ARE BUSINESSES BECOMING MORE EFFICIENT THROUGH TIME? TESTING THE CHANGE IN WORKING CAPITAL REQUIREMENTS ACROSS ECONOMIC SECTORS

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ABSTRACT

This study tests the efficiency of businesses through time by examining their working capital requirements. These represent the funds needed to conduct daily business operations. So many changes occurred in the last two decades have presented many changes that have helped businesses to better conduct their operations. The key to these changes was the use of technology and the Internet. The availability of these tools at affordable cost helped their wide spread utilization among corporations and small businesses. In addition, the adoption of technology was one of the critical components of success for large corporations in the global economy. The efficiency of using resources is among the major factors in defining the success of these businesses. With efficiency, fewer resources are used to conduct a business or produce a product. The hypothesis of this study is to examine if there has been a significant reduction in working capital requirements as a result of the increase of efficiency; the study examines the efficiency across the nine economic sectors to control the type of business activity. The output of the study shows that there has been significant evidence that businesses today, across different economic sectors, are relatively pledging fewer resources in working capital than they used two decades ago.

Keywords: efficiency, quality, information technology, communication, global economy, working capital, Internet, and economic sectors.

INTRODUCTION

The purpose of this study is to examine if businesses are becoming more efficient in using their resources though time. The study investigates one area, which is the usage of resources to finance the daily operations of businesses. There have been many changes that marked the last two decades; with no doubt the advancement of technology and the introduction of Internet are among the most significant ones.

There were so many factors that affected efficiencies and of no doubt technology is cited as one of the main drivers. Technology has transformed society and our lives by making our daily transactions (paying bills, shopping, banking) more convenient. It has also facilitated communication by making distance irrelevant and the cost of human interactions negligible. Furthermore, technology has fostered development in many fields such as business, government,

education, transportation, and communication. From the early 1980's to date, a vast evolution and revolution of information technology has taken shape in our world. Information technology has rapidly become the "backbone of commerce" (Carr, 2003). Indeed, Melville, Kraemer, and Gurbaxani (2004) continue to find that IT is a valuable component for organizational performance.

In the 80's, organizations began to understand how to benefit from adopting information technology to enhance their value chain, thereby improving relationships between the organization, suppliers, and customers and providing internal and external competitive advantages. The trend continues today, as evidenced by Tallon, Kraemer and Gurbaxani (2000) who find that executives understand information technology implementations benefit firm value chains. Since then, the advancement of information technology has outpaced the innovation of physical processing technologies lowering the cost of information technology. This affordability made the use of information as a competitive advantage more available to all businesses (Porter & Millar, 1985). When at one time information technology and its related costs were considered a necessary evil, today information technology is considered the lifeline of most businesses (Swanson & Ramiller, 2004).

The next sections of the study deal with the literature review, research methodology, data analysis, study limitations, conclusions and recommendations.

LITERATURE REVIEW

The benefits of technology are clearly visible in business. It helps them employ relevant practices and promotes firm progress. Zhu (2004) finds that IT positively benefits firms with regard to sales, inventory management, and cost minimization. Similarly, Bharadway (2000) finds that firms with greater information technology implements fare better with regards to profitability and performance.

In communication, IT brings speed, clarity, and proximity at virtually no cost. Research continuously indicates that information technology reduces communication costs and promotes informational efficiencies and congruence within firms (Brynjolfsson and Hitt, 2000; Dewett and Jones, 2001).

The benefits of information technology are clearly visible in electronic-learning; with it, students are able to take control and manage their own learning processes, charting courses at their own pace and obtaining immediate feedback. Interactions and information gathering are also facilitated via chat platforms, discussion boards and e-libraries. Zhang et al (2004) find that technology fosters a more flexible learning environment for the changing face of students today, while Arbaugh (2000) concludes that information technologies promote student participation. In addition, information technologies are of great help to students with learning disabilities and students in remote locations.

Finally, technology has reshaped healthcare by allowing physicians and patients to interact in a secure environment to discuss sensitive issues. Physicians can also follow-up on patients and provide advice using social networks. Bates (2002) finds that the additional use of information technology can help improve healthcare quality and promote operating efficiencies in medicine.

Similarly, Shekelle, Morton, and Keeler (2006) conclude that healthcare information technologies provide for a safer medical environment and allow for more efficient management of tasks and patients.

As evidenced, there are many studies that evaluate the effectiveness of technology. Hitt et al. (2006) highlighted the role of technology as a major source of information, essential for business success. Bettis and Hitt (1995) argued that new constructs and approaches are needed to understand the requirements for success in the new competitive landscape. Makri et al (2010) suggested that the integration of science and technology serves as a good indicator of firm's synergy, providing a base for future research and changes in managerial practices.

Pflughoeft et al. (1996) discussed the use of an intelligent knowledge base simulator that reduces mean flow time and tardiness; when compared to the more common scheduling, it proved to be a more useful tool by facilitating good solutions for the decision-maker. Kant and Sridharan (1998) investigated scheduling information in materials requirement planning that will exploit the capabilities of modern computer technologies. Their results showed that improvements could be accomplished but would be influenced by the operating environment. Parker (1998) pointed out that advanced planning is achieved by technologies. It is clear that scheduling systems have evolved from local stand-alone tools into a more shared environment such as Enterprise Resource Planning systems. Parker (1996) highlighted the dynamics of production scheduling and he argued that it is more complicated than the game of chess. He added that most experts agree that regardless of the level of technological tools, manufacturing resource planning, and materials requirement planning, just-in-time (JIT), total quality management (TQM), Enterprise Resource Planning, the integration of information technologies such as knowledge-based systems, intelligent decision-support systems, and solver technologies are the key to managing inventory. Umble, Haft, and Umble (2003) also state that ERP and information technologies promote firm unity and streamline business transactions

As for Alavi and Leidner (2001), they defined the components of advanced information technologies to include the Internet, intranets, extranets, groupware, data warehousing, data mining, intelligent software agents, and workflow systems. They added that advanced information technologies can be used to acquire, capture, organize, transfer, and apply knowledge. According to Wiig (1999), knowledge management promotes the development and application of strategies that leverages firm capabilities and intellectual assets to attain the enterprise's ultimate goals, ascertains profitability and ensures long-term viability.

The advantages in information technology were not limited to hind sighted views of technological improvement and advancements. In fact, Michael E. Porter, a Harvard professor of business strategy, and Victor Millar, a managing partner in 1985 of Arthur Andersen and Company, partnered in a 1985 collaborative effort to inform the world of the then emerging changes that would impact the lives of businesses and individuals across the world.

In his books, Michael Porter (1980, 1985) discusses competitive strategy and competitive advantage and how they both impact and are impacted by the value chain. Porter and Millar (1985) use the theories of Porter (1980, 1985) in association with information technology to illustrate how a company can obtain advantages over their competitors by improving links to

external parties (i.e. suppliers and customers). The initial basis for the importance and power of information and information technology is justified initially by Porter and Millar.

Porter and Millar (1985) addressed the issue of how information could transform the nature of competition. In order to comprehend how advances in information technology (IT) affect competition and provide sources of strategic competitive advantage, managers must envision IT in a broad sense. It is vital that the organization understand the information their business creates, as well as the extensive spectrum of integrated technologies that are available to process the information (Haag *et al.*, 2005). Organizations that obtain such broad understanding are positioned to enhance their competitive force in three ways: 1) providing the organization the capability to change the industry structure thus altering the rules of competition, 2) giving the organization new ways to outperform their rivals, and 3) producing the ability for new businesses frequently extending from the organizations existing operation (Porter & Millar, 1985).

Additionally, Porter understood that information gives the organization the capability to change the industry. This requires an understanding of the forces that collectively determine industry profitability. These five forces include: the power of buyers, the power of suppliers, the threat of new entrants, the threat of substitute products, and the rivalry among existing competitors (Porter, 1979). The effects of information technology can alter each of the competitive forces, thus opening the structure of many industries, altering the attractiveness of industry creating a need and opportunity for change (Porter, 1980). For example, information technology increases the power of buyers in industries assembling purchased components by making it easier for buyers to evaluate sources of materials and make-or-buy decisions. To further illustrate, from a supplier power perspective, information technology creates barriers to entry by often requiring large investments in complex and more advanced technology (Porter & Millar, 1985). Banks desiring to compete in online banking services need advanced software and hardware to give customers online banking services. This advanced technology need creates a barrier to entry for other emerging banks that are smaller and find it impractical to invest in such costly IT (Haag et al., 2005). Another example involves the threat of new entrants. From a flexibility and agile manufacturing standpoint, computer-aided design and computer-aided manufacturing systems have influenced the threat of substitution by giving customers product modification capability creating customized products in a more expedient and efficient manner (Porter & Millar, 1985).

Another way in which information creates a competitive advantage, according to Porter and Millar (1985) is by giving the organization new ways to outperform their rivals. Cost reduction by use of information is the first of three ways in which organizations can outperform rivals. Historically, the only way in which information technology was used to impact cost (in the form of data processing) was to reduce repetitious information processing, such as accounts payable or accounts receivable (O'Brien, 2005). Today information technology goes far beyond those barriers of limited efficiency gains extending into practically all areas of organizations providing goods and services (Porter & Millar, 1985). For example, barcode scanners used in grocery and other retail shopping stores have increased the efficiency of the checkout process. This cost saving idea has now led to self-checkout stations, as well as grocery carts equipped with wireless scanners which scan the items as customers put them in the cart. This process not only decreases cost, but also improves customer satisfaction. Albertson's Chief Technology

Officer, Bob Dunst, notes that "our customers tell us they feel they save 15 to 20 minutes in a shopping trip" (Higgins, 2004). In addition to cost reductions, IT alters cost drivers of activities improving the organization's overall cost position.

Besides cost, the impact of information technology on organization's differentiation tactics aids organizations to outperform their rivals. These differentiation tactics are often achieved by bundling information with physical products or embedding information systems in the physical product itself (Porter & Millar, 1985). EMC Corporation exhibits their differentiation strategy by incorporating information technology to monitor and service their primary product – data storage systems. EMC accomplishes this by building in a variety of sensors into their storage systems which measure conditions of the operating environment, such as temperature, vibration, and technical performance. More than 1,000 diagnostics are performed routinely on EMC storage systems. Whenever these diagnostic tests fail, the storage system automatically calls the EMC support call center, taking a proactive measure to avoid failure of the storage system. More than 80 percent of the 4,000 calls received at the call center come from EMC storage systems. When a call is received, the problem is either resolved remotely, or a technician is sent on-site to make the repairs needed (Scott & Garvey, 2000). By providing superior proactive service, EMC uses information to outperform rivals.

Organizations also use information to their advantage to change their competitive scope and thus outperform their rivals. Advances in information technology create relationships within industries that previously did not exist (Porter & Millar, 1985). For example, Enterprise Resource Planning systems utilize advances in both communication and information technologies to not only connect the functional areas in organizations, but also connect the suppliers of goods and services with both customers and suppliers. This improved means of system integration and communication provides faster customer response times, faster order fulfillment times, and better overall communication in addition to cost reduction and added value (Davis & Heineke, 2005).

Information technology alters competitive scope by breaking geographical barriers enabling globalization in trade. Organizational activities can be coordinated locally, regionally, nationally, or globally with suppliers, customers, or other internal organizational units (Porter & Millar, 1985). Dell Computer utilizes information technology to change the competitive scope within their respective industry on many fronts. Offering world-wide online order capability for customized systems through their website and 24/7 customer support by virtue of their online knowledge management systems, Dell utilizes information to support their business to customer competitive strategies. Dell's use of information technology has been essential in achieving the fundamentals of its business model - direct sales and build-to-order. Information technology also provides valuable insights to Dell on how IT can be applied to achieve speed and flexibility in an industry in which time is critical (Kraemer *et al.*, 2000).

According to Porter and Millar (1985), the use of information provides for the creation of new business and industries in three ways. First, information technology provides the foundation which makes new businesses technologically feasible (Porter & Millar, 1985). Con-Way NOW, a small unit of transportation giant CNF, is making a niche for the freight industry by utilizing a global positioning system (GPS) to provide a new cross country guaranteed long haul freight

service.   Con-Way NOW bases this new business on one simple guarantee: when you book a shipment (typically heavy long haul freight) that shipment will arrive at the time promised, anywhere in the continental United States. This guarantee differs from that of UPS, FEDEX, and other freight companies in that it is directed toward long haul heavy freight. The GPS provides valuable information to Con-Way NOW staff to aid in the scheduled delivery such as an automatic warning when a truck deviates off course by more than 200 miles (Fishman, 2003).

Second, information technology can initiate new businesses by creating "derived demand" for new products (Porter & Millar, 1985). Such businesses are created through demand as derived from the availability of information technology. Fidelity Investments provides an example of new business as derived from the availability of financial information and wireless technology.   Fidelity Anywhere, the company's wireless offering, services over 170,000 customers with real-time stock quotes, trades both during and after trading hours, retirement account management, and insurance management. In addition, Fidelity Anywhere incorporates yet another derived demand feature with the integration of BlackBerry handhelds giving users the ability to phone a Fidelity representative at the touch a button (Collett *et al.*, 2003).

The third way in which Porter and Millar (1985) reflect information technology creates new business and industry is based on the ability of information technology to create new businesses within old ones. Their assertion in 1985 stood on the fact that an organization with information processing well-established in its value chain may have excess capacity or abilities that can be sold outside of their organization or industry (Porter & Millar, 1985). For example, consider the television cable industry and the impact of broadband technology. Adelphia, Time Warner, and other major cable providers had an infrastructure in place, such that broadband internet access could be developed from which significant revenue and profits have been experienced.   In addition, internet service providers have capitalized on their information technology infrastructure to profit from voice over internet protocol (VoIP). As of 2004, 10% of all phone calls made were by VoIP with demand growing in large fashion (Jardin, 2004).

Working Capital

The measure of working capital management includes the Cash Conversion Cycle and its components. Those components are Average Collection Period, Inventory Turnover in Days, and Average Payment Period. Working capital management is a basic function for the survival of firms and it has long been the subject of studies by many researchers. Deloof (2003) highlighted the momentum effect of managing working capital on a firm's profitability. He concluded that managing working capital efficiently reduces the number of days accounts receivable and inventories are outstanding; this positively reflects on the firm profitability. He added that an efficient working capital management is very important to create shareholder value. Shin and Soenen (1998) also addressed the net trading cycle as a comprehensive measure of managing working capital; they report a significant relationship between net trading cycle and profitability.

Shah and Sana (2006) suggest that managers can generate positive returns for shareholders by managing working capital. McMahon and Holmes (1993) talked about the critical role that working capital management plays in the prosperity and survival of firms,

especially small and medium enterprises. Verlyn and Laughlin (1980) addressed the importance of the cash conversion cycle and state that even though working capital management is not receiving the same attention as long-term investment in financing decisions, it occupies a major portion of a financial manager's time and attention. In an industry wide study performed by Jose et al (1996), the authors find that aggressive liquidity management is correlated with higher profitability for several industries.

Similar studies highlight the importance of short term asset management which falls under the area of working capital management. Padachi (2006) addressed the manufacturing firms' efficiency of working capital where most of their assets are composed of current assets. They showed evidence that efficient working capital management increases cash flow, which in turn increases firm growth opportunities and returns to the shareholders. Uyar (2009) explained working capital management as a continuous function which is core to the survival of firms. He noted that if working capital management is not given due consideration, firms cannot survive for a long period of time.

Teruel and Solano (2007) tested the impact of firms' size and working capital on the profitability. Their results suggested that working capital management is very important for small and medium size firms as managers can create value for the shareholders by reducing the inventories level and receivable outstanding days. Afza and Nazir (2008) investigated the factors determining the working capital requirements. In accord with other research, Raheman and Nasr (2007) analyzed the relationship between working capital management and firms' profitability.

Contrary to traditionally held views, certain studies showed evidence that using a conservative approach by investing in working capital might increase firms' profitability. Smith, K (1980) argued that when high inventory is maintained, it reduces the cost of interruptions, decreases supply cost, and protects against price fluctuation and loss of business due to scarcity of products. In a study, Czyzewski and Hicks (1992) concluded that firms with the highest return on assets hold higher cash balances. Samiloglu and Demirgunes (2008) suggested that current assets have a negative impact on firm profitability and the cash conversion cycle. However, size and financial assets do not have a significant effect on firm profitability

The relationship of corporate profitability and working capital management was also investigated by Lazaridis & Tryfonidis, (2006). They report that there is significant evidence of a negative relationship between gross profit and the cash conversion cycle. They argue that managers can create profit by properly handling the individual components of working capital, which includes accounts receivable, inventory, and accounts payable. Cachon and Fisher (2000) also find that IT enables firms to share inventory information efficiently and at a minimal cost.

Based on the above, it is clear that technology is playing a key role in shaping businesses and increasing the efficiencies of using resources. The increase in the efficiency of using resources reflects positively on the finances, as less capital is needed. This study focuses on the efficiencies of using working capital and current technological tests to determine if less working capital is needed than before. Specifically, we focus on whether or not technology reduces the working capital requirements for businesses?

RESEARCH METHODOLGY

The study tests if there has been a significant reduction in working capital requirements through time because of the increase in the efficiency of firms. It follows a two stage procedure. In the first stage, a summary of the variables in the model is presented to highlight their characteristics i.e. examining the changes of sales, cost of sales, and working capital over a span of 20 years period – starts year 1991 and ends 2010 (Hair et al. 2010) – across economic sectors.

In the second stage, hypothesis testing is done; it employs a controlled experiment (Ryan, 2011) by testing the significance of the relative change of working capital to that of the sales and cost of sales across the nine sectors. The following steps are followed: 1- record the current assets, current liabilities, working capital, sales, and cost of sales of all U.S. public firms with stocks that are traded on national and regional stock exchanges at two separate points; the first point is the beginning period i.e. year 1991 and the second point is the ending period i.e. year 2010; 2- measure the dollar change of these items by subtracting the beginning period balance from the ending period balance of firms in the study; 3- measure the percentage change of each item by dividing the dollar change over beginning balance; 4- measure the difference between the relative change of working capital change to that of sales and cost of sales and that is d1 = WC-relative change - S-relative change; d2 = WC-relative change - COS-relative change; 5- compute the mean and the standard deviation of the differences of both d1 and d2; 6- apply the procedure over the nine economic sectors; and 7- test the significance of the difference of relative change of d1 and d2 at a level of significance of 5% (Lohr, 2010) by using the following:

$$ t = \frac{\overline{d} - d_0}{(s_d / \sqrt{n})}, $$

Sample and data collection

Data used is a secondary type and is taken from Compustat. The original number of firms listed is 9,753. Only 1,474 firms remained in the model due to missing data. In order to capture the relative change in the balances (Hair et al, 2010), data of these companies were taken from two time frames i.e. December 31, 1991 and December 31, 2010.

Data analysis

The first stage of the study highlights the characteristics of all variables; table 1 represents data output of sales. In checking the sales figures, the average sales of the 1474 firms in year 1991 was $1,824 million and jumped to $5,438 in year 2010, which represents an average growth of almost three times. In checking the relative average growth in sales among all firms, it was 37.81 times, which is ten times that of the overall average. The highest growth in the relative average sales among firms was for health sector; it increased by 26 times. The lowest increase in the relative average sales among was for utility sector; it increased by 1.7 times during the same period.

Table 1: Sales (In Millions $)

Economic Sector	Measure	S91	S10	Sales %
Consumer Discretionary	Mean	2,747	6,829	466%
	STD	8,672	19,566	1395%
Energy	Mean	4,208	16,172	1313%
	STD	15,338	49,187	2859%
Financials	Mean	279	736	2330%
	STD	552	1,873	8878%
Health Care	Mean	490	3,492	26180%
	STD	1,741	10,921	171689%
Industrials	Mean	1,734	4,243	918%
	STD	4,579	10,349	5174%
Information Technology	Mean	883	3,149	1369%
	STD	4,836	12,261	6577%
Materials	Mean	1,832	3,802	413%
	STD	4,240	7,077	906%
Telecommunication Services	Mean	3,094	19,084	430%
	STD	4,549	38,077	473%
Utilities	Mean	1,515	3,417	177%
	STD	1,795	3,807	233%
All Sectors	**Mean**	**1,824**	**5,438**	**3781%**
	STD	**6,689**	**18,981**	**67960%**

In checking the standard deviation of sales (fluctuation) for the same period, the average standard deviation of sales figures of all sectors in year 1991 was $6,689 million and in year 2010 jumped to $18,981, which is three times that of year 1991. In checking the relative change of sales among the 1474 firms, it increased 679 folds, which is an indicator of the huge differences in the level of activities (sales volume) among the firms. The highest increase in relative change in sales (standard deviation) among firms was for the health sector, it increased by 1716 times. As for the lowest increase in relative change in among firms was for the utility sector; it reported an average increase of 2.33 times.

Table 2 represents data output of cost of sales. In checking the cost of sales figures, the average sales of the 1474 firms in year 1991 was $1,246 million and jumped to $3,722 million in year 2010, which represents an average growth of almost three folds. In checking the relative average growth of cost of sales among all firms, it showed a relative average increase of 11 folds. The highest growth in the relative average cost of sales among firms was for health sector; it increased by 87 times. The lowest increase in the relative average cost sales among firms was for utility sector; it increased by 1.96 times during the same period.

Table 2: Cost of Sales (In Millions $)

Economic Sector	Measure	COS91	COS10	COS %
Consumer Discretionary	Mean	1,785	4,637	510%
	STD	6,163	14,957	1919%
Energy	Mean	3,275	12,882	1526%
	STD	11,816	40,026	3019%
Financials	Mean	212	573	688%
	STD	427	1,578	2601%
Health Care	Mean	199	1,711	8721%
	STD	620	6,898	84223%
Industrials	Mean	1,347	3,174	1627%
	STD	3,523	7,866	13404%
Information Technology	Mean	440	1,669	1494%
	STD	2,153	7,233	8098%
Materials	Mean	1,323	2,793	409%
	STD	3,006	5,397	768%
Telecommunication Services	Mean	1,602	8,798	343%
	STD	2,431	17,681	409%
Utilities	Mean	1,025	2,511	196%
	STD	1,183	2,774	262%
All Sectors	**Mean**	**1,246**	**3,722**	**1096%**
	STD	**4,831**	**14,475**	**7008%**

In checking the standard deviation of cost of sales for the same period, the average standard deviation of cost of sales figures of all sectors in year 1991 was $4,831 million and in year 2010 jumped to $14,475, which is almost three times that of year 1991. In checking the relative change of cost of sales among the 1474 firms, it increased 70 folds, which is an indicator of the huge differences in the level of activities (cost of sales volume) among the firms. The highest relative change in cost of sales (standard deviation) among firms was for the health sector, it increased by 842 times. As for the lowest relative change in cost of sales among firms was for the utility sector; it reported an average increase of 2.92 times.

Table 3 represents data output of working capital. In checking the working capital figures, the average working capital of the 1474 firms in year 1991 was $126 million and jumped to $540 million in year 2010, which represents an average growth of around three folds. In checking the average growth of working capital among all firms, it showed a relative average increase of 6 folds. The maximum increase in the relative average working capital among firms was for health sector; it increased by 41 times. The lowest increase in the relative average working capital among firms was for material sector; it increased by 30% times during the same period.

Table 3: Working Capital (In Millions $)

Economic Sector	Measure	WC 91	WC10	WC %
Consumer Discretionary	Mean	377	256	549%
	STD	1,418	1,372	2350%
Energy	Mean	914	113	700%
	STD	2,833	818	4021%
Financials	Mean	130	36	2815%
	STD	251	64	8410%
Health Care	Mean	815	98	4147%
	STD	2,880	399	37842%
Industrials	Mean	409	111	982%
	STD	1,109	504	5277%
Information Technology	Mean	1,014	167	754%
	STD	3,525	687	2833%
Materials	Mean	709	182	30%
	STD	1,447	438	1940%
Telecommunication Services	Mean	(1,083)	(295)	123%
	STD	3,222	1,072	1104%
Utilities	Mean	23	(79)	65%
	STD	510	236	1353%
All Sectors	**Mean**	**126**	**540**	615%
	STD	**797**	**2,160**	3677%

In checking the standard deviation of working capital for the same period, the average standard deviation of working capital of all sectors in year 1991 was $797 million and in year 2010 jumped to $2,160, which is almost three times that of year 1991. In checking the relative change of working capital among the 1474 firms, it increased by 36 folds, which is an indicator of the huge differences in the level of activities (working capital volume) among the firms. The highest change in the relative change of working capital (standard deviation) among firms was for the health sector, it increased by 378 times. As for the lowest relative change in working capital among firms was for the telecommunication sector; it reported an average relative change of 11 times.

In the second stage, the study focuses on testing the significance of relative change in working capital to that of sales and cost of sales across the nine economic sectors. The following table figures include percentage change of sales, percentage change of WC, difference of percentage changes of WC – sales or cost of sales, sector size, t test computed (or test statistic), and p-value of test statistic .

Table 4 represents the summary output of relative change of working capital compared to that of sales across the nine economic sectors. In checking the significance of the results of WC versus sales, the relative mean difference of consumer discretionary was -10 times (t = -6.13 and p-value = .0000), which is highly significant; energy was -20 times (t = -6.34, p-value = .0000), which is highly significant; financials was -51 times (t = -2.41, p-value = .0084), which is highly

significant; health sector was -30 times (t = -2.40, p-value = .0088), which is highly significant; industrial was -19 times (t = -4.33, p-value = .0000),which is highly significant; information technology was -21 times (t = -4.17, p-value = .0000),which is highly significant; material was -4 times (t = -2.45, p-value = .0077),which is highly significant; telecommunication services was -5 times (t = -1.77, p-value = .03899), which is significant at a level of 5%; utilities was -2 times (t = -2.17, p-value = .01585), which is significant at 5% level of significance; and overall sectors was -32 times (t = -2.45, p-value = .0196), which is significant at 5% level of significance.

Table 4: Testing the Significance of working capital versus Sales

Economic Sector	Measure	WC %	Sales %	D-S	n	t	p-value
Consumer Discretionary	Mean	549%	466%	-1015%	309	-6.13	0.000%
	STD	2350%	1395%	2908%			
Energy	Mean	700%	1313%	-2013%	112	-6.34	0.000%
	STD	4021%	2859%	3800%			
Financials	Mean	2815%	2330%	-5145%	32	-2.41	0.842%
	STD	8410%	8878%	12053%			
Health Care	Mean	4147%	26180%	-30327%	194	-2.40	0.884%
	STD	37842%	171689%	176272%			
Industrials	Mean	982%	918%	-1901%	292	-4.33	0.001%
	STD	5277%	5174%	7497%			
Information Technology	Mean	754%	1369%	-2122%	216	-4.17	0.002%
	STD	2833%	6577%	7480%			
Materials	Mean	30%	413%	-444%	134	-2.45	0.770%
	STD	1940%	906%	2098%			
Telecommunication Services	Mean	123%	430%	-553%	20	-1.77	3.899%
	STD	1104%	473%	1395%			
Utilities	Mean	65%	177%	-242%	165	-2.17	1.585%
	STD	1353%	233%	1434%			
All Sectors	**Mean**	**615%**	**3781%**	**-328%**	**1474**	**-2.45**	**1.9684%**
	STD	**3677%**	**67960%**	**5147%**			

Table 5 represents the summary output of relative change of working capital compared to that of cost of sales across the nine economic sectors. In checking the significance of the results of WC versus cost of sales, the relative mean difference of consumer discretionary was -10 times (t = -5.79 and p-value = .0000), which is highly significant; energy was -22 times (t = -6.76, p-value = .0000), which is highly significant; financials was -35 times (t = -2.20, p-value = .01468), which is significant at an alpha of 5%; health sector was -128 times (t = -1.91, p-value = .0290), which is significant at an alpha of 5%; industrial was -26 times (t = -3.02, p-value .0014),which is highly significant; information technology was -22 times (t = -3.71, p-value = .0001) which is highly significant; material was -4 times (t = -2.35, p-value = 0.0101)), which is highly significant; telecommunication services was -4 times (t = -1.57, p-value .0596), which is significant at a level of 10%; utilities was -2 times (t = -2.32, p-value = .0108), which is significant at an alpha of 5%; and overall sectors was -4 times (t = -2.41, p-value = .0218) which is significant at an alpha of 5%.

Table 5: Testing the Significance of working capital versus cost of sales

Economic Sector	Measure	WC %	COS %	D-O	n	t	p-value
Consumer Discretionary	Mean	549%	510%	-1059%	308	-5.79	0.0000%
	STD	2350%	1919%	3214%			
Energy	Mean	700%	1526%	-2226%	111	-6.76	0.0000%
	STD	4021%	3019%	3817%			
Financials	Mean	2815%	688%	-3503%	31	-2.20	1.4685%
	STD	8410%	2601%	9018%			
Health Care	Mean	4147%	8721%	-12868%	193	-1.91	2.9006%
	STD	37842%	84223%	93888%			
Industrials	Mean	982%	1627%	-2609%	291	-3.02	0.1466%
	STD	5277%	13404%	14763%			
Information Technology	Mean	754%	1494%	-2248%	215	-3.71	0.0144%
	STD	2833%	8098%	8918%			
Materials	Mean	30%	409%	-440%	133	-2.35	1.0103%
	STD	1940%	768%	2170%			
Telecommunication Services	Mean	123%	343%	-466%	19	-1.57	5.9639%
	STD	1104%	409%	1332%			
Utilities	Mean	65%	196%	-261%	164	-2.32	1.0826%
	STD	1353%	262%	1445%			
All Sectors	Mean	615%	1096%	-481%	1474	-2.41	2.1877%
	STD	3677%	7008%	7685%			

RESULTS OF THIS STUDY

In checking the summary results for the period year 1991 to 2010, it showed that the relative increase in working capital is significantly smaller than that of sales (table 4) in most of the economic sectors. as the test statistic value of the difference between the relative change of working capital and that of sales is -2.45 with a p-value of 2%; the result is significant at 5% level of significance. In comparing the working capital relative change to that of cost of sales, it showed a test statistic value of -2.41 with a p-value of 2.2%; this means that the relative increase in working capital is significantly smaller than that of the cost of sales at a level of significance of 5%. Both results support the research hypothesis; during the period 1991 – 2009, even though businesses had increase in sales, cost of sales and working capital, but the increase in working capital is significantly smaller than that of both sales and cost of sales.

CONCLUSIONS

Various scholars throughout the 80's, 90's, and more recently have expressed their theories on how organizations compete and add value to products and services. Porter postulated the theory of his five forces model to create the three generic strategic approaches for organizations to outperform competitors within an industry. Roth & van der Velde identified that successful organizations strategically focus on alternative competitive advantages such as

customization, delivery speed, product development and innovation (Roth & van der Velde, 1991), and Ward, Bicklord, and Loeng identify four strategic concepts that organizations use as competitive strategy: niche differentiator, broad differentiator, cost leader, and lean competitor (Ward *et al.*, 1996).

Information technology, as identified by Porter and Millar (1985), provides a profitable and strategic framework for organizations to gain competitive advantage. Organizations can capitalize using the benefits of information technology to enhance their value chain improving relationships between the organization, suppliers, and customers providing internal competitive advantages. The relationship that information technology potentially brings to potential customers provides external competitive advantage. The proactive employment of information technology utilized to compete on multiple competitive priorities provides an additional competitive advantage (Davis & Heineke, 2005).

Evidence of the advantages presented by information technology is evident in this study as the research output is robust; it shows that there is significant evidence that businesses nowadays need to invest less in working capital to operate than twenty years ago as a result of using technology. The reduction of working capital requirement benefits various stake holders. First, it increases market efficiency as more investors will be capable of entering the market. Second, it decreases the cost of products as the cost of finances decreases with less money needed to finance working capital and manage daily operations. Third, with the increase of number of businesses on the market and the lower cost of finances, consumers enjoy better quality products with lower cost.

LIMITATIONS

The study has two limitations, which are 1- many companies were removed from the study because of lack of information; only 1,474, firms remained in the study out of 9,753; 2- study results showed that variations within the items and between them were very high. More investigations are required.

RECOMMENDATIONS

It is recommended to conducts further studies where there is more control over the size and or industry sector. This may lead to less variability and more accurate results.

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