outstanding; ITO: Inventory turnover; DPO: Days payable outstanding; NLB: net liquid balance; IV: Independent variable

From Table 5.8, the correlation coefficients among the independent variables are less than 0.7. This second test reaffirming the notion there is no multicollinearity among independent variables.

### 5.2.6 Autocorrelation

Table 5.9 shows the model summary results of the standard multiple regression using SPSS version 20. Together with the R square value of 15% (coefficient of determination) and the standard error of estimation of 0.33, the Durbin-Watson value shows a value of 1.86 which is within the acceptable d-statistic value range from 1.5 to 2.5 (Gujarati, 2003; Ghazali, 2008) which validates that the model does not have any autocorrelation issues. This means there is no lag correlation between series of observations in time series data or in cross-sectional data.

Table 5.9  
*Model Summary*

Model	R	R square	Adjusted R square	Std error of the estimate	Durbin-Watson
1	0.386	0.15	0.12	0.33	1.86

So far, substantial preliminary analyses tests have been conducted on the econometric assumptions of normality, linearity, homoscedasticity, correlation, multicollinearity and autocorrelation. Based on the foregoing test results, none of these econometric assumptions have been violated. The validated data is ready for further specific statistical techniques of regression analyses in order to address the research questions.

### 5.3 Descriptive statistics

SPSS is used to examine the collected data in order to determine the characteristics of the sample in term of frequency and percentage of distribution. Then, we evaluate if any of the variables violated any of the econometric assumptions underlying the statistical techniques use to address the research questions. Finally, we address research question no.2 of this research study.

## Frequency and percentage distribution

Table 5.10  
*Frequency distribution of the manufacturing sectors*

No	Manufacturing Sector	Frequency (Nos.)	Percent (%)
1	Non-metallic mineral industry	45	16.0
2	Aerospace	0	0.0
3	Textiles and textile product	28	9.9
4	Basic metal products	27	9.6
5	Electrical and electronic	30	10.6
6	Engineering support	4	1.4
7	Food and sustainable resources	55	19.5
8	Machinery and equipment	58	20.6
9	Medical devices	6	2.1
10	Petrochemical	23	8.2
11	Pharmaceuticals	6	2.1
	Total	282	100

Table 5.10 shows the frequency distribution of firms in the manufacturing sectors. Machinery and equipment sector has the largest concentration of firms (58 firms or 20.6%) followed by food and sustainable resources (55 firms or 19.5%). The other significant manufacturing sectors include the non-metallic mineral industry sector (45 firms or 16%), electrical and electronic sector (30 firms or 10.6%), textiles and textile product sector (28 firms or 9.9%), basic metal products sector (27 firms or 9.6%) and petrochemical sector (23 firms or 8.2%).

Separately, Table 5.11 highlights descriptive statistics of the research sample size description. In order to ensure none of the variables violated any of the econometric assumptions, some variables identified in Table 5.2 need to be transformed.

After the transformation process, some of the sample data were ‘omitted’ and amounts to 135 or 4.35% which is small as compare to the remaining observations of 2,967 or 95.65%.

Table 5.11  
*Research sample size description*

<b>Variable</b>	<b>Research sample size</b>	<b>Missing sample size</b>	<b>Remaining sample size</b>
ROA	282	26	256
CF	282	41	241
LV	282		282
SG	282	68	214
S	282		282
A	282		282
WCR	282		282
DSO	282		282
ITO	282		282
DPO	282		282
NLB	282		282
Total observation	<b>3,102</b>	<b>135</b>	<b>2,967</b>
Percentage	<b>100 %</b>	<b>4.35 %</b>	<b>95.65 %</b>

### **Statistical measures**

Table 5.12 displays the descriptive statistics of different measurements aspect of the research sample. Briefly, the leverage (LV) variable shows the highest mean, median and standard deviation. The lowest of these three measurements are shown by working capital requirements (WCR) and net liquid balance (NLB) variables respectively. Separately majority of the skewness and kurtosis values fell within the  $\pm 2$  range. It indicates that the non normal data has been transformed into normal distribution data.

Table 5.12  
*Descriptive measures*

Measure	Status	ROA	CF	LV	SG	S	A	WCR	DSO	ITO	DPO	NLB
N	Valid	256	241	282	214	282	282	282	282	282	282	282
	Missing	26	41		68							
Mean		0.905	0.826	18.510	0.905	2.416	1.272	0.258	1.827	0.660	1.601	0.000
Median		0.962	0.909	17.008	0.962	2.362	1.255	0.247	1.874	0.672	1.599	-0.019
Std. Deviation		0.353	0.431	14.889	0.482	0.544	0.284	0.144	0.276	0.343	0.308	0.202
Skewness		-1.280	-1.192	0.500	-0.954	0.802	-0.157	0.471	-0.520	0.241	-0.351	0.285
Std. Error of Skewness		0.152	0.157	0.145	0.166	0.145	0.145	0.145	0.145	0.145	0.145	0.145
Kurtosis		3.836	1.837	-0.669	4.552	1.177	0.102	0.262	1.777	0.728	0.678	-0.320
Std. Error of Kurtosis		0.303	0.312	0.289	0.331	0.289	0.289	0.289	0.289	0.289	0.289	0.289
Minimum		-1.056	-0.854	0.000	-1.585	1.322	0.301	-0.020	0.688	-0.252	0.492	-0.440
Maximum		1.841	1.734	56.256	2.401	4.540	2.013	0.828	2.772	1.767	2.361	0.600

ROA:Return on assets; CF:Cash flow; LV:Leverage; SG:Sales growth; S: Size; A:Age; WCR:Working capital requirements; DSO:Days sales outstanding; ITO:Inventory turnover; DPO:Days payable outstanding; NLB:Net liquid balance

### Mean by sector

Table 5.13 presents descriptive statistics of the major sectors identified in the manufacturing industry. Their characteristics could be examined using the mean of the variables adopted in this study.

Briefly, medical devices sector records the highest return on assets (ROA) of 17.7% and cash flow (CF) of 11.1% amidst a modest sales growth (SG) of 7.2 % and leverage (LV) of 19.2%. Also, it records as one of the oldest sector with age (A) of 27.5 years. In contrast, the basic metal products sector has shown the highest leverage (LV) of 30.5% and age (A) of 28 years but recorded the lowest return on assets (ROA) of 5.9% and sales growth (SG) of 4.4%. Majority of the manufacturing sectors have shown a consistent size (S) values.

Table 5.13

*Dependent & independent variables mean by sector (in %)*

No	SECTOR	N	ROA Mean	CF Mean	LV Mean	SG Mean	S Mean	A Mean
1	Non-Metallic Mineral	45	6.117	5.595	18.400	11.263	2.337	23.409
2	Textiles and Textile Product	28	11.300	6.084	13.829	8.287	2.287	14.857
3	Basic Metal Products	27	5.917	4.698	30.543	4.471	2.688	28.222
4	Electrical and Electronic	30	6.447	5.097	17.591	14.745	2.174	17.233
5	Engineering Support	4	14.639	12.290	16.489	6.630	1.758	12.500
6	Food and Sustainable Resources	55	11.064	7.058	21.142	8.426	2.669	28.836
7	Machinery and Equipment	58	9.335	8.211	15.914	11.772	2.397	21.138
8	Medical Devices	6	17.775	11.126	19.190	7.196	2.558	27.500
9	Petrochemical	23	8.970	5.941	12.276	4.402	2.222	25.435
10	Pharmaceuticals	6	12.345	10.376	17.148	8.549	2.516	19.833
	Total	282						

N: No of firms; ROA:Return on assets; CF:Cash flow; LV:Leverage; SG:Sales growth; S: Size; A:Age

**Working capital management efficiency indicators**

Table 5.14 contains WCM information in the manufacturing sectors, segregated by the amount of capital invested in its operating cycle (measured by WCR) and the primary source of liquidity which is purely a financial decision (measured by NLB).

Table 5.14

*WCM variables mean by sector*

No	SECTOR	N	WCR Mean	DSO Mean	ITO Mean	DPO Mean	NLB Mean
1	Non-Metallic Mineral	45	0.283	106.466	4.023	64.680	(0.029)
2	Textiles and Textile Product	28	0.318	70.127	10.153	49.027	0.075
3	Basic Metal Products	27	0.331	69.548	4.353	34.012	(0.150)
4	Electrical and Electronic	30	0.268	102.683	8.419	60.268	0.048
5	Engineering Support	4	0.276	76.835	4.730	35.773	0.110
6	Food and Sustainable Resources	55	0.163	55.532	8.165	45.597	(0.017)
7	Machinery and Equipment	58	0.259	84.199	5.457	52.730	0.027
8	Medical Devices	6	0.230	47.276	6.309	28.401	(0.042)
9	Petrochemical	23	0.262	94.647	5.846	43.683	0.057
10	Pharmaceuticals	6	0.262	81.192	3.260	57.474	(0.035)
	Total	282					

N: No. of firms; WCR:Working capital requirements; DSO:Days sales outstanding; ITO:Inventory turnover; DPO:Days payable outstanding; NLB:Net liquid balance

From the operating cycle perspective, all sectors are showing positive working capital requirements (WCR) sign. It has two implications; firstly it shows that all sectors are adopting conservative policy of managing working capital requirements (WCR). Secondly, positive working capital requirements (WCR) mean that firms' excess investment must be financed either by free cash flow or debt (Faden, 2013). The information revealed in Table 5.13 and Table 5.14 have shown that all sectors are generating positive operating cash flow (CF) and adopting leverage (LV) possibly to support the positive working capital requirements (WCR) position.

The sectoral analysis in Table 5.14 shows that the engineering support sector is adopting a modest working capital requirements (WCR) of 0.276 times, but it is generating the highest cash flow (CF) of 12.29 % (Table 5.13). This shows that engineering support sector is managing its working capital requirements (WCR) efficiently. In contrast, basic metal products sector is showing the highest working capital requirements (WCR) of 0.33 times. At the same time it is generating the lowest cash flow (CF) of 4.69 % (Table 5.13). It can be inferred that this sector is not managing its working capital requirements (WCR) efficiently.

From a financial decision perspective, the engineering support sector shows the highest source of liquidity i.e. net liquid balance (NLB) of 0.11times, while basic metal products sector records the lowest source of liquidity i.e. net liquid balance (NLB) of -0.15 times.

This means that a positive net liquid balance (NLB) of 0.11 times indicates that the engineering support sector has the financial flexibility and liquidity in honouring its working capital requirements (WCR) commitments, while net liquid balance (NLB) = -0.15 times value of net liquid balance (NLB) shows that basic metal products sector is totally dependent on external financing to fulfil its working capital requirements (WCR) commitments.

The next item to be analyzed is the days sales outstanding (DSO), which is based on the rough guide to acceptable ratios discussed earlier in Chapter 4. The DSO for the non-metallic mineral sector is 106 days, electrical and electronic sector is 102 days and petrochemical sector is 94 days. These three sectors have DSO of higher than 85 days, which shows that they are not managing their WC efficiently by taking longer time to collect their payments from their customers. This may indicate that these sectors do not have sufficient cash to finance their short term obligations due to the extended cash cycle. In contrast, the medical devices sector (47 days) and food & sustainable resources sector (55 days) have the shortest days sales outstanding (DSO) which indicate that generally the companies in this sector are managing their working capital management (WCM) efficiently.

The next item to be analyzed is days payable outstanding (DPO). The DPO for non-metallic mineral sector is 64 days and electrical & electronics sector is 60 days, which are relatively high (>60 days) based on the guidelines. This suggests that these sectors are getting better credit terms from their respective vendors or these sectors are slower in paying their vendors, which indicate poor working capital management (WCM).



Sectors like medical devices (28 days), basic metal products (34 days), engineering support (35 days) and petrochemical are paying their vendors relatively faster.

Meanwhile, for the inventory turnover (ITO), textiles and textile product sector records ITO of 10 times, electrical & electronics sector of 8 times and food & sustainable resources sector of 8 times, which are relatively higher than other sectors. This indicates they are managing their stocks more efficiently than other sectors.

From the foregoing discussion it is shown that Shulman and Cox (1985) approach to differentiation between operating cycle (represented by WCR) and changes in liquid financial assets (represented by NLB) provides an alternative measure of a firm efficiency and liquidity position. The ability to further drill-down of operating cycle (represented by WCR) into components DSO, ITO and DPO supports research question number 2 where WCM provides an alternative measure of firm operating efficiency and liquidity position.

#### **5.4 Results of regression analysis**

Based on the research framework identified under Figure 4.1 (see page 80), the hypotheses developed earlier are ready to be tested, using multiple regression and hierarchical multiple regression.

#### **5.4.1 Using multiple regression (MR) to test hypothesis 3 until hypothesis 7**

Hypotheses 3 to 7 are described in details as follows,

Hypothesis 3: Days sales outstanding (DSO) is negatively related to firm performance.

Hypothesis 4: Days payable outstanding (DPO) is negatively related to firm performance.

Hypothesis 5: Inventory turnover ratio (ITO) is positively related to firm performance.

Hypothesis 6: Working capital requirements (WCR) is negatively related to firm performance.

Hypothesis 7: Net liquid balance (NLB) is positively related to firm performance.

At this stage, the dependent variable, ROA, is regressed against all five independent variables, namely days sales outstanding (DSO), days payable outstanding (DPO), inventory turnover ratio (ITO), working capital requirements (WCR) and net liquid balance (NLB).

The multiple regression result is shown in Table 5.15. The results show that the overall *F* value is 5.095, while the *R* squared and adjusted *R* squared are 0.075 and 0.06 respectively. This shows that the predictive power of the model with the five independent variables is 7.5%.

According to Maddala (2001) cited in Ghazali (2008) the main objective of any research should focus on the logical and theoretical relevancy of the predictive variables and the overall model significance rather than emphasizing on model with

high adjusted R-squared value. Moreover, Wooldridge (2012) has acknowledged that low R-squared value is common in cross sectional analysis. Bellemare (2015) emphasized that cross-sectional data normally show R-squared values range from 0.05 to 0.30.

Table 5.15

*Standard multiple regression test results assessing components of WCM*

No	Variables	Predicted sign	Beta coefficient	S.E.	Sig
1	Days sales outstanding (DSO)	-	-0.221	0.092	0.003
2	Inventory turnover (ITO)	+	0.071	0.078	0.351
3	Days payable outstanding (DPO)	-	-0.041	0.085	0.587
4	Net liquid balance (NLB)	+	0.166	0.113	0.010
5	Working capital requirements (WCR)	-	0.110	0.209	0.201
	F value		5.095		
	F significant		0.001		
	R square		0.075		
	Adjusted R square		0.060		

The results in Table 5.15 also show that days sales outstanding (DSO) is significant with a beta coefficient of -0.221. The significant coefficient supports hypothesis 3 whereby ROA should be negatively related with DSO. This finding is similar to literature both in developed markets (such as Belgium, Greece, USA, Spain, and Turkey) and emerging markets (such as Nigeria, Pakistan, and Kenya). Likewise net liquid balance (NLB) is also significant (p-value= 0.010) with a beta coefficient of 0.116. The positive relationship supports hypothesis 7, whereby ROA is expected to be positively related to NLB.

Both inventory turnover (ITO) and days payable outstanding (DPO) results revealed that they do not have any significant impact on firm performance. The components of WCR are DSO, DPO and ITO, and the findings showed that only DSO is significantly related to ROA. This shows that WCR does not have any significant influence on firm performance. Therefore, hypothesis 4, hypothesis 5 and hypothesis 6 are rejected.

#### **5.4.2 Using hierarchical multiple regression (HMR) to test hypotheses 1, 2 and 8 through 17**

This section highlights the overall results of hierarchical multiple regression (HMR) in the manufacturing sectors. The analysis covered the moderation roles of working capital requirements (WCR) and net liquid balance (NLB) on the key determinants of WC and firm performance.

The details examination involves analysing of model 1, model 2 and model 3 respectively.

#### **Hypothesis 1**

Based on Fisher separation theorem (FST), net working capital of a firm could be segregated into working capital requirements (WCR) and net liquid balance (NLB). Hypothesis one intends to examine the moderating role of WCR on the relationship between key determinants of WC and firm performance.

Hence, the hypothesis is stated as:

**Hypothesis 1: The relationship between key determinants of WC and firm performance is moderated by WCR.**

Table 5.16  
*Examining the moderating value of significant WCR*

Variable	Model 1		Model 2		Model 3	
	All Predictors		Moderator		Interaction	
Cash flow	0.001	**	0.000	**	0.000	**
Leverage	0.364		0.386		0.361	
Sales growth	0.833		0.684		0.868	
Size	0.126		0.083		0.046	*
Age	0.013	*	0.025	*	0.017	*
F value	5.590		5.177		3.672	
F change	5.590		2.826		1.739	
F significant	0.000		0.000		0.000	
Significant F change	0.000		0.094		0.128	
R square	0.134		0.147		0.188	
Adjusted R square	0.110		0.119		0.136	
R square change	0.134		0.013		0.040	

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

Model 1

In stage 1, all the independent variables are regressed against firm performance. The R square value indicates that 13.4% of firm performance could be predicted from cash flow, leverage, sales growth, size and age. It is the overall measure of strength between the predictor variables and dependent variable. Out of the five predictor variables, cash flow variable is significant at  $p < 0.01$ , while firm age is significant at  $p < 0.05$ .

Model 2

In stage 2, WCR (consists of DSO, DPO & ITO) is introduced into the model. This has resulted R square change value improved by 1.3%. The p-value related to the F significant value is 0.000 which is very small. The model is justified to be significant at

less than 99% level. Separately, it is observe that cash flow variable is significant at  $p < 0.01$ , while firm age is significant at  $p < 0.05$ .

### Model 3

In stage 3, all of the 'standardized' key determinants of WC (independent variables) are multiplied with the 'standardized' WCR (moderator) in order to form interaction variables. These interaction variables are then introduced into the model. The R square change reflects the improvement in R-square by 4% when the interaction variables are added in model 3. R-square change is tested using F-test, which is referred to as F-change and it yields a value of 1.739. The p-value related to the F significant value is 0.000 which is very small. The model is justified to be significant at less than 99% level. In addition, it is observe that cash flow variable is significant at  $p < 0.01$ , while firm age and firm size are significant at  $p < 0.05$  respectively.

The evidence suggests that the relationship between key determinants of WC and firm performance is moderated by WCR. Therefore hypothesis one (1) is supported.

### Hypothesis 2

Subservient to Fisher separation theorem, the hypothesis two (2) purports to examine the moderating role of NLB on the relationship between key determinants of WC and firm performance.

As a result, the hypothesis could be stated as:

**Hypothesis 2: The relationship between key determinants of WC and firm performance is moderated by NLB.**

Table 5.17  
*Examining the moderating value of significant NLB*

Variable	Model 1		Model 2		Model 3	
	All Predictors		Moderator		Interaction	
Cash flow	0.001	**	0.000	**	0.000	**
Leverage	0.364		0.189		0.185	
Sales growth	0.833		0.795		0.444	
Size	0.126		0.118		0.118	
Age	0.013	*	0.012	*	0.016	*
F value	5.590		4.808		4.124	
F change	5.590		0.912		2.984	
F significant	0.000		0.000		0.000	
Significant F change	0.000		0.341		0.013	
R square	0.134		0.138		0.206	
Adjusted R square	0.110		0.109		0.156	
R square change	0.134		0.004		0.068	

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

#### Model 1

In stage 1, all the independent variables are regressed against firm performance. The R square value indicates that 13.4% of firm performance could be predicted from cash flow, leverage, sales growth, size and age. It is observe that cash flow variable is significant at  $p < 0.01$ , while firm age is significant at  $p < 0.05$ .

#### Model 2

In stage 2, NLB variable is introduced into the model. This has resulted R square change value improved by 0.4%. The p-value related to the F significant value is 0.000 which is very small. The model is justified to be significant at less than 99% level. Separately, it is observe that cash flow variable is significant at  $p < 0.01$ , while firm age is significant at  $p < 0.05$ .

### Model 3

At stage 3, all of the ‘standardized’ key determinants of WC (independent variables) are multiplied with the ‘standardized’ NLB (moderator) in order to form interaction variables. These interaction variables are introduced into the model. The R square change reflects the improvement in R-square when the interaction variables are added in model 3 which is 6.8%. R-square change is tested using F-test, which is referred to as F-change and yielding a value of 2.984. The p-value related to the F significant value is 0.000 which is very small. The model is justified to be significant at less than 99% level. In addition, it is observe that cash flow variable is significant at  $p < 0.01$ , while firm age and firm size are significant at  $p < 0.05$ .

Considering the above outcomes, it can be concluded that the relationship between key determinants of WC and firm performance is moderated by NLB. As a result hypothesis two (2) is supported.

### Hypotheses 8 to 12

Table 5.18 shows the coefficient values of all the variables in the hierarchical multiple regression (HMR) in the manufacturing sectors. The coefficient values are deduced by transforming the  $b$  weights of each independent variable into beta ( $\beta$ ) coefficients respectively. This conversion enables different independent variables with different units of measurement can be compared with each other (Nardi, 2003). The standardised coefficient is basically the Pearson’s  $r$  that allows researcher to distinguish the relative importance of each of the independent variable in determining the value of the dependent variable (Argyrous, 2011).



Table 5.18  
*Coefficient results of WCR and firm performance*

Independent Variables	Dependent Variable					
	Firm Performance					
	Model 1		Model 2		Model 3	
<u>Model variables:</u>						
Cash flow	0.269	**	0.324	**	0.388	**
Leverage	-0.071		-0.068		-0.073	
Sales growth	0.015		0.029		0.012	
Size	0.120		0.136		0.171	
Age	-0.191	*	-0.173	*	-0.188	*
<u>Moderating variable:</u>						
WCR			0.132		0.135	
<u>Interaction variables:</u>						
Cash flow*WCR					-0.214	*
Leverage*WCR					-0.152	
Sales growth*WCR					0.073	
Size*WCR					0.117	
Age*WCR					0.008	
F value	5.590		5.177		3.672	
F change	5.590		2.826		1.739	
F significant	0.000		0.000		0.000	
Significant F change	0.000		0.094		0.128	
R square	0.134		0.147		0.188	
Adjusted R square	0.110		0.119		0.136	
R square change	0.134		0.013		0.040	

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

Table 5.18 shows the standardized coefficient results of WCR and firm performance classified under Model 1, Model 2 and Model 3. For the interaction variables, the beta coefficient variables are as follows: cash-flow\*WCR is -0.214, leverage\*WCR is -0.152, sales growth\*WCR is 0.073, size\*WCR is 0.117 and age\*WCR is 0.008. The first two interactions are negative, while the other three are positive.

According to Ahmad Zaidi (2014) it would be meaningful to explain the existence of moderating effects of WCR on the relationship between the key determinants of WC and firm performance using line graph and specification variable. Basically, there are five different types of relationships which WCR could influence the relationship between key determinants of WC and firm performance.

The first independent variable of the key determinants of WC is cash flow and in order to test the moderating effects of WCR on the relationship between cash flow and firm performance, the hypothesis could be stated as follows:

**Hypothesis 8: WCR moderates the relationship between cash flow and firm performance**

Figure 5.3 shows the negative moderation (see Table 5.18, [page 141](#)) impact of cash flow on return on assets for 'low-WCR' and 'high-WCR' using line graph. There are two outcomes which could be observed.

Firstly, for 'high-WCR' which generates low cash flow appears to show a low level of ROA while 'high-WCR' which generates higher cash flow shows a high level of ROA. Even though the moderating influence is negative, high cash flow generating during level of 'high-WCR' actually improved firm performance. Similarly, for 'low-WCR' it seemed to be displaying the same trend.

Secondly, 'low-WCR' appears to have lower levels of ROA than 'high-WCR'. This is obvious when the cash flow generation is low and declining.

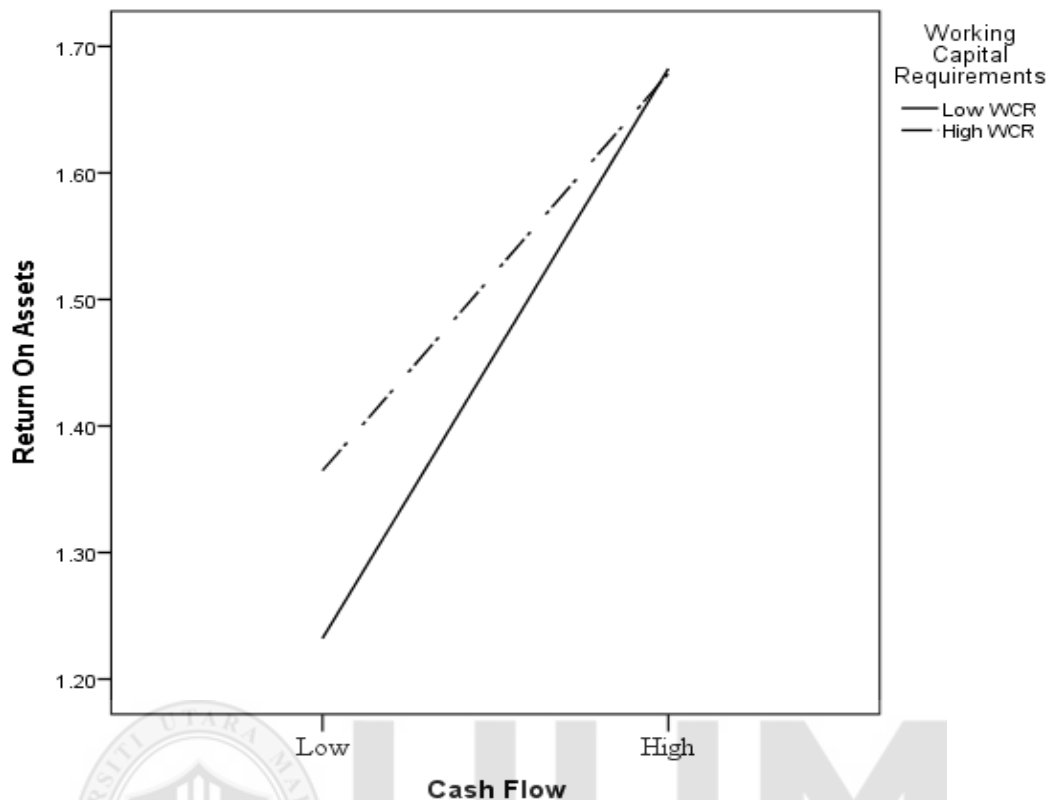


Figure 5.3  
*The moderation effects of WCR on the relationship between cash flow and firm performance*

Next, based on the guidelines furnished in Table 4.8 (see page 109), it can be deduced that the type of moderator which WCR is identified based on the interpretation in Table 5.19 shows that it is a <sup>7</sup>quasi moderator, which falls under quadrant 3 in Table 4.7. This specification variable modifies the form of relationship between cash flow and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

Based on the evidence shown in Figure 5.3 and Table 5.19 has suggested that WCR moderates the relationship between cash flow and firm performance. So, hypothesis 8 is supported.

<sup>7</sup> Quasi moderator refers to a type of moderator which modify the form of relationship between independent and dependent variable

Table 5.19

*Specification variable of CF\*WCR identification*

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model1	CF>>>ROA	0.099	0.099	25.489	0.000	25.489	0.000	**	
Model2	WCR>>>ROA	0.115	0.016	15.069	0.000	4.287	0.040	*	Related to criterion & predictor
Model3	CF*WCR>>>ROA	0.137	0.022	12.182	0.000	5.784	0.017	*	Interaction with criterion Quasi moderator

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; CF:Cash flow; WCR:Working capital requirements

The second independent variable of the key determinants of WC is leverage and in order to test the moderating effects of WCR on the relationship between leverage and firm performance, the hypothesis could be stated as follows:

**Hypothesis 9: WCR moderates the relationship between leverage and firm performance**

Figure 5.4 highlights the negative moderation (see Table 5.18, [page 141](#)) influence of leverage on ROA for ‘low-WCR’ and ‘high-WCR’ separately. Likewise, there are two observations which could be interpreted.

For ‘high-WCR’ which adopts low leverage tends to show a high level of ROA while ‘high-WCR’ which adopts high leverage earns a low level of ROA. Likewise, for ‘low-WCR’ it is also experiencing the same trend like ‘high-WCR’.

There is another observation where ‘high-WCR’ appears to have a higher ROA than ‘low-WCR’ during the initial increase in leverage. Until a breakeven point, the reverse pattern is observed where as the level of leverage increases the ‘low-WCR’ generates a higher ROA than ‘high-WCR’.

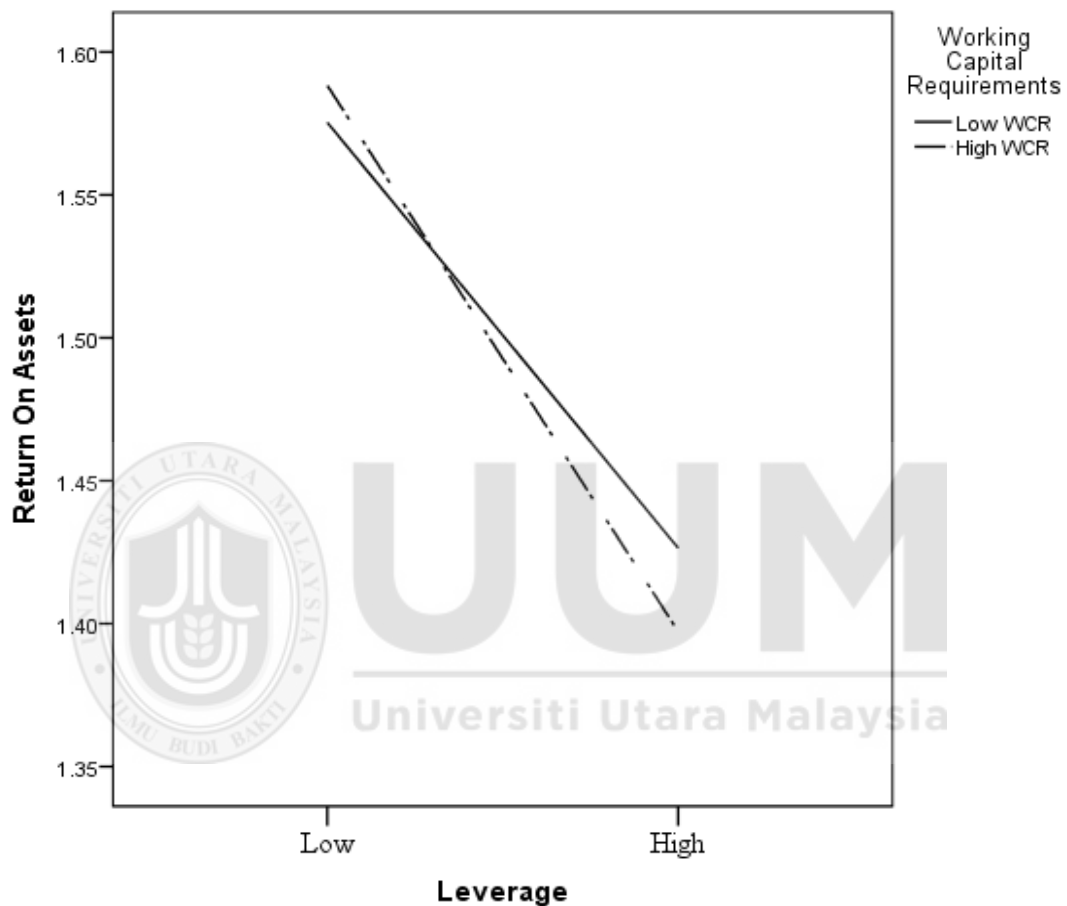


Figure 5.4  
*The moderation effects of WCR on the relationship between leverage and firm performance*

Following this, the analysis was checked with the guidelines shown in Table 4.8 (see [page 109](#)), and the type of moderator which WCR roles is identified based on interpretation in Table 5.20 indicates it is a <sup>8</sup>homologiser, which falls under quadrant 2

<sup>8</sup> A homologiser refers to one type of moderation which influences the strength of relationship between the independent variable and the dependent variable.

in Table 4.7. It affects the strength of relationship between leverage and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

Table 5.20  
*Specification variable of LV\*WCR identification*

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model1	LV>>>ROA	0.025	0.025	6.391	0.012	6.391	0.012 *		
Model2	WCR>>>ROA	0.025	0.000	3.184	0.043	0.002	0.963	Not related to criterion & predictor	
Model3	LV*WCR>>>ROA	0.025	0.000	2.116	0.099	0.003	0.955	No interaction with criterion	Homologiser

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; LV:Leverage; WCR:Working capital requirements

To summarize based on evidence shown in the Figure 5.4 and Table 5.20, there is strong evidence that WCR moderates the relationship between leverage and firm performance. Hence, hypothesis 9 is supported.

The third independent variable of the key determinants of WC is sales growth and in order to test the moderating effects of WCR on the relationship between sales growth and firm performance, the hypothesis is stated as follows:

**Hypothesis 10: WCR moderates the relationship between sales growth and firm performance**

Figure 5.5 demonstrates the positive moderation (see Table 5.18, page 141) influence of sales growth on ROA for ‘low-WCR’ and ‘high-WCR’ separately. There are two outputs which could be recognized.

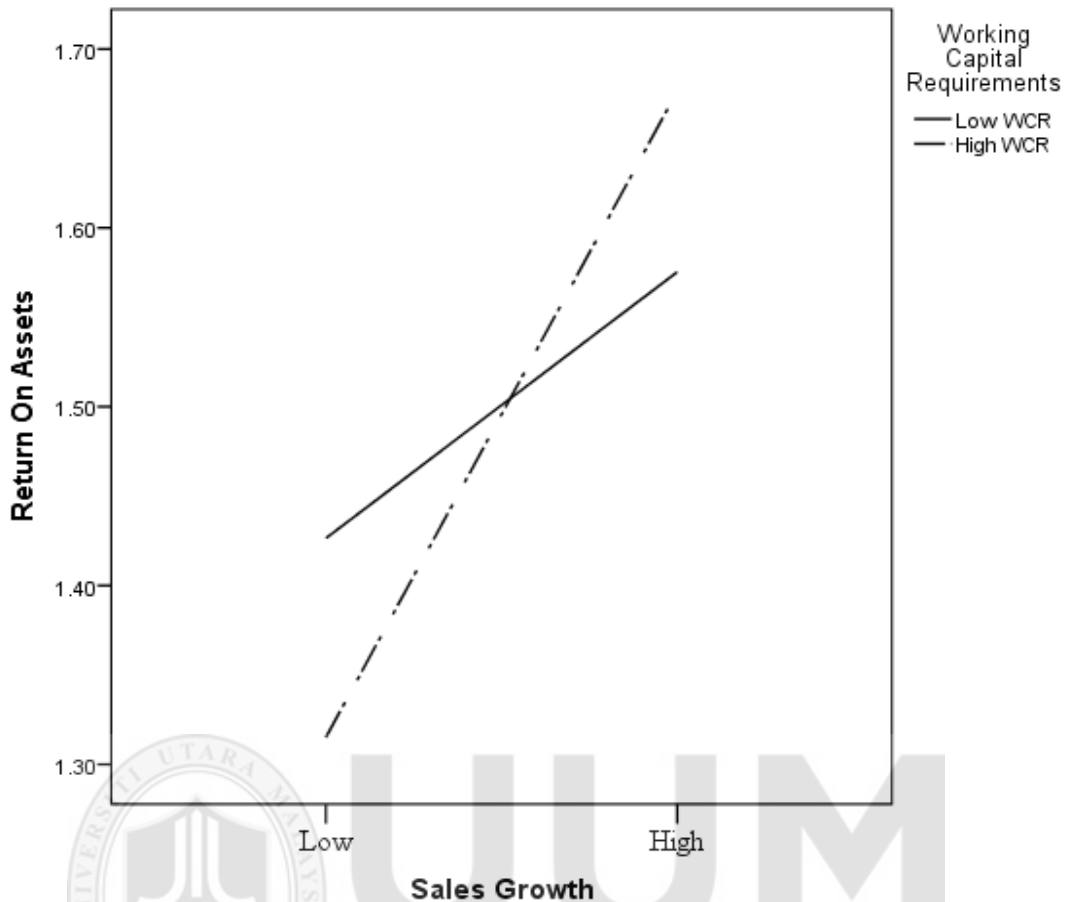


Figure 5.5  
*The moderation effects of WCR on the relationship between sales growth and firm performance*

For ‘low-WCR’ which experience low sales growth tends to show a low level of ROA but as ‘low-WCR’ experience high sales growth, it exhibits higher ROA. Likewise, for ‘high-WCR’ it is also experiencing the same trend like ‘low-WCR’ in term of sales growth.

There is another anomaly where ‘low-WCR’ appears to earn a higher ROA than ‘high-WCR’ during an initial increase in sales growth. Until a breakeven leverage point, the reverse pattern is observed where as sales growth increases the ‘high-WCR’ generates a higher ROA than ‘low-WCR’.

Thereafter, the analysis is checked with the guidelines set in Table 4.8 (see page 109), the type of moderator which WCR is identified based on interpretation in Table 5.21, it is found to be a homologiser, which falls under quadrant 2 in Table 4.7. It affects the strength of relationship between sales growth and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

Table 5.21  
*Specification variable of SG\*WCR identification*

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model 1	SG>>>ROA	0.003	0.003	0.533	0.466	0.533	0.466		
Model 2	WCR>>>ROA	0.003	0.000	0.269	0.764	0.008	0.929	Not related to criterion & predictor	
Model 3	SG*WCR>>>ROA	0.007	0.004	0.478	0.698	0.895	0.345	No interaction with criterion	Homologiser

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; SG:Sales growth; WCR:Working capital requirements

It has been shown that based on the Figure 5.5 and Table 5.21 results, the findings of these results suggest that WCR moderates the relationship between sales growth and firm performance. It can be concluded that hypothesis 10 is supported.

The fourth independent variable of the key determinants of WC is size and in order to test the moderating effects of WCR on the relationship between size and firm performance, the hypothesis is stated as follows:

**Hypothesis 11: WCR moderates the relationship between size and firm performance**



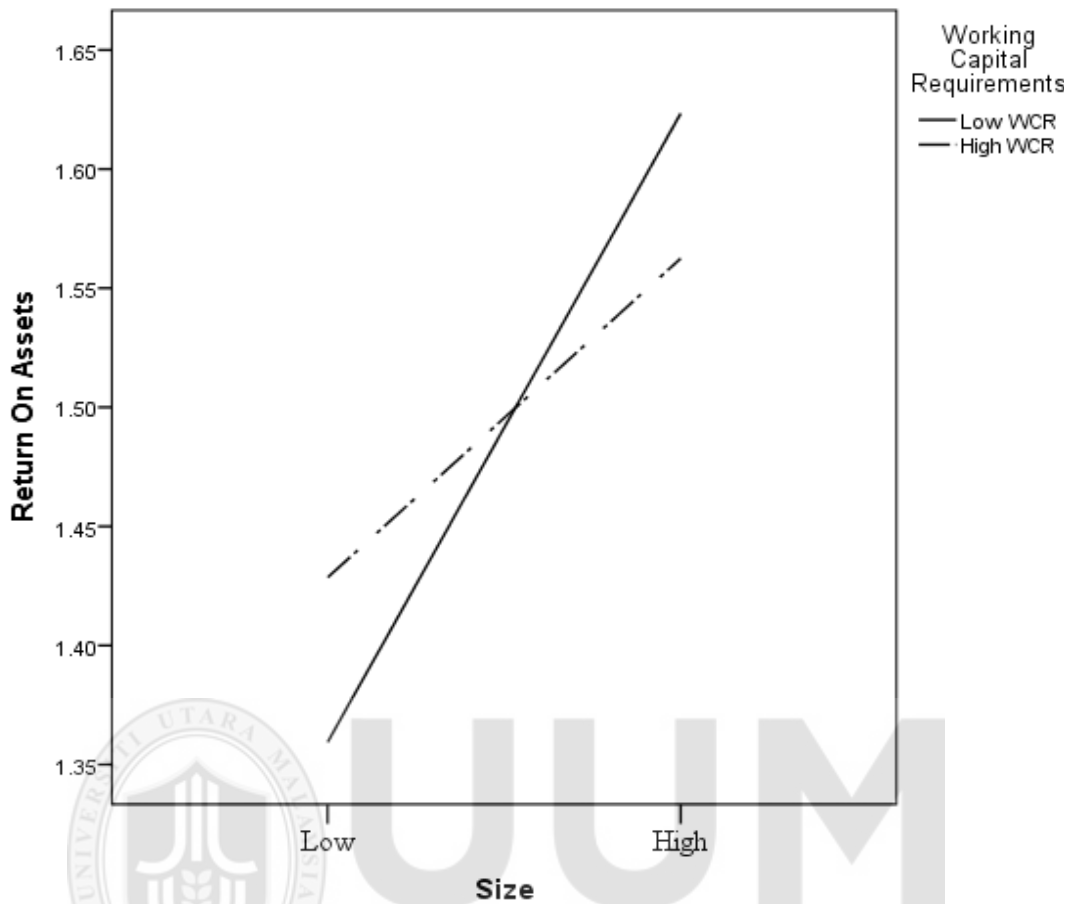


Figure 5.6  
*The moderation effects of WCR on the relationship between size and firm performance*

The evidence from Figure 5.6 demonstrates the positive moderation (see Table 5.18, page 141) influence of firm size on ROA for ‘low-WCR’ and ‘high-WCR’ separately.

There are two outputs which could be detected.

For ‘low-WCR’ with small firm size tends to show a low level of ROA. But as ‘low-WCR’ firm size increases, it exhibits higher ROA. Likewise, for ‘high-WCR’ it is also experiencing the same trend.

There is another finding where ‘high-WCR’ appears to earn higher ROA than ‘low WCR’ during an initial increase in firm size. Until a breakeven point, the reverse pattern is observed where as size increases the ‘low-WCR’ generates a higher ROA than ‘high-WCR’.

Next, the analysis of results with the guidelines explained in Table 4.8 (see page 109), the type of moderator which WCR based on interpretation in Table 5.22 it is found to be a homoligiser, which falls under quadrant 2 in Table 4.7. It affects the strength of relationship between firm size and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

Table 5.22  
Specification variable of S\*WCR identification

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model1	S>>>ROA	0.003	0.003	0.829	0.363	0.829	0.363		
Model2	WCR>>>ROA	0.003	0.000	0.415	0.661	0.004	0.952	Not related to criterion & predictor	
Model3	S*WCR>>>ROA	0.004	0.001	0.324	0.808	0.146	0.703	No interaction with criterion	Homoligiser

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; S:Size; WCR:Working capital requirements

To conclude based on the evidence shown in Figure 5.6 and Table 5.22 results, it is apparent that WCR moderates the relationship between size and firm performance. Thus hypothesis 11 is supported.

The fifth independent variable of the key determinants of WC is age and in order to test the moderating effects of WCR on the relationship between size and firm performance, the hypothesis is stated as follows:

**Hypothesis 12: WCR moderates the relationship between age and firm performance**

The results of Figure 5.7 illustrates the positive moderation (Table 5.18, see [page 141](#)) impact of firm age on ROA for ‘low-WCR’ and ‘high-WCR’ separately. There are two outcomes which could be noticed.

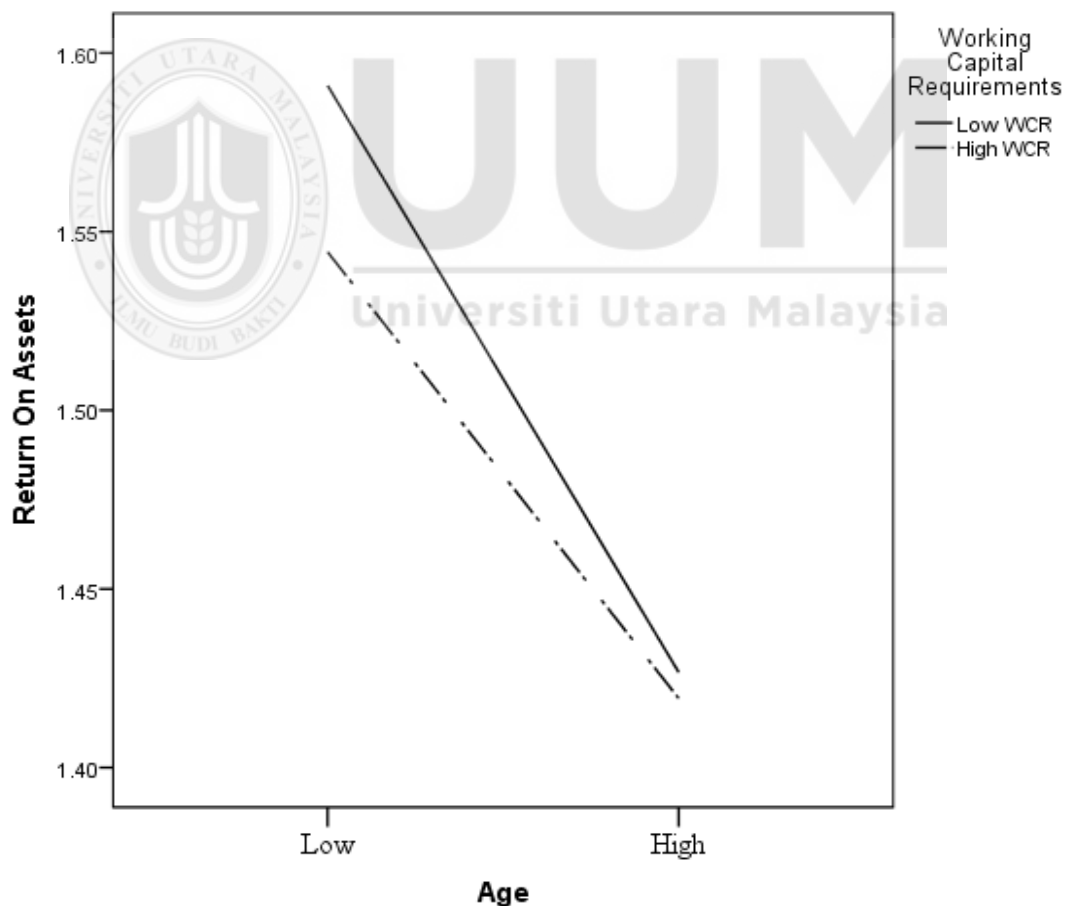


Figure 5.7  
*The moderation effects of WCR on the relationship between age and firm performance*

Firstly, for ‘low-WCR’ adopted by young firm age tends to show a high level of ROA but when ‘low-WCR’ firm age increases, it shows a lower level of ROA. Similarly, for ‘high-WCR’ it seemed to be displaying the similar trend.

Secondly, ‘low-WCR’ appears to have higher levels of ROA than ‘high-WCR’. This is obvious when firms age overtime.

Table 5.23  
Specification variable of A\*WCR identification

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model1	A>>>ROA	0.025	0.025	6.605	0.011	6.605	0.011	*	
Model2	WCR>>>ROA	0.027	0.002	3.527	0.031	0.464	0.497	Not related to criterion & predictor	
Model3	A*WCR>>>ROA	0.029	0.002	2.535	0.057	0.563	0.454	No interaction with criterion	Homologiser

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; A:Age; WCR:Working capital requirements

Next, the analysis based on the guidelines in Table 4.8 (see page 109), the type of moderator which WCR is identified, based on interpretation Table 5.23 it is found to be a homologiser, which falls under quadrant 2 in Table 4.7. It influences the strength of relationship between age and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

In summary, based on the Figure 5.7 and Table 5.23 results of the study have shown that WCR moderates the relationship between age and firm performance. So, hypothesis 12 is supported.

### **Hypotheses 13 to 17**

The coefficient Table 5.24 shows information on beta values outcome of NLB and firm performance which is based on hierarchical multiple regression (HMR) in the manufacturing sectors. The coefficient values are deduced by transforming the *b* weights of each independent variable into beta ( $\beta$ ) coefficients respectively. This conversion enables different independent variables with different units of measurement can be compared with each other (Nardi, 2003). The standardised coefficient is basically the Pearson's *r* that allows researcher to distinguish the relative importance of each of the independent variable in determining the value of the dependent variable (Argyrous, 2011).

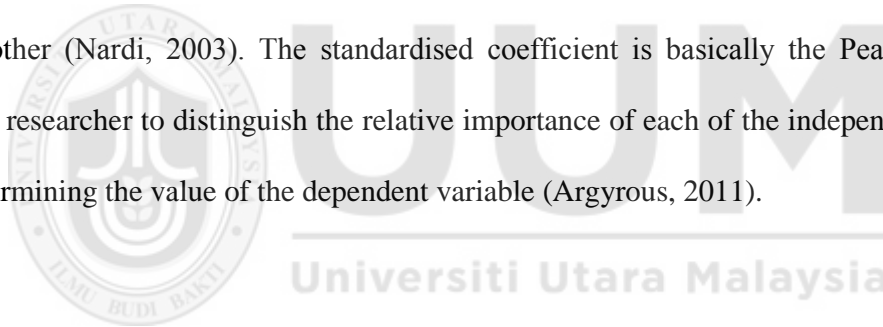


Table 5.24  
*Coefficient results of NLB and firm performance*

Independent Variables	Dependent Variable Firm Performance		
	Model 1	Model 2	Model 3
<u>Model variables:</u>			
Cash flow	0.269 **	0.285 **	0.383 **
Leverage	-0.071	-0.156	-0.169
Sales growth	0.015	0.018	0.058
Size	0.120	0.123	0.121
Age	-0.191 *	-0.195 *	-0.187 *
<u>Moderating variable:</u>			
NLB		-0.114	-0.198
<u>Interaction variables:</u>			
Cash flow*NLB			0.303 **
Leverage*NLB			0.136
Sales growth*NLB			0.058
Size*NLB			0.017
Age*NLB			-0.001
F value	5.590	4.808	4.124
F change	5.590	0.912	2.984
F significant	0.000	0.000	0.000
Significant F change	0.000	0.341	0.013
R square	0.134	0.138	0.206
Adjusted R square	0.110	0.109	0.156
R square change	0.134	0.004	0.068

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

Table 5.24 shows the standardized coefficient results of NLB and firm performance classified under Model 1, Model 2 and Model 3. From the interaction variables are as follows: cash-flow\*NLB is 0.303, leverage\*NLB is 0.136, sales growth\*NLB is 0.058, size\*NLB is 0.017 and age\*NLB is -0.001 respectively. The first four interactions are positive while the last interaction is negative.

Likewise, for the interaction effects of NLB on the relationship between the key determinants of WC and firm performance using line graph and specification variable, there are five different relationships which NLB. Each of these key determinants of WC will be discussed as follows.

The first independent variable of the key determinants of WC is cash flow and in order to test the moderating effects of NLB on the relationship between leverage and firm performance, the hypothesis could be stated as follows:

**Hypothesis 13: NLB moderates the relationship between cash flow and firm performance**

The results in Figure 5.8 demonstrates the positive moderation (Table 5.24, see [page 154](#)) influence of cash flow on return on assets for the ‘low-NLB’ and ‘high-NLB’ separately. There are two outcomes which could be observed.

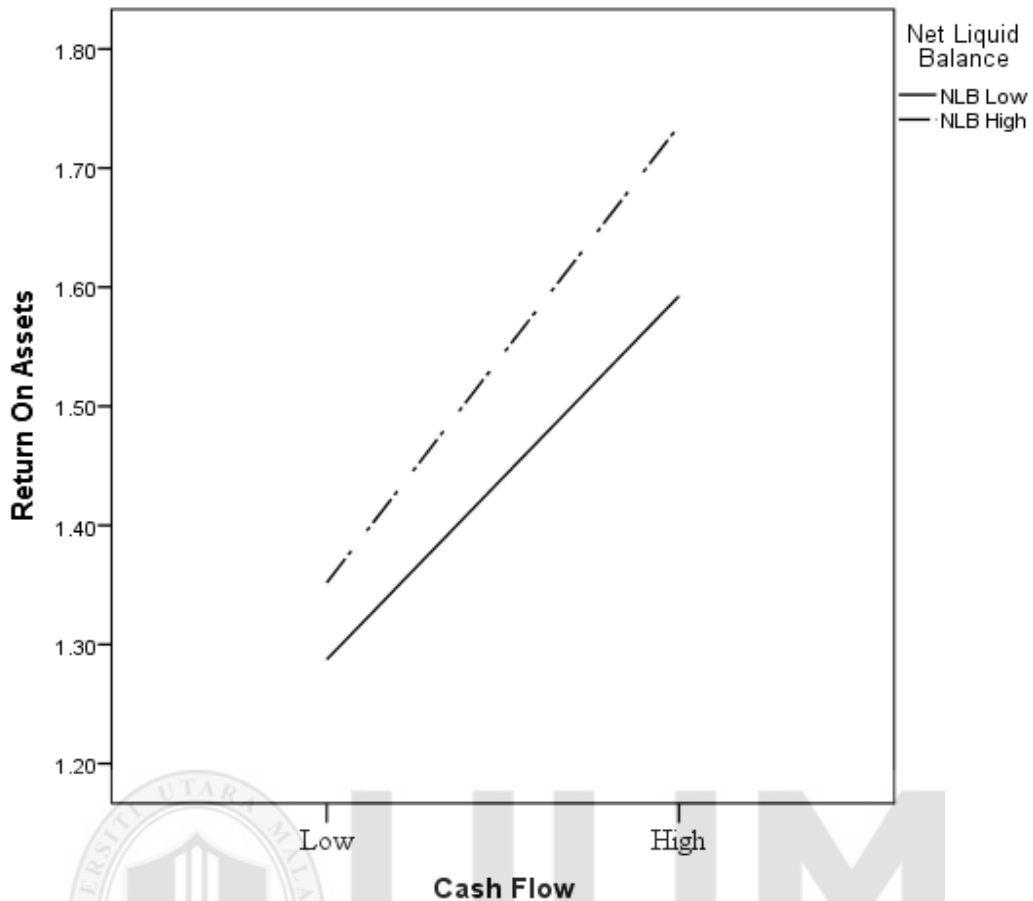


Figure 5.8  
*The moderation effects of NLB on the relationship between cash flow and firm performance*

Firstly, for ‘high-NLB’ which generates low cash flow appears to show a low level of ROA while ‘high-NLB’ which generates higher cash flow shows a high level of ROA. Similarly, for ‘low-NLB’ it seemed to be showing the same trend. Secondly, ‘low-NLB’ appears to have lower levels of ROA than ‘high-NLB’. This is obvious when the cash flow generation is low and declining.

Next, the analysis based on the guidelines in Table 4.8 (see [page 109](#)), the type of moderator which NLB is identified based on the interpretation in Table 5.25 shows that



it is a <sup>9</sup>pure moderator, which falls under quadrant 4 in Table 4.7. This specification variable modifies the form of relationship between cash flow and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

Table 5.25  
*Specification variable of CF\*NLB identification*

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model1	CF>>>ROA	0.099	0.099	25.489	0.000	25.489	0.000	**	
Model2	NLB>>>ROA	0.099	0.000	12.690	0.000	0.001	0.980	Not related to criterion & predictor	
Model3	CF*NLB>>>ROA	0.140	0.041	12.471	0.000	10.942	0.001	**	Interaction with criterion Pure moderator

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; CF:Cash flow; NLB:Net liquid balance

In conclusion, Figure 5.8 and Table 5.25 results have shown that NLB moderates the relationship between cash flow and firm performance. So, hypothesis 13 is supported.

The second independent variable of the key determinants of WC is leverage and in order to test the moderating effects of NLB on the relationship between leverage and firm performance, the hypothesis could be stated as,

**Hypothesis 14: NLB moderates the relationship between leverage and firm performance**

<sup>9</sup> Pure moderator refers to a type of moderator that modify the form of relationship between independent variable and independent variable.

The outcome of Figure 5.9 highlights the positive moderation (Table 5.24, see [page 154](#)) impact of leverage on ROA for ‘low-NLB’ and ‘high-NLB’ separately. There are two outcomes which could be noticed.

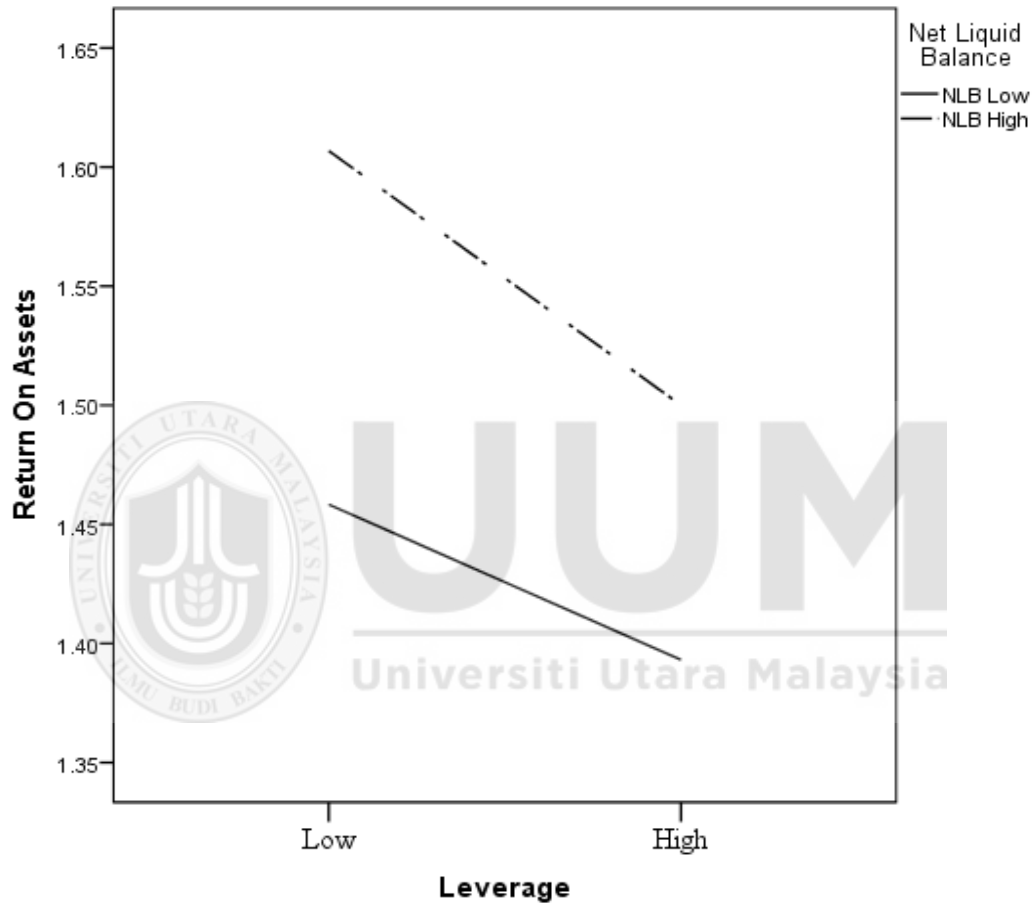


Figure 5.9  
*The moderation effects of NLB on the relationship between leverage and firm performance*

Firstly, for ‘high-NLB’ with low level of leverage tends to show a higher level of ROA but when ‘high-NLB’ firm leverage level is increase it shows a lower level of ROA. Similarly, for ‘low-NLB’ it seemed to be displaying the similar trend.

Secondly, ‘high-NLB’ appears to have higher levels of ROA than ‘low-NLB’.

Next, the analysis of the guidelines in Table 4.8 (see page 109), the type of moderator which NLB is identified based on the interpretation of Table 5.26, it is found to be a homologiser, which falls under quadrant 2 in Table 4.7. It influences the strength of relationship between leverage and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

Table 5.26  
Specification variable of LV\*NLB identification

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model 1	LV>>>ROA	0.025	0.025	6.391	0.012	6.391	0.012	*	
Model 2	NLB>>>ROA	0.025	0.000	3.198	0.043	0.028	0.866	Not related to criterion & predictor	
Model 3	LV*NLB>>>ROA	0.025	0.000	2.124	0.098	0.003	0.958	No interaction with criterion	Homologiser

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; LV:Leverage; NLB:Net liquid balance

Based on the Figure 5.9 and Table 5.26 results, these findings suggest that NLB moderates the relationship between leverage and firm performance. Hence, hypothesis 14 is supported.

The third independent variable of the key determinants of WC is sales growth and in order to test the moderating effects of NLB on the relationship between sales growth and firm performance, the hypothesis is stated as follows:

**Hypothesis 15: NLB moderates the relationship between sales growth and firm performance**

The result shown in Figure 5.10 demonstrates the positive moderation (see Table 5.24, page 154) influence of sales growth on return on assets for ‘low-NLB’ and ‘high-NLB’ separately. There are two outcomes which could be observed.

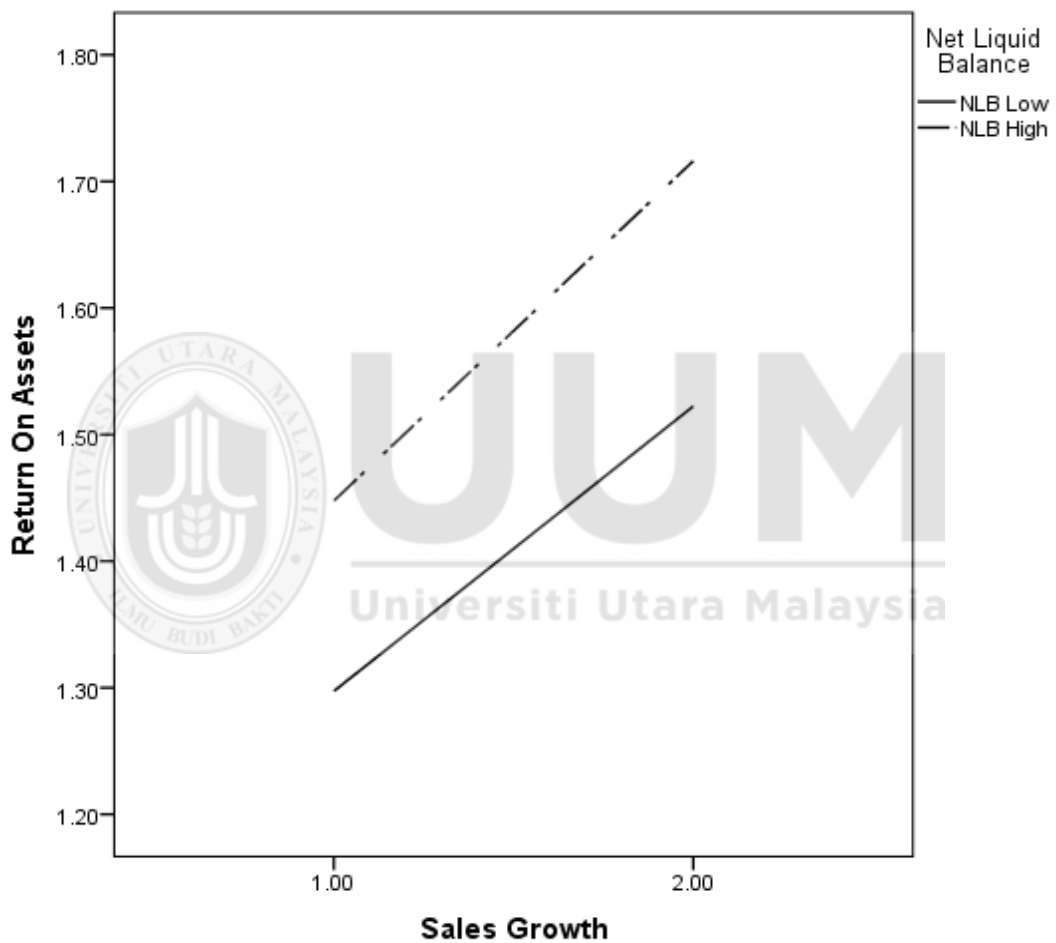


Figure 5.10  
*The moderation effects of NLB on the relationship between sales growth and firm performance*

Firstly, for ‘high-NLB’ which experience low sales growth appears to show a low level of ROA while- ‘high-NLB’ which experience higher sales growth shows a high level of ROA. Similarly, for ‘low- NLB’ it seemed to be showing the same trend.

Secondly, ‘low-NLB’ appears to have lower levels of ROA than ‘high-NLB’.

Next, the analysis of the guidelines in Table 4.8 (see [page 109](#)), the type of moderator which NLB is identified based on the interpretation of Table 5.27 it is found to be a homoligiser, which falls under quadrant 2 in Table 4.7. It influences the strength of relationship between age and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

Table 5.27  
*Specification variable of SG\*NLB identification*

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model1	SG>>>ROA	0.003	0.003	0.533	0.466	0.533	0.466		
Model2	NLB>>>ROA	0.016	0.013	1.602	0.204	2.667	0.104	Not related to criterion & predictor	
Model3	SG*NLB>>>ROA	0.017	0.001	1.130	0.338	0.197	0.657	No interaction with criterion	Homoligiser

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; SG:Sales growth; NLB:Net liquid balance

Based on the Figure 5.10 and Table 5.27 results, it can be suggested that NLB moderates the relationship between sales growth and firm performance. So, hypothesis 15 is supported.

The fourth independent variable of the key determinants of WC is size and in order to test the moderating effects of NLB on the relationship between size and firm performance, the hypothesis is stated as follows:

**Hypothesis 16: NLB moderates the relationship between size and firm performance**

The results of Figure 5.11 shows both ‘low-NLB’ and ‘high-NLB’ lines are lining in parallel position, it can be deduced that there is no influence of NLB on the relationship between size and ROA. Like a normal determinants, ‘low-NLB’ tends to show a low level of ROA, while ‘high-NLB’ shows a high level of ROA.

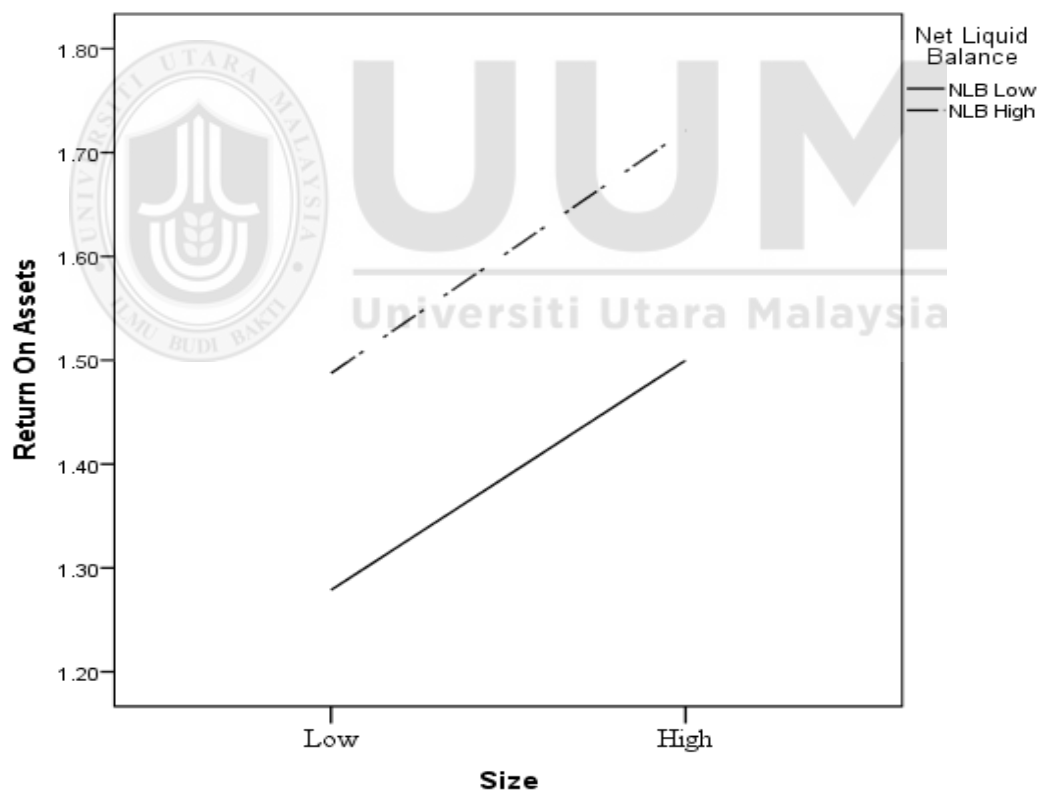


Figure 5.11  
*The moderation effects of NLB on the relationship between size and firm performance*

As explained by the guidelines in Table 4.8 (see page 109) NLB acts as a determinant and it reinforced the line graph findings, whereby it is found that NLB is not a moderator. It does not influence the relationship between size and ROA.

Table 5.28

*Specification variable of S\*NLB identification*

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model 1	S>>>ROA	0.003	0.003	0.829	0.363	0.829	0.363		
Model 2	NLB>>>ROA	0.023	0.020	3.042	0.049	5.241	0.023	*	Related to criterion & predictor
Model 3	S*NLB>>>ROA	0.025	0.002	2.191	0.090	0.499	0.480		No interaction with criterion Determinant or not moderator

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; S:Size; NLB:Net liquid balance

To conclude based on the Figure 5.11 and Table 5.28 results, there is no evidence to suggest that NLB moderates the size and firm performance. Instead NLB is a <sup>10</sup>determinant, which falls under quadrant 1 in Table 4.7. Hence hypothesis 16 is not supported.

The fifth independent variable of the key determinants of WC is age and in order to test the moderating effects of NLB on the relationship between age and firm performance, the hypothesis is stated as follows:

**Hypothesis 17: NLB moderates the relationship between age and firm performance**

<sup>10</sup> Determinant is not a moderator and it does not interact with the dependent variable but related to the independent variable.

The outcomes from Figure 5.12 exhibits the negative moderation (Table 5.24, see page 154) influence of age on ROA for ‘low-NLB’ and ‘high-NLB’ separately. There are two outcomes which could be noticed

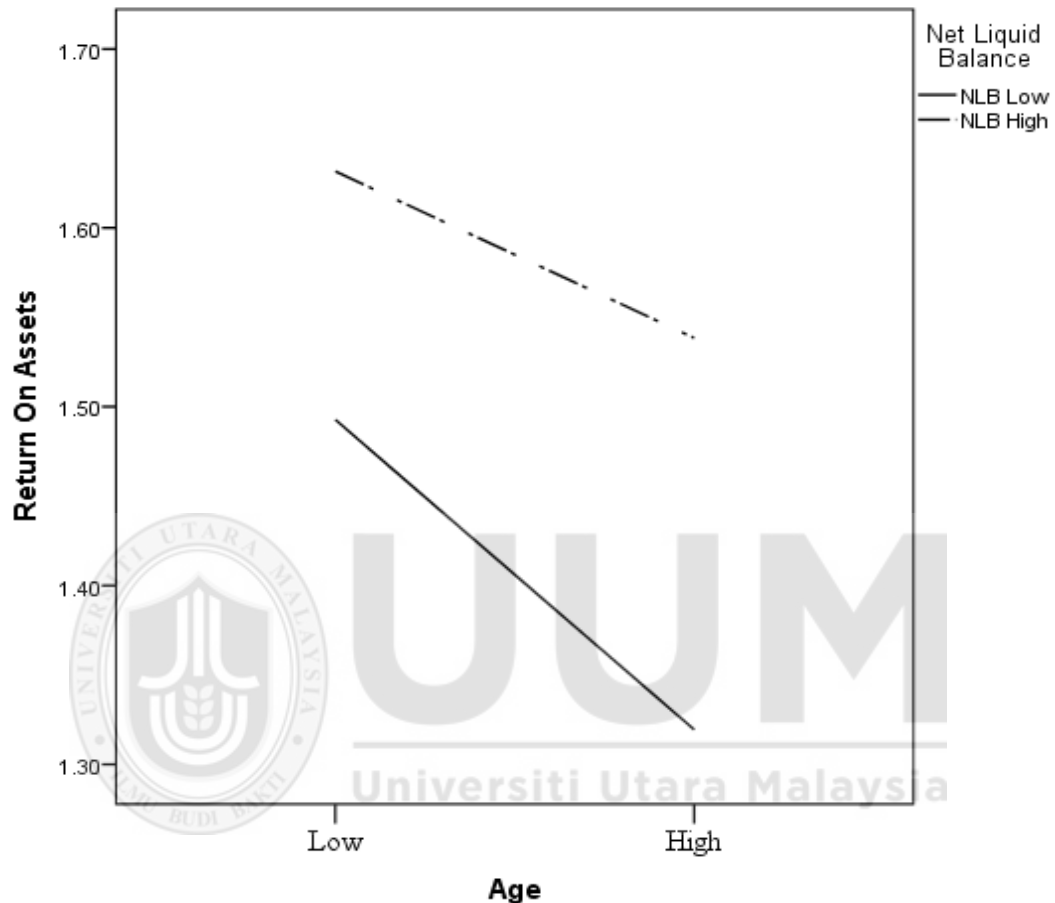


Figure 5.12  
*The moderation effects of NLB on the relationship between age and firm performance*

Firstly, for ‘high-NLB’ of younger age firms tend to show a higher level of ROA and ‘high-NLB’ of older age firms show a lower level of ROA. Similarly, for ‘low-NLB’ it seemed to be displaying the similar trend.

Secondly, ‘high-NLB’ appears to have higher levels of ROA than ‘low-NLB’.



Next, the analysis of guidelines in Table 4.8 (see page 109) has shown the type of moderator which NLB is identified based on the interpretation Table 5.29, it is found to be a homoligiser, which falls under quadrant 2 in Table 4.7. It influences the strength of relationship between age and firm performance (Ahmad Zaidi, 2014; Bergkvist, 2004; Sharma et al., 1981).

Table 5.29  
*Specification variable of A\*NLB identification*

Model	Hierarchical	R Square	R Square Change	F Value	F Sig.	F Change	Significant of F Change	Interpretation	Level of interaction
Model1	A>>>ROA	0.025	0.025	6.605	0.011	6.605	0.011 *		
Model2	NLB>>>ROA	0.040	0.015	5.339	0.005	3.996	0.047	Not related to criterion & predictor	
Model3	A*NLB>>>ROA	0.041	0.001	3.621	0.014	0.216	0.643	No interaction with criterion	Homoligiser

\*\* Regression is significant at 0.01 level (2-tailed)

\* Regression is significant at 0.05 level (2-tailed)

ROA:Return on assets; A:Age; NLB:Net liquid balance

In summary, based on the Figure 5.12 and Table 5.29 results, this study indicates that NLB moderates the relationship between age and firm performance. So, hypothesis 17 is supported.

## **5.5 The major findings**

### **5.5.1 Restatement of research objectives**

As what have been discussed in chapter 1, despite research literature evidence of showing chronic and alarming statistics beholding firms' WCM, firms are still lacking the understanding of WCM function as a firm effective life-blood and nerve centre. In Malaysia context, the manufacturing sector accounts for 20.6% of Malaysia GDP. It is an important economic growth driver and wealth creator (Chang, 2012). As a result this study intends to firstly to identify a WCM model that explains the current WCM practices in the industry, secondly to investigate alternative measure of firm operating efficiency and liquidity position and thirdly, to examine the moderating roles of WCM in the industry.

Briefly, the study objectives are:

1. To evaluate the influence of WCM on the relationship between key determinants of WC and firm performance.
2. To investigate WCM as alternative measures of a firm efficiency, and liquidity position, and
3. To examine the moderating roles of WCM influence on the relationship between the key determinants of WC and firm performance.

### **5.5.2 Objective 1**

This research hypothesizes (hypothesis 1 and hypothesis 2) that the relationship between key determinants of WC and firm performance is moderated by WCR and NLB respectively. The findings have shown (Table 5.16, see [page 137](#) & Table 5.17,

see [page 139](#)) that these relationships are significant (F value is 0.000,  $p < 0.01$  for model 1, 2 & 3). This research concludes that these results showed that the research framework does form a contemporary WCM model. So, this outcome tends to answer research objective 1 whereby WCM moderates the relationship between key determinants of WC and firm performance.

This research has shown a fair range of how much of variance in firm performance (dependent variable) could be explained by the key determinants of WC and WCM considering the small sample of 282 companies involved in this study. In Table 5.16 (see [page 137](#)), model 1 has shown the key determinants of WC contributed 13.4% (variance in firm performance, while model 2 has shown the key determinants of WC together with moderator WCR have contributed 14.7% variance in firm performance. Lastly, model 3 has shown that the key determinants of WC and interactions have contributed 18.8% variance in firm performance. Likewise in Table 5.17 (see [page 139](#)), model 1 has shown the key determinants of WC contributed 13.4% variance in firm performance, while model 2 has shown the key determinants of WC together with moderator NLB have contributed 13.8% variance in firm performance. Lastly, model 3 has shown that the key determinants of WC and interactions have contributed 20.6% variance in firm performance. These double digit percentages of R square are considered significant since this study involved cross sectional data.

This finding supports corporate decision makers to adopt this contemporary WCM model in a more strategic, holistic and sustainable terms as it tends to overcome the ambiguity and piecemeal approaches in WCM models proposed by previous

researchers. Specifically, in this study WCM is position as a moderator and this affects the direction and/or strength of the predictors and criterion (Baron & Kenny, 1986).

Previous researcher like Afrifa (2013) who have adopted WCM as one of the predictors in his study found that WCM has insignificant effects on firm profitability. This finding reaffirmed Henseler and Fassott (2010) caution whereby any attempt to ignore the interacting affects could results in a model to be lacked of relevance.

The results confirmed configurational theory principle of 'fit' in describing WCM of listed manufacturing companies in Malaysia. It shows that optimal level of WCM changes with the key determinants of WC and once the degree of 'fit' is established, then a firm is able to maximize its firm performance. Since this theory is found to be applicable to listed manufacturing companies in Malaysia, it is anticipated that it will be applicable to the rest of the going concern firms elsewhere.

Furthermore, this research recognized that the research framework is supported by an undisputed underpinning theory. The configurational theory that underpins the research framework is able to account for the key determinants of WC-WCM relationship. So, using the key determinants of WC and WCM relationship it enhances the predictive power of firm performance.

This study could be considered as a pioneer research in examining the moderating role of WCM, so much so that it is endeavour that the key determinants of WC-WCM relationship will have a significant meaning to contemporary corporate executives and

members of corporate board of directors especially when their managerial roles are set to be proactive rather than reactive in the business environment (Lindow, 2013).

### **5.5.3 Objective 2**

The research finding for objective 2 is to investigate WCM as an alternative measure of a firm efficiency and liquidity position. The results (Table 5.15, see [page 135](#)) disclosed that only days sales outstanding (DSO) and net liquid balance (NLB) are significant to firm performance. As a result, it partially answers research objective 2 in determining alternative measurements of measuring a firm operating efficiency and liquidity position. This will be discussed further under the following hypothesis sub-headings.

#### **Hypothesis 3: Days sales outstanding (DSO) is negatively related to firm performance**

This study hypothesizes (hypothesis 3) that days sales outstanding (DSO) is negatively related to firm performance. The result (Table 5.15, [see page 135](#)) shows that DSO is significant at 0.003 ( $p < 0.01$ ) and the beta value is -0.0221. This result shows that when there is a reduction in the number of days for a firm to recoup the amounts owed by customers, the complementary effects is reflected with a similar increase in ROA. In this study, the magnitude of the beta value shows that one day reduction in the DSO period will increase ROA by 2.21 %.

Majority of previous research findings (Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Samiloglu & Demirgunes, 2008; Falope & Ajilore, 2009; Gill et al., 2010; Mathuva, 2010;

Karaduman et al., 2011), both in the developed markets and the emerging markets, have shown a negative relationship between DSO and firm performance. The finding of this research is consistent with these studies.

The descriptive findings (Table 5.14, see page 130) shows that the non-metallic mineral sector (106 days), electrical and electronic sector (102 days) and petrochemical sectors (94 days) have high values (>85 days) of days sales outstanding (DSO). These high values results are deduced when compared to the 'rough guide to acceptable ratios' (Table 4.4, see page 97) are considered as standard ratios. They are used to assess firms' efficiency in managing their WCM. It shows that these sectors within the listed manufacturing firms are not managing their WC efficiently. They are taking longer to collect their payments from their customers. Ceterius peribus, it may suggest that these sectors might not have sufficient cash to finance their short term obligations due to the extension of cash cycle. In contrast, the medical devices sector (47 days) and food & sustainable resources sector (55 days) have the shortest days sales outstanding (DSO) which indicates this sector is managing its working capital management (WCM) efficiently.

**Hypothesis 4: Days payable outstanding (DPO) is positively related to firm performance**

This study hypothesizes (hypothesis 4) that DPO is negatively related to firm performance. Previous studies (Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Falope & Ajilore, 2009; Karaduman et al., 2011; Sharma & Kumar, 2011) have concluded that DPO has a negative effect on the firm performance. This finding concurred with previous findings.

Deloof (2003) gave two possible reasons to explain this. Firstly, profitable firms pay their bills earlier and secondly, in the event if firms pay their bills late, they will not be entitled to any discount. Later, Baveld (2012) added another two more explanations for this deviation. Firms operating in developed market have higher access to capital market and they don't rely on suppliers' credit as a source of fund. Another reason of not adopting DPO as a source of funds is the possibility of losing business goodwill in the event if the firms could not meet their debts obligation on the due date. Thus it has become a norm practice in listed manufacturing in Malaysia. This may explain why DPO does not have any significant impact on firm performance.

**Hypothesis 5: Inventory turnover ratio (ITO) is positively related to firm performance**

This study hypothesizes (hypothesis 5) that ITO is positively related to firm performance. Previous researchers (Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Raheman & Nasr, 2007; Samiloglu & Demirgunes, 2008; Falope & Ajilore, 2009; Mathuva, 2010; Karaduman et al., 2011; Sharma & Kumar, 2011) have shown the number of inventory days have a negative influence on firm performance. Since ITO is measures in number of times while previous researchers' measurement is on no. of days, the finding of this study is consistent with previous studies but the association is not significant (Lazaridis & Tryfonidis, 2006; Ramachandran & Janakiraman, 2009; Afrifa, 2013).

The possible answer for this non significant phenomenon between ITO and firm performance was proposed by Sharma and Dhiraj (2009). They reasoned that manufacturing firms in practice do not micro manage their huge amount of low value stocks because it is not economical and unnecessary in the first place. Instead these manufacturing firms observe the Pareto theory approach of monitoring and managing only 20% of the total high value of stocks while the balance 80% of the stocks are manage in regular basis without much hassle. This could the reason why ITO does not have any significant impact on firm performance.

**Hypothesis 6: Working capital requirements (WCR) is negatively related to firm performance**

This study hypothesizes (hypothesis 6) that WCR is negatively related to firm performance. Various researchers in the developed markets have established a negative relationship between WCR and firm performance (Shin & Soenen, 1998; Wang, 2002; Deloof, 2003; Lazaridis & Tryfonidis, 2006; Garcia-Teruel & Martinez-Solano, 2007; Samiloglu & Demirgunes, 2008; Ujar, 2009; Karaduman et al., 2011). It means when a firm adopts a WCM policy with the lowest possible of accounts receivables (AR) and inventories (INV) and the maximum amount of accounts payable (AR) it will achieve the highest firm performance.

But in this study it shows a positive relation between WCR and firm performance. According to Gill et al., (2010) the explanation for the exception results might be due to nature of the monopoly manufacturing industries position which they examined in their



study. Sharma and Kumar (2011) also established a positive relationship between WCR and firm performance, which suggest that when firms loosen their control and monitoring of WCR, it will lead to higher firm performance.

The breakdown of WCR consists of components like DSO, DPO and ITO. Within this equation only DSO is showing significant result while DPO and ITO are showing insignificant results. This could explain the reason why WCR does not have any significant influence on firm performance.

**Hypothesis 7: Net liquid balance (NLB) is positively related to firm performance**

This study hypothesizes (hypothesis 7) that NLB is positively related to firm performance. The result (Table 5.15, see [page 135](#)) shows that NLB is significant at 0.010 ( $p < 0.01$ ) and the beta value is 0.166. The empirical finding from previous research (Nassirzadeh & Rostami, 2010) have shown that NLB has a positive effect on firm performance. The finding of this study has shown a similar positive outcome with firm performance. This indicates that manufacturing firms are keeping more liquid assets in order to maintain a positive NLB position.

The descriptive findings (Table 5.14, see [page 130](#)) in this study has shown that the engineering support sector shows the highest source of liquidity i.e. net liquid balance (NLB) = 0.11, while basic metal products sector records the lowest source of liquidity i.e. net liquid balance (NLB) = -0.15. This means that a positive net liquid balance (NLB) = 0.11 indicates that the engineering support sector has the financial flexibility

and liquidity in honouring its working capital requirements (WCR) commitments, while net liquid balance (NLB) = -0.15 value of net liquid balance (NLB) shows that basic metal products sector is totally dependent on external financing to fulfil its working capital requirements (WCR) commitments.

In summary, according to Sharma and Dhiraj (2009) firms that experience cash shortages is a common symptom for business failure while on the other extreme cash rich firms could failed if it could not capitalized business opportunities in order to maximize firm performance.

#### **5.5.4 Objective 3**

The research finding for objective 3 is to examining the moderating roles of WCM influence on the relationship between the key determinants of WC and firm performance. It was found that WCR moderates all the relationship between the key determinants of WC and firm performance. Except for firm size, it was also found that NLB moderates the relationship between the key determinants of WC and firm performance. Best to the researcher knowledge the moderating roles of WCR and NLB have yet to be explored in any of the previous studies in WCM.

The implications of WCM moderating effects will be discussed further using combined hypotheses under the following hypothesis sub-headings.

**Hypothesis 8: WCR moderates the relationship between cash flow and firm performance**

**Hypothesis 13: NLB moderates the relationship between cash flow and firm performance**

According to Wasiuzzaman and Arumugam (2013) any investment in working capital is positively influence by changes in operating cash flow as a result of the increase in cash holdings and short term investments.

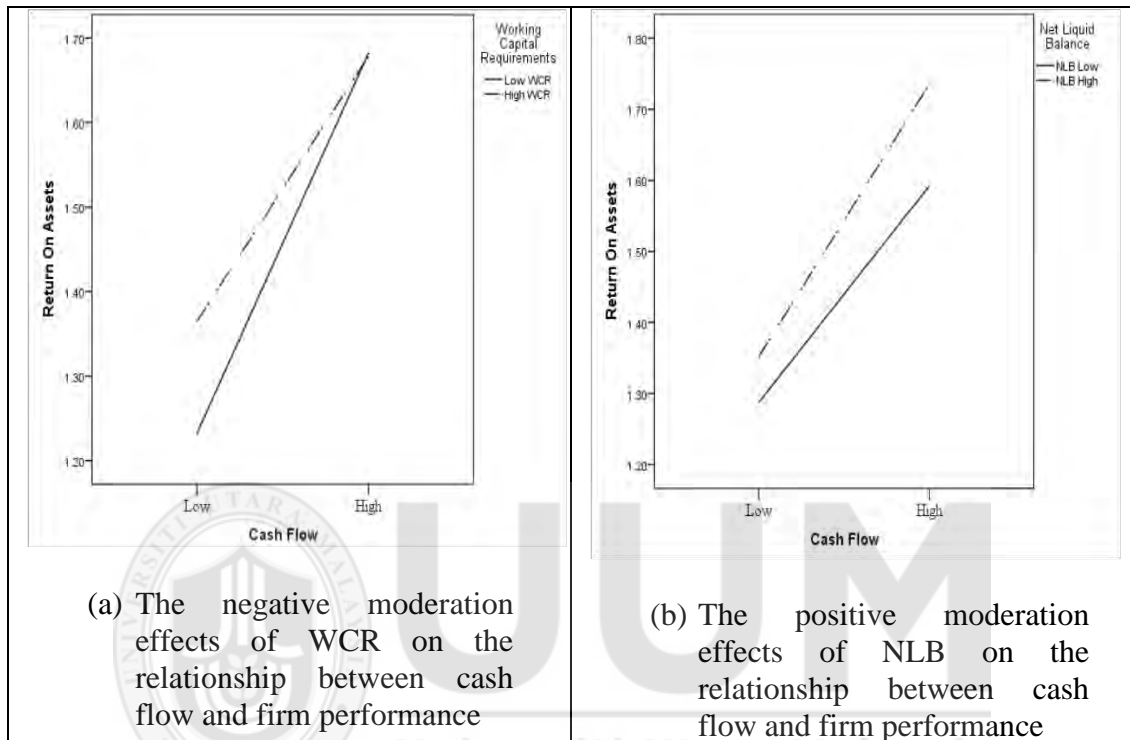


Figure 5.13  
*Comparison between WCR & NLB moderation effect on the relationship between cash flow and firm performance*

Figures 5.13 (a) and (b) above have shown common line graphs pattern. The graphs show that manufacturing firms would be wise to adopt a high level of cash flow in order achieve a better return on ROA when simultaneously pursuing moderation of ‘high-WCR’ and ‘high-NLB’ policy than vice versa. These findings are similar to findings which were found in firms operating in Taiwan by Chiou et al., (2006) and US manufacturing firms by Fazzari and Petersen (1993). This confirms that firms with huge capacity to create internal resources are able to adopting higher level of current

assets because of the cheap cost of funds invested in WC (Fazzari and Petersen (1993), cited in Banos-Caballero et al., (2010)).

**Hypothesis 9: WCR moderates the relationship between leverage and firm performance**

**Hypothesis 14: NLB moderates the relationship between leverage and firm performance**

As explained by Madhou (2011) highly leveraged firms have higher debt servicing expenses and more debt restrictive covenants. As a result low-leverage firms hold higher cash holdings than high-leverage firms. This indicates that low-leverage firms prefer to use internal cash holdings rather than debt as a source of finance.

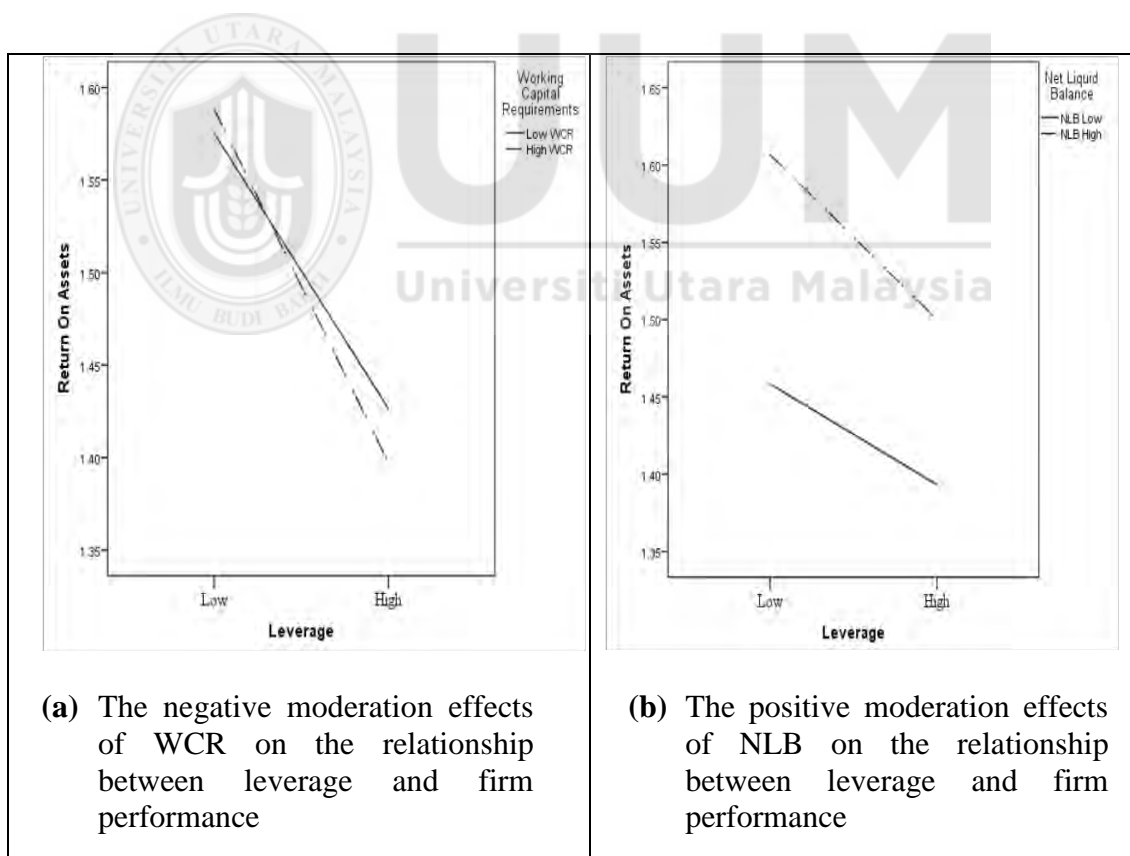


Figure 5.14

*Comparison between WCR & NLB moderation effect on the relationship between leverage and firm performance*

Figures 5.14 (a) and (b) above have shown a similar negative line graph direction. Manufacturing firms experiencing low leverage level should adopt moderation of 'high-WCR' and 'high-NLB' policy in order to maximise firm performance.

After a threshold of high leverage value, manufacturing firms would be prudent to switch from a 'high-WCR' to a 'low-WCR', while maintaining a high-NLB policy in order to maximize firm performance. These findings are similar to conclusion found by Chiou et al., (2006). This confirms that firms with high leverage level tend to incur higher cost of funds in maintaining WC because of risk premium involved.

**Hypothesis 10: WCR moderates the relationship between sales growth and firm performance**

**Hypothesis 15: NLB moderates the relationship between sales growth and firm performance**

Higher level of sales growth would generally involved in higher business transactions with suppliers. In return suppliers will offer better credit terms (Madhou, 2011).

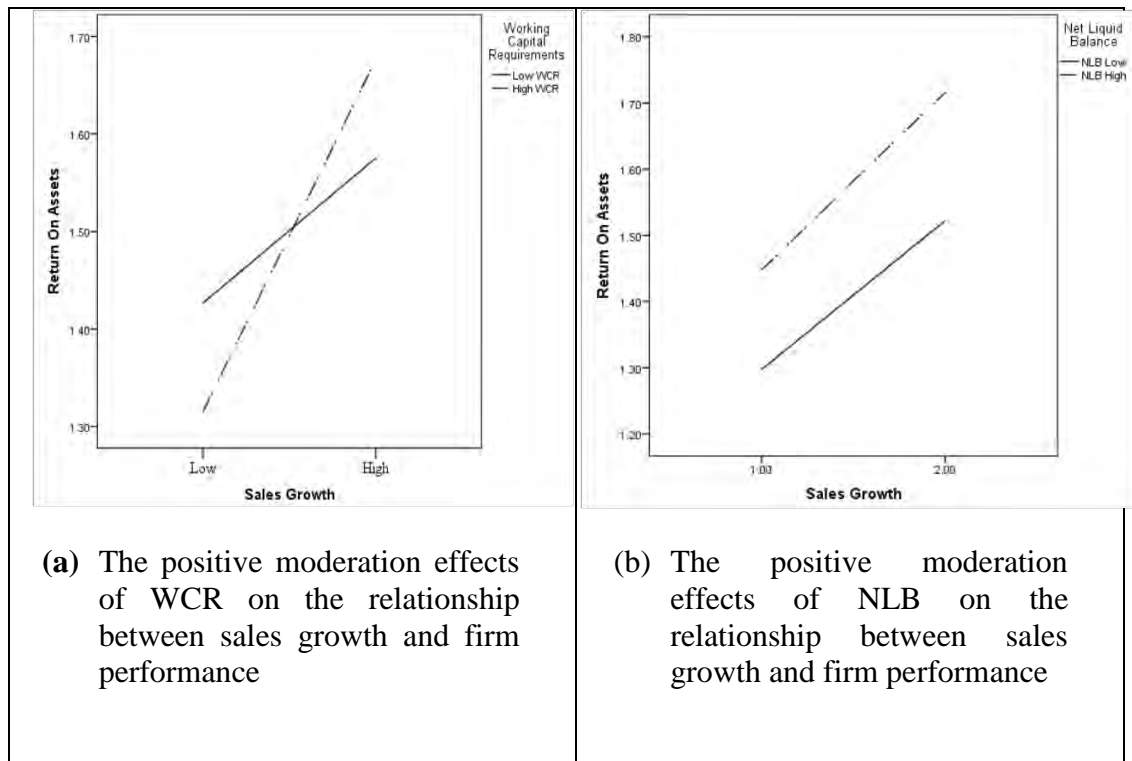


Figure 5.15  
*Comparison between WCR & NLB moderation effect on the relationship between sales growth and firm performance*

Diagrams 5.15 (a) and (b) have shown a similar positive line graph direction. During low level of sales growth manufacturing firms need to adopt moderation of ‘low-WCR’ and ‘high-NLB’ in order to maximize firm performance. The ‘low-WCR’ according to Emery (1987); Petersen, and Rajan, (1997) firms are extending longer credit terms to their customers in order to push up sales during low level of sales growth.

After a threshold of high sales growth manufacturing firms would be prudent to switch to moderation of ‘high-WCR’ and a ‘high-NLB’ approach in order to maximize firm performance. The reason is firms normally stock-up their inventories in anticipation of future sales increase (Kieschnick, LaPlante, & Moussawi, 2006). Moreover, when a firm has a high level of WC it is more agile to expand and improve its operations efficiently (Sharma & Dhiraj, 2009).

**Hypothesis 11: WCR moderates the relationship between size and firm performance**

**Hypothesis 16: NLB moderates the relationship between size and firm performance**

The low level firm size usually grants shorter credit term facilities to customers and invest heavily in inventories. However, the high level firm size grants longer credit term facilities to customers and low inventories level because they have easy access to funds (Chiou et al., 2006; Wasiuzzaman & Arumugam, 2013). The similarity between both of them is to delay payments to their suppliers (Madhou, 2011).

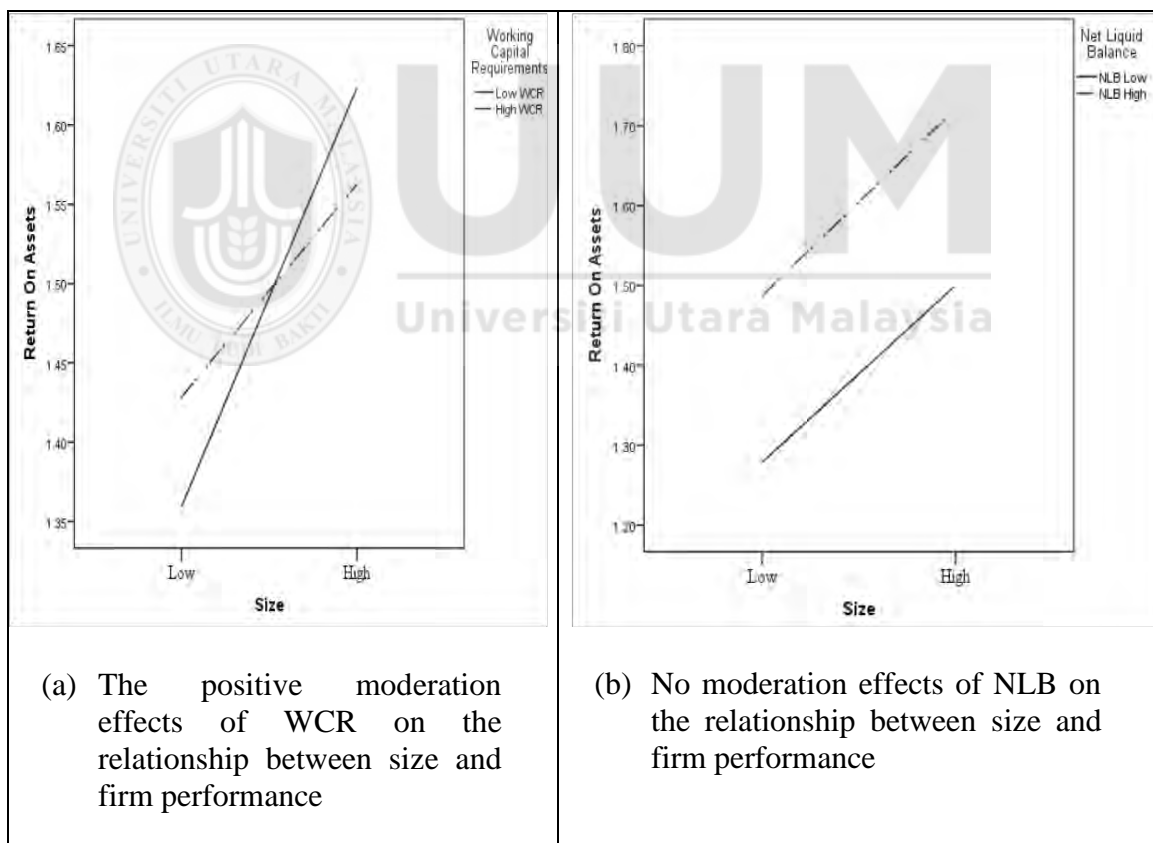


Figure 5.16  
*Comparison between WCR & NLB moderation effect on the relationship between size and firm performance*

Based on Figure 5.16 (a) and (b) it is recognized that moderation only exists in WCR but not NLB on the relationship between firm size and firm performance. According to Hill et al. (2010) firm size is equivalent to capital market access. In this study, all the manufacturing firms are listed and their sizes are substantial. These firms are subjected to comprehensive monitoring by market analysts this has resulted in less information asymmetry. All these listed firms have easy and flexible access to capital and less borrowing restrictions as compared to the unlisted firms. This could explain why NLB moderation influence is insignificant.

**Hypothesis 12: WCR moderates the relationship between age and firm performance**

**Hypothesis 17: NLB moderates the relationship between age and firm performance**

Young firms usually experience higher growth opportunities, while older firms experience stable growth rates with less growth opportunity (Chiou et al., 2006; Wasiuzzaman & Arumugam 2013).



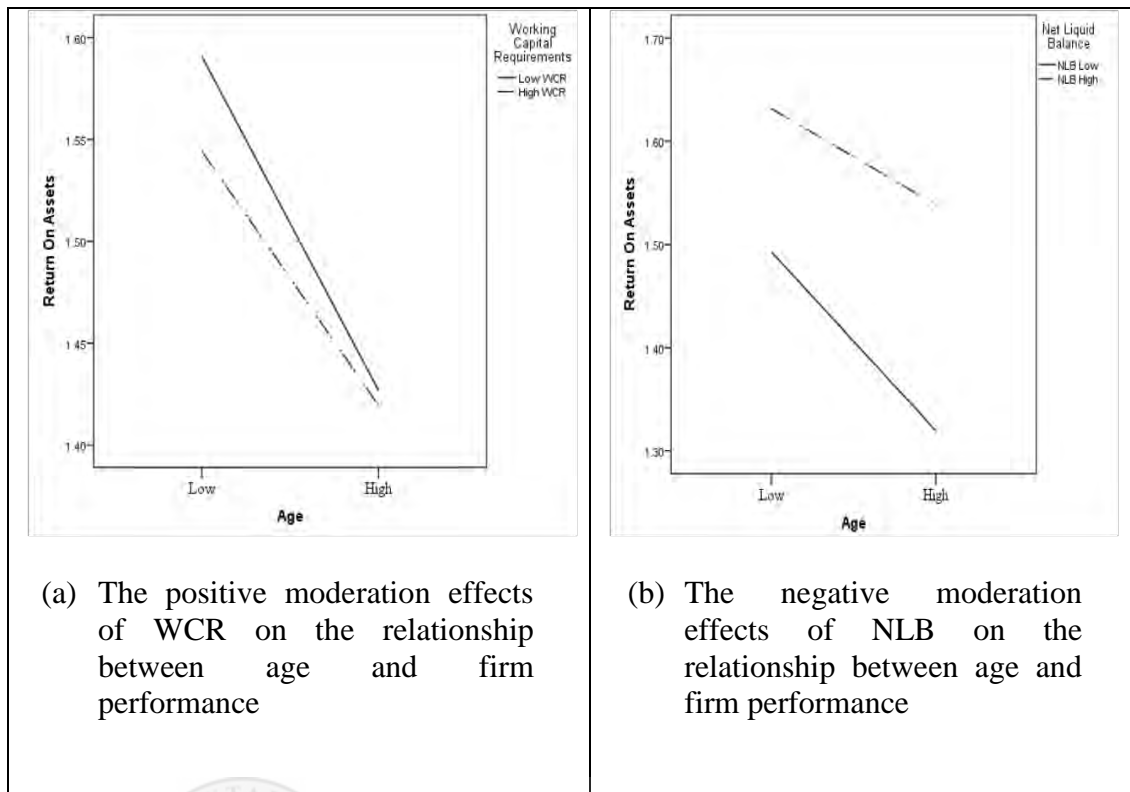


Figure 5.17  
*Comparison between WCR & NLB moderation effect on the relationship between age and firm performance*

Both Figure 5.17 (a) and (b) above have shown a common line graph pattern. So, as manufacturing firms' age it would be wise to pursue moderation of 'low-WCR' and 'high-NLB' in order to achieve a better return on ROA. For younger age firm, the level of 'low-WCR' increases ROA performance as compared to 'high-WCR'.

According to Wasiuzzaman and Arumugam (2013) as firms get older they established a strategic alliance with their debtors and creditors. Overtime they acquired the know how to manage their inventories prudently and they invest less in working capital. This explains why older age firms tend to keep lower WCR in order to maximize firm performance.

## 5.5 Summary

This chapter summarizes the outcome findings of this research concurrent with the research objectives. There are 17 hypotheses deduced in Chapter 4. The findings have shown that thirteen hypotheses were supported, while four hypotheses were not supported as highlighted in Table 5.30.

Table 5.30  
*Research objectives, hypotheses and results*

	Hypothesis	Result
Hypothesis 1 :	The relationship between key determinants of WC and firm performance is moderated by WCR.	Supported
Hypothesis 2 :	The relationship between key determinants of WC and firm performance is moderated by NLB.	Supported
Hypothesis 3 :	DSO is negatively related to firm performance.	Supported
Hypothesis 4 :	DPO is negatively related to firm performance.	Not supported
Hypothesis 5 :	ITO is positively related to firm performance.	Not supported
Hypothesis 6 :	WCR is negatively related to firm performance.	Not supported
Hypothesis 7 :	NLB is positively related to firm performance.	Supported
Hypothesis 8:	WCR moderates the relationship between cash flow and firm performance.	Supported
Hypothesis 9:	WCR moderates the relationship between leverage and firm performance.	Supported
Hypothesis 10:	WCR moderates the relationship between sales growth and firm performance.	Supported
Hypothesis 11:	WCR moderates the relationship between size and firm performance.	Supported
Hypothesis 12:	WCR moderates the relationship between age and firm performance.	Supported
Hypothesis 13:	NLB moderates the relationship between cash flow and firm performance.	Supported
Hypothesis 14 :	NLB moderates the relationship between leverage and firm performance.	Supported
Hypothesis 15 :	NLB moderates the relationship between sales growth and firm performance.	Supported
Hypothesis 16 :	NLB moderates the relationship between size and firm performance.	Not supported
Hypothesis 17 :	NLB moderates the relationship between age and firm performance.	Supported

It is important to specify the types of interaction because WCM could either influence the strength of relationship or modify the form of relationship between key determinants of WC and firm performance. The different types of moderation are referred to as specification variable and it is summarized in Table 5.31 below.

Table 5.31  
*Interaction relationship and specification variable*

No	Interaction Relationship	Specification Variable
1	The moderating effects of WCR on the relationship between cash flow and firm performance	Quasi moderator
2	The moderating effects of WCR on the relationship between leverage and firm performance	Homologiser
3	The moderating effects of WCR on the relationship between sales growth and firm performance	Homologiser
4	The moderating effects of WCR on the relationship between size and firm performance	Homologiser
5	The moderating effects of WCR on the relationship between age and firm performance	Homologiser
6	The moderating effects of NLB on the relationship between cash flow and firm performance	Pure moderator
7	The moderating effects of NLB on the relationship between leverage and firm performance	Homologiser
8	The moderating effects of NLB on the relationship between sales growth and firm performance	Homologiser
9	The moderating effects of NLB on the relationship between size and firm performance	Determinant or not moderator
10	The moderating effects of NLB on the relationship between age and firm performance	Homologiser

Best to the researcher knowledge, the current study is a first attempt to provide a new understanding of the types of interaction evolved from the moderation effects of WCM on the relationship between key determinants of WC and firm performance. Based on the Table 5.31, the present study makes noteworthy contributions to the existing literature.



## **CHAPTER 6**

### **IMPLICATION AND RECOMMENDATION**

#### **6.1 Introduction**

This chapter starts by discussing the research findings of this study, which is based on the three objectives set in chapter 1. The key aspects discussed cover theoretical implication, practitioner implication, and policy implication. It ends by looking into the recommendation for future study.

#### **6.2 Theoretical implication**

The outcomes of this study add to the existing body of knowledge, particularly in the interaction effects of WCM on the relationship between key determinants of WC and firm performance.

This study starts by adding to the existing literature by showing the relationship among firm characteristics, contingencies and firm performance of the configurational theory (CT) in Malaysia listed manufacturing companies. This study confirms the concept of fit is hold to exist when a firm is aligned with its environment, otherwise a misfit is said to exist (Miles & Snow, 2004). It starts by identifying the firm characteristics refer to as WCM, then follow the contingencies which include internal and external environments. In this study the contingencies are refer to as the key determinants of WC. In simple

term, an organization performance in effectiveness and efficiency is thus a function of the degree of 'fit' achieved between contingencies and firm characteristics (Lindow, 2013). Finally, once these requirements are achieved and in equilibrium (strategic fit), the firm performance will be naturally be maximized as predicted by CT (Faden, 2013).

Secondly, this study adds to the existing literature by establishing the variables that form contingencies in the basic fit model. These variables consist of popular explanatory variables commonly used by various researchers in different countries, which covered cash flow, leverage, sales growth, size and age. In this study these variables are identified as key determinants of WC.

These variables support the evidence whereby the variance 13.4 % (see Table 5.16, [page 137](#) or Table 5.17, [page 139](#)) value in estimating the true population value. Even though the predictive power of the model is small with 13.4% (R square) of firm performance could be answered by the key determinants of WC. Nevertheless, according to Maddala (2001) cited in Ghazali (2008), the main objective of any research should focus on the logical and theoretical relevancy of the predictive variables and the overall model significant rather than emphasizing on model with high adjusted R square value alone.

Thirdly, this research unlocked the 'black box' of WCM by identify it roles as moderating variable on the relationship between key determinants of WC and firm performance.

According to Sekaran and Bougie (2010) the presence of the moderator has a strong influence on the existing relationship between the predictors and the criterion. In simple term, it changes the initial relationship between the predictors and the criterion. This change, according to Baron and Kenny (1986) could either modify the strength and/or the direction of the relationship between the predictors and the criterion. The thorough studies of the moderating roles of WCM have been comprehensively examined in this study (see Table 5.31, see [page 183](#)). Based on all findings of line graphs and specification variable results, the moderation effects of WCM are supported.

Fourthly, this study adds to the existing literature by acknowledging that the components of working capital in the balance sheet of Malaysia listed manufacturing companies, can be split into two categories namely operational working capital and financial working capital (Rehn, 2012). Shulman and Cox (1985) officially use the term working capital requirements (WCR) and net liquid balance (NLB) to describe these two categories. This study supports fisher separation theorem.

Fifthly, this study identify that WCR could be further broken down into components that could be optimized and affects the firm operations. According to Gitman (1974); Faden (2013); Ding et al., (2013) these components are identified as days sales outstanding (DSO), days payable outstanding (DPO) and inventory turnover ratio (ITO) respectively.

Together with NLB, these ratios provide alternative measurement of a firm efficiency and liquidity position from a going concern perspective. These ratios complement the

traditional ratios e.g. net working capital, current assets to total assets ratio, current ratio and quick ratio.

### **6.3 Research implication**

The research framework of WCM (see Figure 4.1, page 80) established in this study enable management, owners and lenders to visualize this study framework. Crucially, the proposed research framework, where WCM moderates directly the relationship between the building blocks of the research model allows practitioners to understand the role played by WCM in firms and how to sustain its performance irrespective of the conditions in the industry context.

Specifically, it provides a comprehensive research framework for firm management to gain competitive advantage in terms of operational analysis, resource management and profitability. For the owners, this study framework furnish to the owners on how to maximise shareholders wealth in terms of investment return, disposition of earnings and market performance. As for the lenders, this study framework furnishes them with risk management in terms of liquidity, financial leverage and debt service.

#### **The management**

Firms listed on the stock exchange tends to have unlimited access to finance through equity, debt or the combination of both. However researches have shown that efficiency and effectiveness of managing WCM is important for firm management. This is because WCM affects profitability and risk of firms (Smith, 1980).



Shin and Soenen (1998) has reported a classical of America's leading retailing giants example of Wal-Mart and Kmart in terms of operational analysis, resource management and profitability. Both firms have the same capital structure (estimated 31% debt financing). The ratios of return on sales, assets and equity were 0.87%, 1.74% and 4.91% for Kmart and 3.25%, 10.1% and 24.9% for Wal-Mart respectively. Clearly, the difference in profitability was partially explained by the different WCR, drilled down to days sales outstanding (DSO) is 61 days for Kmart and days sales outstanding (DSO) is 40 days for Wal-Mart. The difference of 21 days addition applied to Kmart's 1994 turnover of \$34 billion at a 10% cost of capital results in saving of \$198.3 million a year. This explains the poor management of Kmart's WC which led to its demise.

Similarly, in this study it was found that days sales outstanding (DSO) is negatively related to firm performance and the result is significant (see Table 5.15, [page 135](#)). This result shows that when there is a reduction in the number of days for a firm to recoup the amounts owed by customers, the complementary effects is reflected with a similar increase in ROA.

This outcome can be interpreted in listed manufacturing firms where they should forge a strategic alliance with their customers in order to maximize its DSO. This strategic alliance forged between a firm and its customers create benefits like, firstly good acquaintances with its customers which enable firm to tailor made credit facilities for preferred customers. This reduces any chances of bad debt or delinquent customers (Martínez Sola, García-Teruel & Martínez Solano, 2012; Cheng and Pike, 2003). Secondly,

this good rapport with customers creates mutual trust that allow firm to grant additional credit facilities in order to increase sales.

Thirdly, any payment due from the customers is collected on time and this improves a firm ROA since it unlock cash tied-up in the operating cycle. A firm can utilize it to make bills payment in order to benefit from early payment discounts. Moreover, any excess free cash can be invested in profitable projects thus further improving a firm ROA. Fourthly, any reduction in DSO increases ROA value because firm does not need to incur funding costs in order to fund investment in customers (Martinez Sola et al., 2012).

The empirical finding from previous research (Nassirzadeh & Rostami, 2010) has shown that NLB has a positive effect on firm performance. Likewise the finding of this study is consistent with this study and it is significant (see Table 5.15, [page 135](#)). The NLB measurement ratio shows that a positive NLB indicates that a firm flexibility in meeting its WCR while a negative NLB shows that the firm is totally depending on outside financing in order to fulfil its WCR (Kleiman, 1992).

It is acknowledged that during crisis period, financial institutions impose a 'credit crunch' on a business and this will definitely put pressure on firms NLB position. This triggers the management of a firm to cut back on its investment including WCR and fixed assets respectively. Also, when liquidity is limited, firms focus on unlocking funds for the variety of different funding needs within a firm. The preference of internal

generated funds as a source of finance is in accordance to pecking order theory as suggested by Myers and Majluf (1984).

At a firm management level, the breakdown of WCM into WCR and NLB components is important in order to keep it from ballooning and thereby endangering the company's cash position.

In terms of financial strategy, WCR is an excellent source of cash, when properly managed. In most firms, there is constantly to search for a ready source of inexpensive funding for the firm. One of the best sources is WCR, consisting of accounts receivable, plus inventory, minus accounts payable. These are the "float" funds required to keep the business operating from day to day.

In the local context, Table 6.1 highlights the snap shot of the funds management report extracted from Hexagon Holdings Berhad (HHB) for May 2012. The 'Summary' section of the report shows the outstanding of group total receivables value of RM16.8 million as at 29.5.2012. By reducing the group total amount of accounts receivable and inventory by RM 3 million or extending the payment terms on accounts payable to 180 days, HHB can achieve a ready source of zero-cost cash in order to cover the group total short falls of RM 2.6 million. HHB aggressive working capital management may lead to negative WCR of RM 2.6 million. In such cases, the operating cycle serves as a source of funding for other assets.

Cash and short-term borrowings as components of the NLB are seen as financial decision variables with no strict correlation to operations. Cash levels and liquid securities can be adjusted with no direct impact on the operations of the firm. Since the NLB comprises only of highly liquid assets, it serves as a measure of the firm's liquidity. If operational requirements change, the NLB is usually affected. In the case of HHB, an increase in accounts receivable or inventory is then accompanied by a decrease in the NLB to bridge the gap. A decrease in the NLB can, however, be avoided if the company is able to successfully boost accounts payable at the same time.

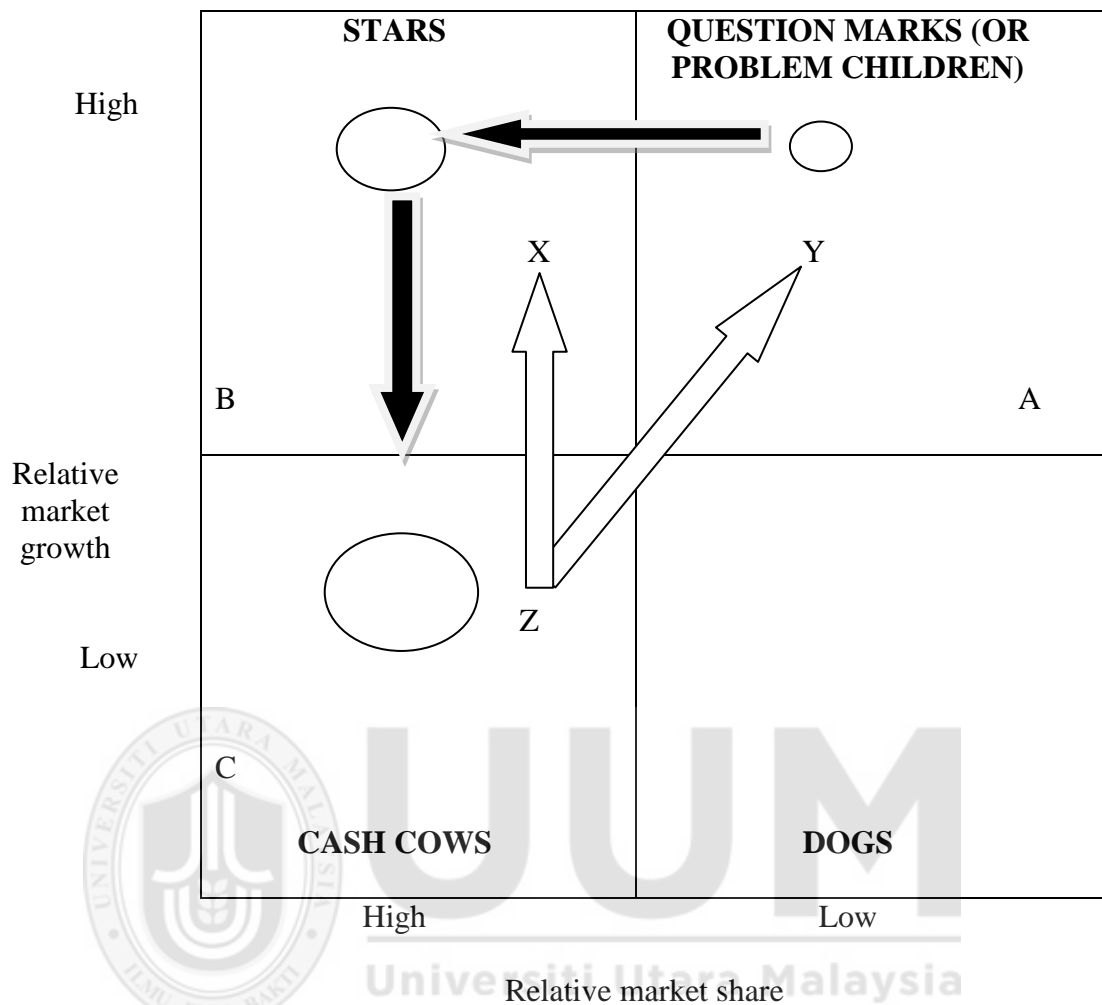


Table 6.1  
Funds management report extracted from Hexagon Holdings Berhad for May 2012

	Engineering Company				Technologies Company	Distributors Company	Manufacturing Company	Servicing Company	Group Total	
	Nilai Branch	Penang Branch	Ipoh Branch	Johor Bahru Branch						Total
	RM	RM	RM	RM	RM	RM	RM	RM	RM	
<b>DEBTORS AGING</b>										
Current (info only)	2,523,313	1,888,664	279,064	868,087	5,559,128	525,367	1,806,379	1,150,863	0	9,041,737
Overdue:										
30 to 90 days	1,370,194	1,126,944	341,898	301,252	3,140,288	615,639	2,061,067	1,548,833	5,400	7,371,227
Less: Week collection	(329,274)	(519,388)	0	(54,593)	(903,255)	0	(81,445)	(437,402)	0	(1,422,102)
	1,040,920	607,556	341,898	246,659	2,237,033	615,639	1,979,622	1,111,431	5,400	5,949,125
91 to 180 days	622,590	46,373	8,404	45,359	722,726	498,018	1,163,579	494,038	0	2,878,361
Less: Week collection	0	(13,937)	0	0	(13,937)	0	(266,497)	(37,098)	0	(317,532)
	622,590	32,436	8,404	45,359	708,789	498,018	897,082	456,940	0	2,560,829
> 180 days	1,835,476	441,662	37,503	25,372	2,340,013	519,006	625,932	5,006,063	0	8,491,014
Less: Week collection	0	(2,484)	0	0	(2,484)	0	(19,863)	(82,536)	0	(104,883)
	1,835,476	439,178	37,503	25,372	2,337,529	519,006	606,069	4,923,527	0	8,386,131
<b>Summary:</b>										
Overdue as at 22.5.2012	3,828,260	1,614,979	387,805	371,983	6,203,027	1,632,663	3,850,578	7,048,934	5,400	18,740,602
Less: Week collection	(329,274)	(535,809)	0	(54,593)	(919,676)	0	(367,805)	(557,036)	0	(1,844,517)
<b>Balance overdue - 29.5.2012</b>	<b>3,498,986</b>	<b>1,079,170</b>	<b>387,805</b>	<b>317,390</b>	<b>5,283,351</b>	<b>1,632,663</b>	<b>3,482,773</b>	<b>6,491,898</b>	<b>5,400</b>	<b>16,896,085</b>
<b>Total collection for the month of May</b>										
Week : 1.5.2012 to 9.5.2012	548,584	422,927	581,063	240,015	1,792,589	20,143	490,162	86,652	0	2,389,546
Week : 12.5.2012 to 16.5.2013	657,119	1,703,748	67,029	4,738	2,432,634	93,094	419,127	287,116	0	3,231,971
Week : 18.5.2012 to 23.5.2014	1,211,291	44,830	68,599	17,739	1,342,459	0	313,491	195,238	0	1,851,188
Week : 22.5.2012 to 29.5.2015	329,274	535,808	0	54,593	919,675	0	367,805	557,036	0	1,844,516
Total collected	2,746,268	2,707,313	716,691	317,085	6,487,357	113,237	1,590,585	1,126,042	0	9,317,221
Monthly operational cost	(2,644,188)	(1,273,229)	(238,272)	(423,143)	(4,578,832)	(336,200)	(1,560,385)	(3,628,300)	(343,000)	(10,446,717)
<b>Surplus/Shortfall (A)</b>	<b>102,080</b>	<b>1,434,084</b>	<b>478,419</b>	<b>(106,058)</b>	<b>1,908,525</b>	<b>(222,963)</b>	<b>30,200</b>	<b>(2,502,258)</b>	<b>(343,000)</b>	<b>(1,129,496)</b>
<b>CREDITORS AGING</b>										
Current	441,523	292,525	381,264	170,516	1,285,828	15,140	490,162	67,632	0	1,858,762
30 to 90 days	487,229	1,304,658	37,025	2,778	1,831,690	83,054	319,124	211,113	0	2,444,981
91 to 180 days	1,011,291	34,850	51,599	15,739	1,113,479	0	215,491	155,200	0	1,484,170
> 180 days	249,274	415,808	0	44,513	709,595	0	257,815	511,032	0	1,478,442
Proposed payment (B) ( > 180 days)	249,274	415,808	0	44,513	709,595	0	257,815	511,032	0	1,478,442
<b>Surplus/(Shortfall) : (A) - (B)</b>	<b>(147,194)</b>	<b>1,018,276</b>	<b>478,419</b>	<b>(150,571)</b>	<b>1,198,930</b>	<b>(222,963)</b>	<b>(227,615)</b>	<b>(3,013,290)</b>	<b>(343,000)</b>	<b>(2,607,938)</b>

One of the significant findings of this research is the interaction role of WCM in assessing the suitability of strategies for manufacturing firms. This could be examined using the Boston Consulting Group's (BCG) portfolio matrix. The basic logic of BCG is the relative market share is linked directly to cash generation and firm profitability. The vertical axis refers to growth rate of the market at which each business or product is targeted. Cash cows quadrant is related to businesses with high relative market share and low growth require little investment and generate lots of cash. Question marks (or problem children) quadrant indicates a follower positioning in a growth market. These businesses require large amounts of cash to turn them into stars. Stars might be able to fund their own development because they have a leading share position in their markets. Dogs' quadrant is likely to be cash users, or cash neutral and to have no prospect for improvement.

The portfolio matrix position provides a good and objective indication in supporting corporate decision makers to adopt WCM in a more strategic, holistic and sustainable terms.



Legend:


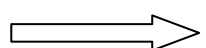
-  Product movement (A to B to C representing the product life cycle)
-  Cash movement (from product z to x and y)

Figure 6.1

*Strategic movements of market portfolio*

Source: Strategic management accountancy and marketing (1995)

Figure 6.1 shows the strategic movements of market portfolio where a product place in the matrix is not fixed for ever. The rate of growth of the market, though normally

outside the control of firm management, should take into account in determining strategy.

Ceteris paribus, during low level of sales growth as question marks (problem children) in quadrant A, manufacturing firms need to adopt holistic strategy of WCM by adopting 'low-WCR' and 'high-NLB' (hypotheses 10 and 15 outcomes) in order to maximize firm performance. The firm 'low-WCR' strategy is consistent with the low market share, while the 'high-NLB' is investing in capital expenditure in order to build market share in the future.

As question marks move to a threshold of high sales growth, it reaches the stars in quadrant B. Next, manufacturing firms would switch WCM strategy to 'high-WCR' and 'high-NLB' (hypotheses 10 and 15 outcomes) in order to maximize firm performance. Manufacturing firms which maintain 'high-WCR' which involved stocking-up their inventories in order to expand and also extending their longer credit terms to their customers in order to push up sales in the hope of increasing their market share. Also, firms are keeping 'high-NLB' for capital expenditure investment in order to maintain their market share.

Subsequently stars tend to move vertically downwards as the market growth rate slows to become cash cows in quadrant C. The WCM strategy remains at 'high-WCR' and 'high-NLB' (hypotheses 8 and 13 outcomes) in order to maximize firm performance.



The 'high-WCR' strategy is to maintain existing market share, while the firm 'high-NLB' strategy is to invest the cash they generate can be used to turn problem children into stars, and eventually cash cows.

Question marks not selected should be managed to generate cash until they become dogs. In the dogs quadrant, the WCM strategy suggested is to pursue moderation of 'low-WCR' and 'high-NLB' (hypotheses 12 and 17 outcomes) in order to achieve a better return in firm performance. The firm 'low-WCR' strategy is consistent with the low market share, while the 'high-NLB' is the results of adopting strategies to generate short term profits or as a result of divestment.

### **The owners**

The owners' and/or the potential investors perspective of a firm operation is the maximization of shareholders through value creation. This could be partly explained by the efficiency and effectiveness of a firm in managing its WCM in an operating cycle where the timing, execution and appraisal of the operation results which meet the firm objectives. Cash flow resulted from the turnover of WC key components release money from their internal operations rather than profits reported in the income statement of a firm (Walker, 1964).

In this study it is revealed (see Table 5.18, [page 141](#) and Table 5.24, [page 154](#)) that cash flow is significant ( $p < 0.01$ ) with different levels of WCR and NLB and it influences the firm performance.

Emphasized are owners and/or potential investors are interested to know whether firms have the capacity to create internal generated cash flow since it is a cheap cost of financing and key to its long term survival. Crucially, WCR and NLB are alternative measurements of a firm efficiency and liquidity position of a going concern.

Therefore, these measurements complement existing traditional ratios (e.g. networking capital, current assets to total assets ratio, current ratio and quick ratio) as they furnished useful information to owners in their evaluation of a firm health conditions. The following example exemplifies such application.

In September 2005, Kuok group through Gaintique Sdn Bhd purchased 12.97 million shares or 18.2% in Hexagon Holdings Berhad at RM1.65 per share (or RM 21.41 million of purchase consideration). Seven years later, in 2012 Kuok group divested all the shares in Hexagon Holdings Berhad (presently delisted) for an average price of RM 0.20 per share (or RM 2.59 million), ([klsehotnews.blogspot.my](http://klsehotnews.blogspot.my) Online, January 10, 2012). The decision to divest all the shares in Hexagon Holdings Berhad could be further explained by the WCR and NLB measurements.

Table 6.2 shows the financial values and ratios extracted from Hexagon Holdings Berhad (HHB) annual reports from 2000 to 2011. Based on the general financial information and the traditional working capital ratios, prima facie HHB seemed to be operating normally. But when we analyze further using Shulman and Cox (1985) WCM measurements it shows a different picture.

Table 6.2

*Financial values and ratios extracted from Hexagon Holdings Berhad (HHB) Annual Reports from 2000 to 2011*

Financial analysis	Unit	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
<u>General financial information</u>													
Sales	RM'mio	111.48	162.25	107.81	100.37	135.98	180.01	219.91	269.65	403.00	350.79	414.27	346.69
Fixed deposits with licensed banks	RM'mio	1.98	1.69	3.00	2.86	3.40	1.89	2.02	2.72	5.94	6.28	0.00	0.00
Cash and bank balances	RM'mio	4.42	4.07	4.94	1.86	5.70	9.87	9.91	18.98	19.09	27.14	27.89	64.56
Total Debt/Total Assets	Ratio	0.84	0.78	0.75	0.85	0.85	0.76	0.68	0.72	0.70	0.71	0.72	0.83
Short Term Debt/Total Assets	Ratio	0.74	0.69	0.68	0.79	0.82	0.71	0.62	0.50	0.53	0.57	0.61	0.76
<u>Traditional working capital ratios</u>													
Net working capital	RM'mio	(6.64)	2.89	1.86	(15.29)	(12.92)	(3.94)	4.69	(50.92)	(76.01)	(79.19)	(52.12)	1.58
Current assets to total assets ratio	Ratio	0.67	0.73	0.69	0.68	0.74	0.74	0.60	0.67	0.73	0.75	0.73	0.75
Current ratio	Ratio	0.91	1.03	1.03	0.81	0.88	1.04	0.97	1.33	1.37	1.31	1.20	1.00
Quick ratio	Ratio	0.08	0.07	0.11	0.06	0.09	0.12	0.09	0.14	0.12	0.13	0.11	0.20
<u>Shulman &amp; Cox (1985) approach</u>													
Working capital requirements (WCR)	RM'mio	29.61	34.62	37.01	26.31	36.30	40.20	52.61	88.67	140.93	190.58	216.18	165.10
Net liquid balance (NLB)	RM'mio	(36.26)	(31.72)	(35.15)	(41.61)	(49.22)	(36.26)	(57.30)	(37.75)	(64.92)	(111.39)	(164.06)	(166.68)
Days sales outstanding (DSO)	Days	145.63	120.11	140.13	123.24	127.04	102.11	118.28	138.54	118.54	152.23	199.97	208.42
Days payable outstanding (DPO)	Days	85.32	113.42	98.59	97.58	96.32	77.88	76.24	82.80	76.26	76.37	70.29	108.59
Inventory turnover ratio (ITO)	Ratio	6.88	5.16	3.62	3.95	4.44	5.30	5.21	3.90	3.32	2.32	6.18	5.35
<u>Rough guide to acceptable ratio (Cyllid Cymra Finance, 2004)</u>													
DSO: Low = < 55 days; Average = 55-85 days; High > 85 days													
DPO: Low = < 45 days; Average = 45-60 days; High > 60 days													

Briefly, WCR figures from 2000 to 2011 is positively high which shows that HHB is investing substantial resources in its operating cycle and it shows that the HHB is not managing its WC efficiently. Also, the NLB figures from 2000 to 2011 reveal a negative NLB which indicates that the firm is totally dependent on external financing to fulfil its WCR obligations (Kleiman, 1992). This is supported by the total debt/ total assets and short term debt/total assets ratios from the year 2000 to 2011.

What is worrying is the deterioration in the days sales outstanding (DSO), which is hovering above 102 days. While it is not unusual to have some customers dragging out the settlement of their debts to 4-5 months, HHB's debtors seemed to be setting a new precedent. A longer than usual DSO raises concern about quality of some of the trade debts. Poor quality of high DSO coupled with high leverage is a serious sign of danger. Since HHB's debts are mostly short-term debts as shown in the ratios total debt/total assets and short term debt/total assets, any banker recalling its facilities could trigger a default.

NLB is helpful to owners as it shows asymmetric information on the possibility of potential dividend payouts by the firm to shareholders or repurchase of any outstanding shares. In addition, NLB indicates to the firm owners how much fund is reinvested in the business because it affects current and future business results and potential return to their investment. But in the case of HHB, the NLB indicator from the year 2000 to 2011 indicated a negative position. Since NLB consists of the difference between a firm cash plus marketable security and short term borrowings, HHB is totally dependent on external financing to fulfil its WCR. Under these circumstances we can conclude that

any chances of potential dividend payment or repurchase of any outstanding shares is remote.

### **The lenders**

Historically, the management and owners of firms are concern about firm business as a going concern. While bond investors and financial institutions orientation are toward formulating risk management by firstly supplying funding to well manage businesses that have good tracking records and secondly the possibility of business default and bankruptcy.

Bond investors and financial institutions needed to decide and formulate risk management in their lending decisions. Harley (2010) asserted that risk management was the most crucial lesson learnt from the recent GFC. Banks and lending institutions need to prudent in their lending because, firstly they are only entitled to regular interest payment and principal and none of rewards of a successful businesses. Secondly, without any outset collaterals or as secured creditors, they rank as general creditors. As a caution, these lenders are looking into the margin of safety on the assets own by the firm, in the event of a default.

Traditionally, bond investors and financial institutions depend heavily on external credit rating agencies e.g. Moody's, Standard and Poor's and Fitch for an independent risk assessment of a firm. These lenders could complement the credit ratings result by examining thoroughly the analysis of a firm's WCR and NLB separately.

The findings of this study shows (see Table 5.18, page 141 and Table 5.24, page 154) that firm age is significant ( $p < 0.05$ ) with different levels of WCR and NLB. The evidence suggests they influence firm performance. These findings are consistent with the past literature (Bertrand & Mullainathan, 2003; Loderer & Waelchli, 2010; Afrifa, 2013) which has shown that age is a predictor of a firm performance.

Traditionally, firm age shows the total number of years which a firm has been operating as a going concern entity. For young set-up firms, majority of them are inexperienced as a new market entrant which curtail their ability to generate profit. They are subjected to steep learning curve in apprehending trade secret practices of the business cycles of the market. The gap within the learning curve involved costly mistakes which results in wastages of business resources and might erode firm profitability. At the extreme end it might result in bankruptcy.

Under these circumstances, these institutions can utilize the NLB and WCR measurements to ascertain whether a potential firm is either facing bankrupt or in distress of undercapitalized situation. In a normal business condition, they can use NLB and WCR to provide benchmarks against other organizations liquidity and efficiency and the possibility of extending any bridging loans to these young firms.

Likewise, older firms inherited and suffered the 'liability of obsolescence' syndrome as they are unable to adapt and fit to cynical nature of business environment. It is acknowledged that during crisis period, the assumption is all stocks would have no value. In the short term, for these older firms, banks and financial institutions need to access the quality of the collectables from DSO and the firms NLB position. This is

true when liquidity is limited and firms tend to focus on unlocking funds from DSO and NLB as funding needs within a firm. Once these due diligence is carried out, the banks and financial institutions is able to further extent their existing loan financing or withdraw them all together.

## **6.6 Policy implication**

The recent survey based on Cashfac Operational Index has revealed that majority of Malaysian firms do not have access to a real-time systems, which can merged and consolidated the view of the group cash position. The data shows that 71.9% of Malaysian firms do not have any sight of their immediate cash positions (The Malaysian Insider Online, 2015, May 10).

This study has identified that cash flow, days sales outstanding (DSO) and net liquid balance (NLB) to be significant factors in driving firm performance. So much so that manufacturing firms should invest in a real time system that is able furnish to decision makers the group cash position at any particular point in time.

It has been highlighted earlier where WC decisions are routine in nature and reversible overtime. In order to measure and control WC decisions, it requires a prompt online feedback system which is expensive and costly to maintain. In the short run, since WC decisions are insignificant any investment in dynamic online analyses system is counterproductive. The investment in a real time system could easily cost firm to incur millions of capital investment in order to purchase software and hardware systems. Based on the findings of Chen (2001) the total cost of investment in online feedback

system could range from 2% to 3% of a firm total turnover. In monetary term, it could be translated into two million Ringgit Malaysia to four million Ringgit Malaysia for small firms and above one billion Ringgit Malaysia for a large firm (Chen, 2001).

The government could mitigate in this situation by allowing manufacturing firms investing in this real time systems to claim the capital expenditure as reinvestment allowance incentive granted under Schedule 7A of Malaysia Income Tax 1967. The existing rate of the reinvestment allowance is 60% on the qualifying capital expenditure and is granted in addition to capital allowances. The reinvestment allowance is used to reduce up to 70% of statutory income of the manufacturing firms from its business source. The incentive period for reinvestment allowance is 15 years from the first year of claim by a firm. Moreover this incentive does not require prior approval from any of the authorities in Malaysia.



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## **6.7 Recommendation for future study**

### **6.7.1 The use of PLS-SEM technique**

It is well known that PLS-SEM approach is regularly used in psychology, sociology, education and marketing survey-based research but not in finance and economics (Saarani & Shahadan, 2012). Interestingly, contemporary academicians (Ittner, Larcker, & Rajan, 1997; Papadopoulos & Amemiya, 2005; Lee, Petter, Fayard & Robinson, 2011) are increasing adopting PLS-SEM used in secondary data research. The pioneers in adopting SEM into corporate finance included Titman, et al., (1988) and Maddala and Nimalendran (1995). The earlier was involved in the study of determinants of



capital structure, while the later was involved in examining the effect of earnings on stock prices. Similarly, contemporary researchers (Chiarella, Pham, Sim & Tan, 1992; Jairo, 2008; Chang, Lee & Lee, 2009) have conducted similar studies in capital structure determinants using SEM techniques under different context in Australia, UK & US respectively.

Most of the studies to date believed that SEM techniques present a better solution to the traditional multivariate regression analysis models especially in acknowledging and reducing measurement and specification errors inherited in research studies.

Advancing from the methods adopted by researchers in previous WCM research study, Saarani and Shahadan (2012), propagated the used of second generation of multivariate analysis (Fornell, 1987) called Partial Least Square-Structural Equation Modelling (PLS-SEM) in their study on WCR for firms in Malaysia. In parallel, future study should expand Saarani and Shahadan (2012) approach by using variance based PLS-SEM estimation technique in testing one complete model of WCM using casual relationship between variables and supports latent variables.

The controversy surrounding multiple ratios being used as observable indicators in order to measure latent variables could be addressed by adopting three major viewpoints of financial performance that includes management, owners (investors) and lenders & creditors. Table 6.3 can clarify and minimize this controversy.

Table 6.3  
*Performance measures by area and viewpoint*  
 Source: Adopted from Helfret (2001)

Management	Owners	Lenders
<u>Operational analysis</u>	<u>Investment return</u>	<u>Liquidity</u>
Gross margin	Return on total net worth	Current ratio
Profit margin	Return on common equity	Acid test
EBIT, EBITA	Earnings per share	Quick sale value
NOPAT	Cash flow per share	
Operating expense analysis	Share price appreciation	
Contribution analysis	Total shareholder return	
Operating leverage		
Comparative analysis		
<u>Resource management</u>	<u>Disposition of earnings</u>	<u>Financial leverage</u>
Asset turnover	Dividends per share	Debt to assets
Working capital management	Dividend yield	Debt to capitalization
Inventory turnover	Payout/retention of earnings	Debt to equity
Accounts receivable patterns	Dividend coverage	
Accounts payable patterns	Dividends to assets	
Human resource effectiveness		
<u>Profitability</u>	<u>Market performance</u>	<u>Debt service</u>
Return on assets (after taxes)	Price/earnings ratio	Interest coverage
Return before interest and taxes	Cash flow multiples	Burden coverage
Return on current value basis	Market to book value	Fixed charges coverage
EVA and economic profit	Relative price movements	Cash flow analysis
Cash flow return on investment	Value drivers	
Free cash flow	Value of the firm	

The SPSS R square measurement of how much variance in the criterion is explained by the predictors in the research model is similarly present in PLS. It's identified as R square or coefficient of determination. Briefly, coefficient of determination measures the extent of variation of endogenous latent variable is explained by the exogenous latent variables within the inner model or structural model (Breiman & Friedman, 1985).

It is generally agreed that R square value needs to be substantially high in order to have a minimum level of explanatory power of the research model (Chin, 1998). The SPSS F tests that are commonly used to compute the significance of each added variable or a set

of variables, to the explanation reflected in R-square changes. Similarly, in PLS this is calculated using effect size or  $f$  square which involves the impact of an independent latent variable on a dependent latent variable (Chin, 1998; Andreev, Heart, Maoz, & Pliskin, 2009; Henseler, Ringle & Sinkovics, 2009). Effect size is derived by calculating the increase in R square of the latent variable when a path is connected, in relative to the latent variable portion of the unexplained variance.

### **6.7.2 WCM influence on firm performance during crisis period**

It was revealed by Beveld (2012) where there were limited researchers who have attempted to carry out any study on the influence of WCM on firm performance during crisis period. The section below shows the limited published works carried out by researchers to date on the relationship between components of working capital (WC) and firm performance during the crisis period.

#### **Problems faced by firms in crisis period**

In the UK, it was revealed the business spends considerable amount of time in managing their WC in recessions, especially banking crisis when firms suffered credit crunch as a result of banks capping the availability of credit (demand side of the economy). In the short term, it will exert pressure on the business WC position (Fernandez-Corugedo, McMahon, Millard & Rachel, 2011).

Likewise, the impact of recession on the supply part of the economy is where the financial sector heightened the cost of raising money for business and this will increase the overall cost of financing. The spillover of uncertainty in payments by debtors may

influence firms to delay production and possibly impact on employment until the economy recovered (Fernandez-Corugedo et al., 2011).

### **Accounts receivable (AR) and firm performance**

Subservient to the problems faced by firms during recession, Regupathi and Zainudin (2003) examined the average collection period (ACP) during different economic conditions (crisis and non crisis) in Malaysia listed companies. Their results have shown firstly, the trade credit was collected more promptly before, than after the financial crisis of 1997, and, secondly, generally for all industry sectors, the financial crisis did not have any influence of company size on ACP. The summary of the research is shown as per Table 6.4.

In details, Regupathi and Zainudin (2003) identified that there is a relationship between company size and ACP which is dependent on industry sector but not economic condition or crisis. In the consumer products, industrial products and constructions sectors, ACP is negatively correlated with company size, where these firms in these sectors have the resources to collect debt promptly.

Table 6.4  
*Effects of Industry Sector, Economic Condition and Company Size on Average Collection Period*

Dependent Variable	Independent Variable	Category 1	Category 2	Result Signal	
Average Collection Period (ACP)	Industry sector		Plantation	Lowest	
			Consumer products	Average	
			Trading & services, mining & technology	Average	
			Property	Above average	
			Industrial products & construction	Highest	
		Economic condition	Crisis (1997)		Low
			Non-crisis		High
		Company size	Crisis (1997)	Plantation	+ve correlated
				Consumer products	-ve correlated
				Trading & services, mining & technology	Independent
				Property	Independent
				Industrial products & construction	-ve correlated
			Non-crisis	Plantation	+ve correlated
				Consumer products	-ve correlated
				Trading & services, mining & technology	-ve correlated
				Property	Independent
	Industrial products & construction			-ve correlated	

Source: Adapted from Regupathi and Zainudin (2003)

In the same study, there were two anomaly observed by the authors, where firstly in the plantation sector, where there is a positive correlation between ACP and company size. The authors' explanation is the plantation sector firms are in mature or declining market and financially stable. They are able to extend credit to their respective customers, and secondly in the trading & services, mining & technology and property sectors, ACP is independent of company size. This means that the speed of trade credit collection is not connected with company size.

Study conducted by Baveld (2012) on public listed firms in Netherland has found inconclusive results in the relationship between AR and firm performance in time of crisis. They can only conclude that the relationship between AR and firm performance might have changed in times of a crisis as the firms did not minimize their AR.

### **6.7.3 Larger firms size acting as a source of trade credit**

Based on the existing literature review there were inconclusive evident that trade credit is seen as a substitute to short term bank borrowing.

Starting in the US, there was unanimous evidence during crisis period where cash rich firms extend their trade credit to their customers through accounts receivable (Meltzer, 1960; Brechling & Lipsey, 1963; Laffer, 1970; Schwartz, 1974; Ramey, 1992; Kohler, Britton & Yates, 2000; Yang, 2011). Thereon, in Japan, Taketa and Udell, (2007) found little evidence to support that trade credit was substituting bank short term loan which was not available to firms during crisis period. Instead they found out that trade credit channel is complimenting existing bank lending channel.

But in the United Kingdom, Pike et al., (2001) found out that during crisis period firms reduce their trade credit to their customers because of their potential defaults. Unexpectedly, in Malaysia, Regupathi and Zainudin (2003) identified that there no relationship between firms average collection period (ACP) and economic condition or crisis. Separately, in The Netherlands, it was revealed by Baveld (2012), study on how large public listed firms in The Netherlands managed has found out that during the crisis period of 2007 extended their trade credit to their customers.

#### **6.7.4 GDP**

In a turbulent economic environment, macro economic factors like GDP played an important role in firms' investment allocation in trade credit and inventories (Smith, 1987; Walker, 1991). When an economy is in a state of recession, any firm planned expansion may be retarded, due to slower debt collection or an increase in firm inventories level as a result of slower sales (Lamberson, 1995; Chiou et al., 2006). This could be translated into a higher WCR level for firms as a result of the poor state of the economy (Chiou et al., 2006). Likewise, firms will tend to reduce the WCR during economic expansion (Manoori, & Muhammad, 2012). Therefore, it is expected that GDP is negatively related to WCR.

In dissentient, there are views whereby during economic expansion, financing is easily available. Firms are not concern about the level of WCR. Instead, during a economic recession, firm tends to minimize the level of WCR (Banos-Caballero, et al., 2010; Lamberson , 1995).

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