

Distinguished Competency and Efficacy of Working Capital Management Ensuing Firm Survival, Liquidity, Solvency and Profitability: A Study on Automotive Industry

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ABSTRACT

Limited research interest in studying working capital management process, is found in the literature. However, working capital management has been the most crucial determinant factor for any industry's survival, liquidity, solvency and profitability. Therefore, to tackle efficiently liquidity and profitability trade-off, all industries are compelled to improvise their working capital management strategies. Continuation of working capital management process at optimal level, expedites firm's value creation and also facilitates to design framework in smoothening financial constraints so as to make effective usages of firm's resources. The paper argues that automotive industry occupies a significant proportion of global economy. Therefore, an effort has been made to undertake an in-depth study on the industry. The study besides identifying the industry leader, explores diverse techniques to advance comparative study on the industry efficiency level in managing working capital process. The research outcome facilitates investors to choose the most commendable automotive companies for investments.

KEY WORDS

Crucial Determinant Factor, Liquidity and Profitability Trade-off, Working Capital Management Strategies, Smoothening Financial Constraints, Diverse Techniques, Commendable Automotive Companies

INTRODUCTION

Working capital management is one of the important sensitive areas of financial management and is the significant benchmark to measure firm's operational and short-term financial efficiency. It is an important operating decision as it reflects day-to-day, point-to-point and level-to-level fluctuations in the quantity and components of working capital which are volatile and ever changing in nature because of changes in variables such as demand and supply, cost of funds, receipts and payments schedules besides regulatory mandates. The main objective of working capital management is to hedge the firm from potential risks of all its elements during the realization period of operating cycle and to eliminate anxieties on possible shortages or excess of working capital components. Andre Fourcans and Thomas J. Hindelang (1974) highlighted that significant additional dimensionality is added to the problem when multi-faceted social, economic, and political factors, foreign exchange rates, foreign tax methodologies, fresh sources of funds from overseas money markets, are overlaid on the framework. In an ideal world if no risk or uncertainty persists, there is almost non-existence of working capital management process except when firms are required to manage working capital tied into work-in-progress. Besides optimal utilization of all the components of current assets and current liabilities, the goal of working capital management is to balance between profitability and risks that

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contribute positively to firm's value creation. Therefore, managers have to be well aware the paybacks and costs connected with inventory holding, accounts receivable and accounts payable (Rani, 2013; García-Teruel & Martínez-Solano, 2010). Inefficient management of working capital has been cited as a major cause of businesses failures (Altman, 1968; Dunn & Cheatham, 1993; Shin & Soenen, 1998). Competency in managing working capital helps firms not only to withstand the impact of economic turbulence but also plays a crucial role during booming economic seasons (Kesimli & Gunay, 2011; Reason, 2008). Accordingly, Padachi & Howorth (2014), explained that maintaining stable growth, avoiding financial distress and sustaining solvency, are crucial for firm's long-term survival. Efficient working capital management process comprehend planning and monitoring of working capital components in a manner that reduce risk of failure and enable to meet short term liabilities besides facilitating to avoid excessive investment in current assets (Eljelly, 2004). Firms with low current assets level may incur scarcity and create hitches in maintaining smooth business operations (Van Horne and Wachowicz, 2005). Any suboptimal level of net working capital, ultimately lowered firm's value and reduce shareholders return, (Gitman, 2005). Therefore, it is the responsibility of managers to maintain an optimum level of working capital to minimize risks (Atseye, et al., 2015) and to maximize firm's value. The existence of any business depends on the proficiency in managing working capital components besides maintaining them at optimum level.

Present globalized and integrated economy facilitates leading multinational corporations (MNCs) to internationalize business by acquiring intangible assets besides to source capital at competitive rate, (Bhattacheryay, 2021). MNCs, judiciously apply working capital management policies, secure inputs globally, convert those inputs to finished/semi-finished products with labor, equipment, and market them globally to generate and capture value through multiple operations spread over various countries. Automotive industry is placed as one of the well-established MNCs and occupies a significant proportion of global economy as the industry has mass penetration in almost all the upstream and downstream linkages of economic activities. The industry probably reflects the competitive, technological and organizational challenges that many other industries end up facing sooner or later. The industry gradually evolves as one of the key contributors in driving globalization of the world economy. However, automotive industry is increasingly concerned with its internationalization strategies due to increasing time-based competition and tighter relationship between original equipment manufacturers (OEMs), suppliers and other members of the supply chain including component distributors, contract manufacturers and logistics service providers. Although supply chain management (SCM) is of great importance to the automotive industry, advanced technology is the key (Mondragon et al., 2006). All these developments put pressure on the suppliers to keep up with the technological progress which compels them to offer a suitable product portfolio and a cost-efficient production environment (Heigl and Rennhak, 2008). In spite of all these multiple challenges, automotive industry generates and captures high values by taking on unique business models besides combining with or acquiring foreign businesses.

Reviewing the general economic environment for the year 2020 and 2021, the world economy was underway to transform from a trend of modest growth to a sharp decline partly due to the upshots of trade frictions and majorly due to the effects of Covid-19. Global economy going forward, there were great concerns for the sharper decline in global automotive business. Automobile markets were in a state of stiff volatility due to very few vehicle registrations and imposition of lockdown for several weeks.

As working capital management plays a commanding role in firm's financial sustainability in generating adequate cash flow, investors are very much keen to understand the factors that determine a firm's overall performance positioning over the other industry players. Accordingly, the performance of each automotive company is based on working capital factors matrix influencing working capital management process and on the key financial ratios in managing working capital, an

overall positioning is developed. As an outcome, investors' confidence level is kept afloat while initiating investment in the automotive industry. To have an overall view on the working capital functioning of global automotive industry, therefore an effort has been made to undertake an in-depth examination on the working capital management process, and for which ten major global automotive companies having registered offices in advanced, developing and emerging countries, are chosen.

The remainder of the paper proceeds as follows. First, after the introduction section, the objectives of the study on which it is grounded, are defined and explained. Then an outline of the literature is planned to heighten how earlier study is hypothesized various aspects of working capital management and in what way, the literatures are different from earlier study. In the next section, the paper is conveyed about the theory and hypothesis development, thereafter, a comprehensive summary on the research processes is carried out covering methodologies and techniques. Finally, the implications of the findings on all the objectives, limitations of the study, a few suggestions for future research and the conclusion, are provided.

OBJECTIVE OF THE STUDY

Keeping in mind the significance of working capital management, an attempt is made to examine its impact on the automobile industry, one of the largest manufacturing activities that have significant contribution in the world economy. The following are the major four objectives on which the paper is founded.

First, the goal of working capital management is to optimize each component of current assets and current liabilities besides to balance between profitability and risk that contributes positively to firm's value creation, therefore, recognition of optimal investment level of each type of working capital components influencing working capital management, has evolved as the firm primary focus area of operations.

Second, working capital management is one of the significant benchmarks to measure global firm's operational and financial efficiency. Accordingly, automotive players are compelled to make continuous efforts in improving working capital management process. Therefore, appropriate techniques are used in the paper to evaluate how efficiently global automotive companies are managing their working capital process.

Third, the purpose of the paper is also to study managements' consciousness on the objective of working capital management process. Therefore, to measure objectivity level of each automotive companies working capital management process, diverse techniques are used. As an outcome of the techniques, the global automotive leaders in managing working capital process, is recognized.

Fourth, a well-managed working capital contributes highly to a firm's value creation enabling investors to identify potential investment opportunity. Techniques like correlation matrix, quantitative factor matrix and ratio analysis techniques are used to bring a conclusive decision in identifying the leaders of automotive industry. Accordingly, investors can select the most commendable automotive companies for investments.

LITERATURE REVIEW

Working capital management is a part of general enterprise strategy to firm's value maximization and signifies management of working capital components in a manner that achieves optimum balance between liquidity and profitability (Eiteman, et al., 2013). Therefore, to tackle efficiently liquidity and profitability trade –off, firms need to improve and adopt effective working capital management strategies. In light of this, the study is aimed to create managements' consciousness on how working capital components influence working capital management. The study is descriptive, based on

secondary data wherein past ten years' performances of ten global automotive companies, are critically analyzed and interpreted.

Kerry Cooper (1984) narrated that firms having world-wide operations, are operated in diverse economic and political climates besides to face multiple complexity in conducting global business. He also highlighted how foreign exchange risks impacted on firm's profitability, net cash flows and on the working capital management. (Kargar and Blumenthal, 1994) commented that firms may likely to face insolvency if there is nonexistence of trade-off between liquidity and profitability with reference to working capital management. Anthony J. D'Alessandro and Alok Baveja (2000) observed that despite the diversity of models and advancement of technology, the automotive industry is still driven by well-planned working capital management process as the automotive companies are faced continuous price pressure from the market. Jobs Benders and Masaya Morita (2004) pronounced that Toyota Production System (TPS) was accepted globally as the best automotive manufacturing system which had been contributed largely in managing working capital. Eljelly (2004) interpreted that the management of working capital components play a critical role in the performance of any firm. Moussawi, et al., (2006) suggested that managers respond positively to incentives in managing firm's working capital. He also argued that where adequate management of working capital exists, firms incur low financial expenses. Atrill (2006) believed that the various elements of working capital are interrelated and can be seen as part of a short-term cycle. Satish (2007) elucidated that if only one of the working capital components made any dramatic difference, it was obvious for meticulous management of all the working capital components and even also a portion of the deferred liabilities. Nazir (2009) argued that firms with more profit give greater attention to establish efficient working capital management hence they end up with more current assets. Swati Modi (2012) made study on the adequacy and efficacy of working capital management for Indian automobile industry and commented that firms are likely to have aggressive working capital management approach. Mr. Nilufer Usmen (2012) expressed that tax differentials due to host countries transfer pricing schemes, represent as strategic tools for working capital management. (Singh & Kumar, 2014; Baker, et al., 2017) expressed that working capital management is the most important tasks for firm's profitability, liquidity besides increasing return on equity. Kalaivani and Jothi (2017) elucidated that firm's overall success in managing working capital is dependent on the merits of financial ratios. Andrea Borenich, Peter Greistorfer & Marc Reimann (2019) narrated that all the supply chain partners are under pressure to correspond to the technological advancement, to offer appropriate product group and a cost-proficient production environment.

The review is not designed to critique the literature which suggest several preliminary conclusions on how firms manage their working capital, instead to highlight how prior research conceptualizes various aspects of working capital management and in what way, the literature is different from the study. After going through the detailed literature review, it is found that working capital management has a paramount significance in the mind of researchers, as a number of researches have been conducted into this particular field. But very few researches are available on the working capital management of automobile industry. Therefore, an effort is made to assess the influence of working capital components in managing working capital and further, a comparative study on working capital management is also conducted to identify the global automotive leaders who are the most successful companies in managing working capital process.

THEORY AND HYPOTHESIS DEVELOPMENT

Working capital finance, the most important component of a firm's financial structure, includes the level of investment in current assets and the extent to have current liability financing. Managing working capital at an optimal level builds significant impact on both firm's liquidity and profitability

(Deloof, 2003). Therefore, firms need to adopt and implement widespread working capital management strategies while tackling its liquidity and profitability trade-off. Main theme of the strategic theory is to establish an interaction between current assets and current liabilities which play a vital role in firm's profitability, risk management and value enhancement (Smith, 1980; Padachi & Howorth, 2014). The foremost cause of accomplishment for any business depends on how working capital management succeeds to find out an optimal mix between its key components i.e., receivables, inventory, cash and accounts payables (Filbeck & Krueger, 2005). Therefore, as suggested by working capital theory, managers must achieve an optimal level of working capital in maximizing firm's value (Aktas, et al., 2015; Baños-Caballero, et al., 2013). In managing working capital, managers always look for safeguarding inventory and cash besides having all-time credit risk assessment, (Orobia, et al., 2016). As a part of prudent working capital management, firm's location choices now gradually become fine-grained and flexible as they break value chains into ever finer expertise activities such as increased outsourcing of value-adding activities to suppliers, shorter innovation cycles etc., (Nicolai, et al., 2018). The task of working capital management has become a key determinant for profitability as firms should have their financial resources in the right form in the right place at the right time. Working capital is described as the essence of a firm (Aktas, et al., 2015; Ek & Guerin, 2011; Rani, 2013) and denotes as current or circulating capital. While managing working capital, firms focus on the fixation of net current assets level by maintaining optimal investment level for each type of working capital components (current assets & current liabilities) i.e., receivables, inventories, cash & cash equivalents and accounts payables.

CURRENT ASSET MANAGEMENT

Firm invests in current assets with an objective to circulate its components from one form to another in the ordinary course of business by embracing the recurring transition from cash to inventories to receivables and back to cash. Investment in current assets implies that to the extent resources are blocked up in current assets, they cannot be utilized in business and hence the profitability is adversely affected. Current asset investments are short lived-in nature and components thereof, are persistently being transformed into other form of components till reach to finished goods (Rao, 1989). While a firm maintains a low level of current assets, there are high possibilities of having a low level of liquidity besides stock outs. On the other hand, excessive current assets level may lead to a negative effect on firm's profitability due to blockage of funds (Van Horne & Wachowicz, 2005). As investment in current assets entails costs that reduce the level of profitability, one of the dilemmas being faced by firms in current assets management is to strike a balance between liquidity and profitability, which are inversely related. Deloof (2003) established the proposition that the receivables and inventories comprise a substantial percentage of current assets. Therefore, managing current assets can be thought of as involving a trade-off between costs that rise and costs that fall with changes in the level of current assets. As the current asset management is having high contributing factor in managing working capital, the author hypothesizes that,

H1: All the automotive companies are uniformly focused on two aspects, one - fixation of current assets level, second - maintaining efficiently the optimal investment level of each type of current assets components in managing working capital.

RECEIVABLES MANAGEMENT

The goal of receivables management is to collect receivables as quickly as possible in spite of losing sales on one side and high collection pressure on the other side. To achieve the goal, firms need to

have well defined credit policies comprising of credit selection, credit terms and credit monitoring process. Receivables are short-term assets generated out of rendering goods or services on credit to customers (Olsen & Wetz, 2014). In the process, due to accumulation of receivables, multifaceted risks are evolved pertaining to collection costs, bad debt loss, and capital costs, (Rani, 2013; García-Teruel & Martínez-Solano, 2010). To augment sales, capital costs are generated due to the time gap between the sale of products till realization (Rani, 2013, Knauer & Wohrmann, 2013). Firms manage the additional costs, arising out of receivable financing, either using internal funds (opportunity costs) or through external financing bearing interest cost (Rani, 2013; García-Teruel & Martínez-Solano, 2010). Ultimate objective of receivables management is to strike balance between the return that the company gets from receivables financing in the form of increased sales, profits and the cost that the company has to incur in funding these receivables. Therefore, the primary objective of receivables management for any firm, is to minimize risk of holding the receivables and to maximize returns, (Rani, 2013). As receivables have major share in the total current assets besides blocking a considerable amount of firm's capital, its importance is having high relevance to firm in managing working capital, accordingly the author hypothesizes that,

H₂: While managing working capital, all the automotive companies possess uniform efficiency level in striking balance between returns that they receive out of receivables financing in the form of increased sales, profits and the cost incurred.

INVENTORY MANAGEMENT

Inventory forms a major component of a firm's current assets. Ebenezer & Asiedu (2013) defined inventory management as, "the planning, coordinating and controlling activities related to the flow of inventory throughout an organization". Significant amounts of capital are spent by firms in procuring inventory (Knauer & Wohrmann, 2013; Rani, 2013) and in turn, they secure uninterrupted production, minimize stock-out costs, and reduce procurement costs through bulk purchase (Basu & Wang, 2011; Ranganatham, 2011). Firms holding high level of inventories with high inventory turnover, may reduce costs besides supplying the products as scheduled and also protects the firm against price escalation generated out of adverse macroeconomic factors, (Blinder & Maccini, 1991).

An efficient inventory management provides a cutting edge to win over competitors as excess of inventory will eat up profits, on the other hand, insufficient inventory holdings will also take away opportunities. Therefore, the investments in inventory holding should strike a balance between efficient, smooth production operations and profitability, which ultimately involves trade-off between having too little or too much inventory. For any level of sales volume, the amount of required working capital is lower when turning inventory into receivable is quicker (Ranganatham, 2011). Uninterrupted availability of inventories at optimum level, on account of proper planning procurement, ensures steadiness of operations, improves profitability besides minimizing shortages. Shortages can upset customers but reduce risk of paying higher prices for credit purchases due to inflationary effect, (Paramasivan & Subramanian, 2009). As inventory management consumes a major portion of working capital and manager's decision-making time, firms continuously search for the best practices to reduce costs tied up in working capital and also search for the best modalities in reducing manager's time in managing inventory. Therefore, inventory management highly contributes in managing working capital, accordingly, the author hypothesizes that,

H₃: All the automotive companies, while managing working capital, uniformly optimize their investment in inventory and knock uniform balance between costs of holding inventory and stock out costs.

CASH MANAGEMENT

The key purpose of cash management is to optimize cash balance that is being used within the firm in order to increase profitability but without reducing business activities or exposing the firm to undue risk in meeting financial obligations. Therefore, the objective of cash management is to strike a balance between holding too much and too little cash. Liquidity implies conversion of assets into cash during the usual course of business and recognizes steady uninterrupted cash flow to meet current obligations, as and when due, besides ensuring requisite cash availability to meet day-to-day business operations. Firms having lower level of liquid assets, the greater will be the risks of not being able to meet ongoing obligations (Van Horne & Wachowicz, 2005). Cash conversion cycle is a measure of working capital efficiency in regard to firm's short-term financial plan and denotes the number of day's working capital has been tied up in operations. Cash conversion cycle i.e., recurring transition of cash to inventories to receivables and back to cash, is the foundation of working capital management. A positive cash conversion cycle means the firm possibly uses negotiated liabilities like bank loans to support its operating assets. Operating cash flow has a significant impact on working capital management and firms with better operating cash flows tend to increase their working capital investment (Atseye, et al., 2015; Wasiuzzaman & Arumugam, 2013). As the likelihood of cash inflows and outflows, are the greatest concern in managing working capital, (Stephen, et al., 2013), firm's goal is to minimize the length of the cash conversion cycle and to reduce the level of negotiated liabilities. One of the key liquidity ratios contributing to working capital management is cash ratio which is applied as an important cash management tool. It is evident that cash is the most liquid asset of all and vital for the existence of any firm and requires firm constant monitoring. Accordingly, the author hypothesizes that,

H4: All the automotive companies, while managing their working capital, are uniformly capable to maintain an optimal balance in paying off their current obligations with available cash and cash equivalent.

CURRENT LIABILITY MANAGEMENT

Management of current liability concerns the optimal quantity of liquid assets a firm should have on business. Current liabilities represent the firm's short-term financing as they include all current obligations of the firm. Drag on liquidity happened when managers fail to collect payments quickly enough, but continuation of the situation is not favorable for the firm (Aminu & Zainudin, 2016). Current liabilities symbolize an important and generally inexpensive source of financing for a firm. Profitability and business risks depend on the level of current liability financing being enjoyed by the firm. As financing constraint carries the day, liquidity management has become a challenge for managers and evolves as a forefront in corporate finance research, (Froot, et al., 1993). The financial manager must obtain the right quantity and the right form of current liability financing at a low cost besides to have least risks. Current liability management is bestowed on the concept that demonstrates a firm's ability to pay off its current liabilities with its current assets. The ability can be measured by the use of liquidity ratio that implicates the relationship between current assets and current liabilities and is applied as an important management tool for measuring firm's short-term solvency. While current assets generate a majority of cash-inflows for firms, on the other hand, current liabilities create the maximum amount of short-term cash outflows (Knauer & Wohrmann, 2013; Rani, 2013). Current ratio is simple but incredibly useful information for financial analysts, like firms prone to high bankruptcy with low current ratio and, firms having too high ratio would impact the profits adversely etc. The ratio is one of the important financial metrics which signifies firm's solvency as it

measures the liquidity position of a firm and is useful internally to finance manager and externally to creditors, lenders, banks and investors (Kothari, 2017).

The ratio is the absolute measure of liquidity besides to measure firms' margin of safety that management needs to maintain by harmonizing unavoidable disproportion funds flow from working capital components. Current ratio is the net amount of all the components of working capital and is projected to make understand whether a firm has sufficient amount of short-term net funds to carry on its operation. Considering the overall importance of the ratio in managing firm's short-term solvency, the author hypothesizes that,

H5: While managing working capital, all the automotive companies maintain uniform level of current ratio that makes them appropriate to meet their all-current potential demands in a manner that minimize cost and maximize value.

ACCOUNTS PAYABLE MANAGEMENT

Accounts payables, a key component of working capital, is the largest single category of firm's current liabilities and an outcome of supplier financing. Accounts payables management demonstrates as spontaneous source of financing in the sense that it arises from ordinary business transactions and advances as a source of financing current assets. The ultimate test of liquidity is the ability of the firm to meet its current obligations, therefore, if a firm is able to honor its ongoing financial obligations, its working capital management can be regarded as efficient. Accounts payable management is an important part of a firm's financial strategy as it takes discipline to avoid viewing managers' cash and credit purchases equally. It facilitates immediate input procurements with delayed payment terms and in the process, firms must match their incoming payments with outgoing obligations (Hill, et al., 2012). However, when suppliers offer delayed payment terms there is an implicit cost associated with the transactions. The implicit cost of credit should be compared with the opportunity cost of cash in concluding the offer. Accounts payables represent around 40% of current liabilities of the average non-financial firms and a major portion of management time is employed in managing the same. Accordingly, the author hypothesizes that,

H6: While managing working capital, all the automotive companies have established uniform efficiency level in utilizing trade credits that the cost of availing the credit is lessor than the sourcing costs.

METHODOLOGY

Methodologies adopted in the paper, consists of four parts.

In the first part, ten major global automotive companies, on the basis of their positioning in the marketplace having business operations in advanced, developing and emerging countries, are selected for analysis. Correlation matrix is used for analysis to demonstrate correlation between working capital and six sample variables (components of working capital) influencing working capital management. However, due to the presence of reasonable level of collinearity among variables, it becomes difficult to take a conclusive decision. Therefore, quantitative factor matrix is developed. Wherein the impacts of working capital components are developed numerically by presenting +ve and -ve to examine and to evaluate the key factors (receivables, inventories, cash and accounts payables) that influence firm's working capital management process. A ranking on the basis of quantitative factor matrix is also established.

In the second part, due to the existence of high correlation between pair of predictor variables and also as the quantitative factor matrix has not proved to be strong enough to take an absolute decision, a further study is contemplated by analyzing key ratios to reach at a concluding decision. Six ratios like, current asset turnover ratio, receivable turnover ratio, inventory turnover ratio, cash ratio, current ratio and accounts payable ratio, are analyzed using single factor ANOVA test to find out the efficiency level of automotive companies in working capital management process. A ranking is also drawn based on the outcome of the analysis.

Third, the purpose of the paper is also to study managements' consciousness on the objective of working capital management process and therefore, to measure objectivity level of each automotive companies working capital management process, diverse techniques are used to find out the leaders amongst the global automotive players. Combining the ranking on the influence of working capital components and the ranking on the contribution of ratios in managing working capital process, an overall ranking is made.

Fourth, a well-managed working capital, contributes highly to firm's value creation enabling investors for potential investment. Techniques like correlation matrix, quantitative factor matrix and ratio analysis techniques are used to bring a conclusive decision in identifying the leaders of automotive industry. As an outcome, investors are facilitated in selecting the most commendable automotive companies for investments.

SAMPLING AND DATA ANALYSIS

The major ten global companies from the automotive industry are chosen on the basis of their position in the marketplace and profiles. The study implicates the analysis of automotive companies past ten years (2011-2020) performance data, sourced from their annual reports. The following two major statistical techniques are used for analysis.

First, correlation matrix is used as inputs for exploratory factor analysis in evaluating the influence of working capital components in managing working capital.

CORRELATION MATRIX

Correlation coefficients are used to measure how strong a relationship exist between two variables and is important to examine for detecting the problem of multi-collinearity i.e., existence of high correlation between pair of predictor variables (Chawla & Sondhi, 2011). If correlation coefficient between any pair of predictable variables is greater than 0.75, it indicates that both the variables in that particular pair share a large amount of common shared variance and may reflect same attribute. The matrix is used as inputs for exploratory factor analysis to find out in what way working capital components influence in taking working capital management decision.

Second, as "Analysis of variance" is used in testing hypothesis to recognize how different groups respond to each other by connecting between independent and dependent variables, it is tested here on the key ratios of automotive companies, contributing to working capital management process with a view to draw a concluding inference.

ANOVATEST

Analysis of Variance (ANOVA) is a technique to investigate any number of factors. If there is one independent variable (one factor i.e., working capital here) divided into various categories, then it is termed as one factor analysis of variance. The computed duly analyzed value is compared with the table value for accepting or rejecting the hypothesis. The one-way analysis of variance is used to find

out the presence of any statistically significant differences between means of two or more independent groups, (Chawla & Sondhi, 2011). The null hypothesis for the ANOVA test is that the two means are equal whereas a significant result means that the two means are unequal. One-way analysis of variance for ten automotive companies are showcased through table 13 to table 18.

ANALYSIS AND FINDINGS

Working capital management plays a commanding role in a firm's financial sustainability as it can directly affect liquidity, profitability and solvency which compel firms to monitor working capital components in generating adequate cash flow. Therefore, automotive companies are compelled to lay constant efforts in improving working capital management process besides maintaining additional short-term financing yield.

FIRST OBJECTIVE

“Influence of Working capital components on working capital management.”

In the study, ten major global automotive manufacturing companies having business operations in advanced, developing and emerging countries, are selected on the basis of their position in the marketplace and profiles. Correlation matrix is used to measure the influence of working capital components in managing working capital process.

BAYERISCHE MOTOREN WERKE AG (BMW)

The BMW Group operates more than 140 countries with a workforce of 134,628 employees. In the year ending Dec'2020, BMW registered gross income of Euro19,271Million against a sale of Euro 98990Million with year-on-year negative growth of 19.75% (Margin 19.47%). In full-year 2020, the BMW Group delivered 2,324,809 BMW, MINI, and Rolls-Royce vehicles (-8.4%) to customers worldwide. The group has made an excellent start to the financial year 2021 mainly due to strong demand for electrified vehicles. Deliveries to customers in the period from January to March increased significantly by 33.4 % to 636,606 units (2020: 477,111units). BMW Group registered a growth in revenues by 15.2 % to €26,778 million against €23,252 million (Jan –March'2020). Gross profit for the first quarter 2021 amounted to €5,190 million (2020: €3,534 million). As a result of the various factors, Group Q1 profit before tax climbed by €2,959 million to €3,757 million (2020: €798 million).

Table 1. Correlation Matrix: Factors Affecting Working Capital (In Million US Dollars)

BMW (In Million Dollar) (1 Euro = US \$1.20)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2010D	9456	41206	31750	2516	9309	6707	4694
2011D	11174	44806	33632	3770	11552	6998	5814
2012D	11340	47251	35911	2903	11657	8980	7135
2013D	10502	47532	37030	2765	11492	8121	8362
2014D	11007	51860	40853	2418	13297	6902	8545
2015D	9398	52336	42938	3110	13277	4742	8543
2016D	13025	56041	43016	3175	14203	5753	9343
2017D	15846	62140	46294	3017	15220	8598	10645
2018D	14067	63197	49130	2454	16367	10372	10450
2019D	14206	79020	64814	2897	18100	10906	11072
Working Capital	1						
Current Assets	0.7705	1					
Current Liabilities	0.6703	0.9895	1				
Receivables	0.0244	-0.1035	-0.1261	1			
Inventories	0.7940	0.9695	0.9486	-0.0695	1		
Cash & Cash Eqv	0.6300	0.6195	0.5783	-0.3003	0.5584	1	
Accounts Payables	0.7743	0.8814	0.8506	-0.1657	0.9270	0.4742	1

Note: Observations

- Exhibits correlation between working capital and six sample variables (components of working capital) influencing working capital management.
- Displays the presence of reasonable level of collinearity among variables and existence of relatively high correlation (>0.75) between some pairs of variables confirming the need to carefully scrutinize the impact of multi-collinearity on the samples.

BMW maintains positive operating and cash conversion cycle throughout with an average of 71 days and 34 days, indicating holding of strong position in managing working capital. While working capital is positively correlated with four variables and negatively correlated with two variables, the correlation is considered satisfactory and signifies maintaining prudent working capital management process.

FORD MOTOR COMPANY

Since 1903, Ford Motor Company, had put the world on wheels and established as a global automotive company with an employee strength of around 190,000 worldwide. The Ford Motor Company registered revenue just over US\$127 billion in 2020 with a decline of about 22 percent year-on-year. Vehicles sale also made a deep from 5.4 million (2019) to 4.2 million (2020). Ford Motor Company's Q1 2021 revenue increased to US\$36.2bn (up US\$2.2bn compared to 2020) and produced a net income of

US\$3.3bn. Ford's balance sheets also continue to remain strong with its cash flow exceeding US\$31bn, and its total liquidity above US\$47bn. Ford commands 5.59% of the global automotive market share with a brand value as of 2020 sat at \$10.07 billion.

Table 2. Correlation Matrix: Factors Affecting Working Capital (In Million US Dollars)

Ford Motor Company (Amount in Million US Dollar)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2010D	6470	33086	26616	3992	5917	6301	15010
2011D	10660	36791	26131	4219	5901	7965	16749
2012D	13311	41760	28449	5361	7362	6247	18151
2013D	11800	41073	29273	5641	7708	4959	18151
2014D	6518	38758	32240	5789	7870	4567	18876
2015D	11050	42574	31524	5173	8319	5386	19168
2016D	10793	43152	32359	4457	8898	7820	20239
2017D	8706	43498	34792	4049	10277	8930	22115
2018D	7812	41575	33763	3698	11220	7111	20426
2019D	7199	39516	32317	3618	10786	8437	19681
Working Capital	1						
Current Assets	0.4829	1					
Current Liabilities	-0.2814	0.7043	1				
Receivables	0.4560	0.1905	-0.1609	1			
Inventories	-0.2598	0.6277	0.8985	-0.4140	1		
Cash & Cash Eqv	-0.1127	0.1424	0.2475	-0.8209	0.4213	1	
Accounts Payables	-0.0069	0.8501	0.9372	-0.1536	0.8652	0.4051	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

Ford has positive operating cycles throughout with an average of 36 days and negative cash conversion cycles of 18 days, quantify more dependence on creditor's financing. While working capital is positively correlated with four variables and negatively correlated with two variables, the correlation is considered to be satisfactory and signify maintaining prudent working capital management process.

GENERAL MOTORS COMPANY

General Motors Company (GM) established in 1908 and it's headquartered is situated in the state of Michigan, US. GM's automotive business is divided into GM North America (GMNA), GM International (GMI) and GM Corporate. GM's annual revenue registered at US \$122.5 billion and declined by more than 10% in FY2020 compared to the prior year. Full-year automotive operating cash flow marked at

US\$7.5 billion with adjusted automotive free cash flow of US\$2.6 billion. Sales ended December 2020, reached at 3.370 million units from 4.209 Million units in Dec'2019. During the 1Q of 2021, revenue registered at US\$3.5 billion with a net income of US\$3.0 billion (9.3% margin) with EBIT-adjusted of US\$4.4 billion (13.6% margin). Automotive operating cash flow in Q1 exhibited at US\$(1.1) billion with an adjusted automotive free cash flow of \$(1.9) billion.

Table 3. Correlation Matrix: Factors Affecting Working Capital (In Million US Dollars)

General Motors Company (Amount in Million US Dollar)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2010D	10213	50485	40272	8699	12125	21061	21497
2011D	18857	61145	42288	9949	14324	15499	24551
2012D	14023	56523	42500	10395	14714	18422	25166
2013D	15975	56874	40899	8535	14039	20021	23621
2014D	14207	57382	43175	9078	13642	18954	22529
2015D	15311	59956	44645	8337	13764	15238	24062
2016D	6479	60076	53597	8700	11040	12574	23333
2017D	4306	48223	43917	8164	10663	15512	23929
2018D	8773	48443	39670	6549	9816	20844	22297
2019D	9391	48391	39000	6797	10398	19069	21018
Working Capital	1						
Current Assets	0.6557	1					
Current Liabilities	-0.2771	0.5437	1				
Receivables	0.5324	0.6814	0.2754	1			
Inventories	0.8676	0.7334	-0.0311	0.8231	1		
Cash & Cash Eqv	0.1327	-0.5421	-0.8374	-0.2841	-0.0336	1	
Accounts Payables	0.3883	0.6051	0.3384	0.6991	0.6252	-0.5085	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

General Motors maintains a positive operating cycle throughout with an average of 57 days and negative cash cycle of 9 days, indicating reliance on creditor's funding. While working capital is positively correlated with five variables and negatively correlated with one variable, the correlation is considered highly satisfactory, signifies maintaining efficient working capital management process.

HYUNDAI MOTOR COMPANY

Hyundai Motor Company, established in 1967, is the world's fastest-growing South Korean automotive company. In the year ending December 2020, full year revenue, registered at KRW 103.998 trillion with

a declining trend of around 2% y-o-y from KRW 105.746 trillion. Hyundai's 2020 global sales marked at 3.74 million units, down 15.4% (y-on-y). Korea sales rose 6.2% but overseas sales retreated 19.8% amid COVID-19. Net profit for the year 2020 was restricted to KRW1.925 million, a drop of 39.6% year on year. The company aims for a total sale of 4.16 million vehicles this year ending December'2021.

Table 4. Correlation Matrix: Factors Affecting Working Capital (In Million US Dollars)

Hyundai Motor Company							
(In Million Dollar) (1 South Korean Won = US \$0.0009)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2010D	5625	37231	31606	7901	10372	8451	14647
2011D	1142	26342	25200	5477	5614	5608	9377
2012D	10084	34182	24098	5392	6050	6083	10245
2013D	10387	33910	23523	5943	6365	6185	10269
2014D	12055	38274	26219	6725	6675	6387	10555
2015D	9100	39376	3276	7483	8279	6598	10613
2016D	10237	42825	32588	6856	9471	7101	10739
2017D	12312	43595	31283	6161	9252	7939	10371
2018D	9271	42429	33158	6199	9643	8202	11772
2019D	6297	41314	35017	6224	10497	7814	12356
Working Capital	1						
Current Assets	0.6253	1					
Current Liabilities	-0.0182	0.7689	1				
Receivables	0.0757	0.4195	0.4754	1			
Inventories	0.0483	0.7765	0.9553	0.5729	1		
Cash & Cash Eqv	0.1136	0.7280	0.8396	0.4837	0.9322	1	
Accounts Payables	-0.1813	0.3417	0.5863	0.6493	0.7476	0.7866	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

Hyundai has positive operating cycles and cash conversion cycles throughout with an average of 78 days and 18 days, indicating holding of overall strong position. While working capital is positively correlated with all the six variables, the correlation is considered to be very sound and signifies maintaining high efficient working capital management process.

RENAULT

Renault group employing more than 183,000 people, a French multinational covering 134 countries through 40 manufacturing sites and 12800 points of sales and after-sales, manufactured multi brand

car since 1898. Renault Group and AVTOVAZ (Russia's leading automaker) have been strengthening their ties since 2008. In the context of the Covid-19 pandemic, in 2020, Group Renault worldwide sales totaled 2,951,971 vehicles, down by 21.3%. Group revenues, ending December' 2020 reached €43,474 million (-21.7%). In the year ending December'2020, excluding AVTOVAZ, Renault's automotive sales revenues registered at €37,736 million with a reduction of 23% year on year. Operating margin excluding AVTOVAZ, also hit at a level of (€1,450) Million, which represented -3.8% of revenues (2020) compared to +2.6% in 2019. AVTOVAZ's operating margin reached €141 Million (2020) against €155 Million in 2019 due to the impact of Covid-19. Renault Group achieved revenues of €10 billion (-1.1%) in the first quarter of 2021 however excluding AVTOVAZ, the revenue stood at €8.6 billion. Revenue generated by AVTOVAZ in the quarter registered at €685 Million with a reduction of 2.3%. During the quarter ending March'2021, Renault Group vehicles sales registered a growth of 1.1% and scored at 665,038 vehicles includes 42,951 electric and hybrid vehicles.

Table 5. Correlation Matrix: Factors Affecting Working Capital (In Million Dollars)

Renault (Million US Dollar) (1 Euro = US \$1.1200)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2010D	4981	20745	15764	1696	5475	10576	7688
2011D	5556	19712	14156	1625	5290	9141	7682
2012D	6953	21390	14437	1434	4590	12086	7995
2013D	6931	20922	13991	1237	3745	12844	7619
2014D	7489	23171	15682	1691	4033	13909	8681
2015D	6703	24864	18161	1745	4905	13885	10067
2016D	7052	28527	21475	2613	6922	14516	11517
2017D	8812	29128	20316	2420	7539	14213	12022
2018D	9610	28031	18421	1704	7004	14132	11635
2019D	8812	28273	19461	1525	6877	14758	11907
Working Capital	1						
Current Assets	0.7940	1					
Current Liabilities	0.5544	0.9461	1				
Receivables	0.1776	0.6476	0.7921	1			
Inventories	0.5493	0.8238	0.8353	0.6718	1		
Cash & Cash Eqv	0.7815	0.8350	0.7268	0.3633	0.3882	1	
Accounts Payables	0.7880	0.9915	0.9377	0.6154	0.8542	0.7853	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

RENAULT has positive operating cycles throughout with an average of 53 days and negative cash conversion cycles of 16 days, indicating reliance on creditors' financing. While working capital is

positively correlated with four variables and negatively correlated with two variables, the correlation is considered to be satisfactory and signifies maintaining prudent working capital management process.

SAIC MOTOR CORPORATION LTD

SAIC Motor is the largest automotive company of China. December ended 2019, SAIC Motor delivered 6.238 million vehicles contributing 22.7 percent of domestic market and continued the status as domestic leader. With a consolidated sales revenue of US\$122.4 billion, SAIC Motor globally ranked 7th position in the automobile industry beside to stand at 52nd position in “Fortune Global 500 list of 2020”. SAIC Motor showed y-o-y improvements in almost all the performance areas. In 2020, SAIC generated a gross revenue of CNY 742.132 billion, reflecting a decline of 12.0% year over year. In the current year, till April’2021, SAIC sold around 1.56 million vehicles with a growth of 42.4% (year on year) and continued leadership. In the month of April alone, SAIC sold 419,500 vehicles, including 50,000 new energy vehicles (NEVs) with an increase of 432.2% (year on year). In a one-month period, export sales reached 42,900 (+62.6%), including 29,000 self-branded vehicles (+127%), year on year basis. SAIC Motor has fixed a target to sell more than 500,000 NEVs in the current year.

Table 6. Correlation Matrix: Factors Affecting Working Capital (In Million Dollars)

SAIC MOTOR CORPORATION LIMITED							
(In Million US Dollar) (1 RMB = US \$0.15)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2010D	4641	26392	21751	1592	3580	10615	9548
2011D	5065	28684	23619	1796	4388	10823	10981
2012D	5586	28373	22787	2314	3742	9127	7172
2013D	7766	34827	27061	2886	4637	13364	9161
2014D	6633	35556	28923	3104	5814	13192	9904
2015D	3099	40489	37390	4399	5586	10901	14855
2016D	6570	49655	43085	4599	5556	15892	15710
2017D	1336	58492	57156	5200	7506	18241	18167
2018D	7271	68006	60735	6019	8841	18565	18789
2019D	7100	74963	67863	6201	8160	19174	20562
Working Capital	1						
Current Assets	0.1136	1					
Current Liabilities	-0.0033	0.9931	1				
Receivables	0.0365	0.9645	0.9665	1			
Inventories	0.0605	0.9509	0.9500	0.9361	1		
Cash & Cash Eqv	0.1417	0.9408	0.9303	0.8820	0.9135	1	
Accounts Payables	-0.1113	0.9447	0.9639	0.9340	0.9013	0.8742	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

SAIC has positive operating cycles throughout with an average of 34 days and negative cash conversion cycles of 16 days, indicating reliance on creditors financing. While working capital is positively correlated with all the six variables, the correlation is considered to be very sound and signifies maintaining high efficient working capital management process.

SUZUKI MOTOR CORPORATION

With the technical capabilities and future economic growth, Michio Suzuki in 1937 decided to bet on automobile manufacturing switching from looms business. In the year ended March'2020, net revenue declined by ¥375.1 billion (10.6%) to ¥3,157.4 billion year-on-year owing to losing sales in India and Pakistan while operating income reduced by ¥106.7 billion (35.1%) to ¥197.1 billion year-on-year owing to appreciation of Yen, increased in depreciation expenses due to tech upgradation and partly owing to the impact of Covid-19. In the year ending March'2021, overall sales and operating profit both registered a negative growth of 8.9% (¥310.2 billion) and 9.6% (¥20.7 billion), year on year and reached

¥3,178.2 billion and ¥194.4 billion respectively. Due to the improvement in financial revenue, ordinary profit, however, increased by ¥2.9 billion (1.2%) to ¥248.3 billion year-on-year.

Table 7. Correlation Matrix: Factors Affecting Working Capital (In Million Dollars)

SUZUKI MOTOR CORPORATION (Million US Dollar) (\$1 = ¥105)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2011	5402	13075	7673	1949	2208	7099	2545
2012	4500	14376	9876	2420	2283	7946	3380
2013	6434	14859	8425	2411	2489	7987	3337
2014	6989	17055	10066	2959	2631	9251	4132
2015	8154	19131	10977	3017	2994	10887	4571
2016	4636	15549	10913	3193	2726	7397	3834
2017	7312	18628	11315	3326	3163	9835	4076
2018	6656	18486	11831	3704	3361	9020	4227
2019	2692	15450	12758	4245	3351	6654	3118
2020	2992	14664	11672	4070	3386	5756	2457
Working Capital	1						
Current Assets	0.6847	1					
Current Liabilities	-0.2717	0.5154	1				
Receivables	-0.3997	0.3569	0.9412	1			
Inventories	-0.1523	0.5421	0.8948	0.9428	1		
Cash & Cash Eqv	0.9226	0.8313	0.0129	-0.2040	0.0050	1	
Accounts Payables	0.7599	0.8857	0.2761	0.0513	0.1738	0.8968	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

SUZUKI has positive operating and cash conversion cycles throughout with an average of 84 days and 23 days, indicates holding satisfactory position. While working capital is positively correlated with three variables and negatively correlated with three variables, the correlation is considered to be unsatisfactory and signifies maintaining weak working capital management process.

TATA MOTORS LIMITED

Tata Motors Group is a leading global automobile manufacturing company comprising of \$35 billion organization. The group is pioneer in providing wide range of trucks, buses and defense vehicles and sports vehicles and one of the largest OEM in India and present wide-ranging integrated, smart and e-mobility solutions. In the full year ending March'2021, Tata Motors, including exports, sold vehicles of 484,591 units with an increase of 2%, and achieved revenues of ₹47.0KCr with a growth of 7.1%

respectively, year on year basis. In the 4th quarter alone, including exports, Tata Motor sold 195,859 units (+90.2%). During the year, pre-tax loss before exceptional item stood at ₹3.7KCr against loss of ₹4.6KCr in FY20. However, free cash flow for the year registered at ₹2.7KCr. Tata Motors Limited sales in the domestic & international market for May 2021 stood at 26,661 vehicles.

Table 8. Correlation Matrix: Factors Affecting Working Capital (In Million Dollars)

TATA MOTORS LIMITED							
(In Million US Dollar) (1 US Dollar = 0.014 Indian Rupees)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2011	1663	7145	5482	914	1970	1597	3906
2012	463	9024	8561	1153	2550	2553	5136
2013	302	10381	10079	1534	2945	2956	6288
2014	2055	13418	11363	1480	3818	4159	8024
2015	2600	14246	11646	1761	4098	4496	8037
2016	3245	16144	12899	1819	4675	4603	8908
2017	3762	16257	12495	1971	4911	1958	8078
2018	2538	19036	16498	2785	5899	2060	10085
2019	635	17280	16645	2659	5461	3018	9592
2020	617	16742	16125	1564	5243	2585	8908
Working Capital	1						
Current Assets	0.3914	1					
Current Liabilities	0.0798	0.9485	1				
Receivables	0.2461	0.8593	0.8461	1			
Inventories	0.3265	0.9946	0.9650	0.8702	1		
Cash & Cash Eqv	0.1980	0.183	0.1300	0.0268	0.1044	1	
Accounts Payables	0.3153	0.9800	0.9530	0.8550	0.9674	0.3239	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

Tata Motors has positive operating cycles throughout with an average of 89 days and negative cash conversion cycle of 45 days, indicates dependence on creditors financing. While working capital is positively correlated with four variables and negatively correlated with two variables, the correlation is considered to be satisfactory and signifies maintaining prudent working capital management process.

TOYOTA MOTOR CORPORATION

Toyota Motor Corporation, Headquarters in Japan, established as one of the largest automobile manufacturers in the world. Due to the impact of COVID-19, consolidated vehicle unit sales reduced by 19 thousand units, or 0.2% less, to register at 8,958 thousand units in FY2020, resulted decrease in operating income by 160.0 billion yen. Net revenues for the automotive operations decreased by 215.5 billion yen, or 0.8%, to 26,863.5 billion yen in FY2020 compared with FY2019. However, operating income increased by 13.4 billion yen, or 0.7%, to 2,052.3 billion yen in FY2020 compared with FY2019. The increase in operating income was mainly due to cost reduction efforts, as well as the decrease in expenses and expense reduction efforts. Sales revenues for the automotive operations decreased by 2,148.1 billion yen, or 8.0%, to 24,651.5 billion yen, and operating income decreased by 405.9 billion yen, or 20.2%, to 1,607.1 billion yen in FY2021 compared with FY2020. The decrease in operating income was mainly due to decreases in both production volume and vehicle unit sales. Toyota global sales secures 859,000 Units for April 2021.

Table 9. Correlation Matrix: Factors Affecting Working Capital (In Million Dollars)

TOYOTA MOTOR CORPORATION (Million US Dollar) (\$1 = ¥105)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2011	14217	61984	47767	14129	12420	12386	14259
2012	8691	68933	60242	19347	15449	10520	21279
2013	13180	72941	59761	19370	16339	10547	19930
2014	17943	84462	66519	20021	18043	13446	20764
2015	26161	96639	70478	20752	20353	1609	22594
2016	32932	104953	72021	19897	19629	22078	22441
2017	20246	97962	77716	20872	22747	21496	24191
2018	20125	100950	80825	21949	24186	22767	24347
2019	25351	106316	80965	23706	25299	26573	24916
2020	24938	99311	74373	20532	23189	26423	22899
Working Capital	1						
Current Assets	0.8581	1					
Current Liabilities	0.6253	0.9373	1				
Receivables	0.4481	0.8005	0.9124	1			
Inventories	0.6159	0.9190	0.9786	0.8838	1		
Cash & Cash Eqv	0.7409	0.8814	0.8366	0.6329	0.8877	1	
Accounts Payables	0.5020	0.8514	0.9532	0.9583	0.9055	0.6935	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

Toyota has positive operating and cash conversion cycles throughout with an average of 68 days and 27 days, indicates holding strong position. While working capital is positively correlated with four variables and negatively correlated with two variables, the correlation is considered to be satisfactory and signifies maintaining prudent working capital management process.

VOLKSWAGEN AG

Volkswagen AG employing 119,394 people, is a major German automobile manufacturer and was founded by the German government in 1937. As of December 31, 2019, the group sold 10,974,636-unit vehicles globally, a rise of 1.3% y-o-y and set a new record. During the period ending Dec'2020, the Covid-19 pandemic had a strong impact on the group business. The group unit sales fell by 11% at 9.2 million vehicles and sales revenue reduced by 11.8% to Euro 222.9 bn. The group before special items, generated an operating profit of Euro 10.6bn, reduced by 19.3, year on year basis. Volkswagen has not only started introducing the ID badged electric cars to the world but is now coming up with performance variants of these EVs. Based on the positive business performance in the first quarter of 2021, the Volkswagen Group has revised its forecast for operating profit, net cash flow and net liquidity. The Volkswagen Group raised the outlook for its operating margin for full year 2021 to 5.5 to 7.0 percent.

Table 10. Correlation Matrix: Factors Affecting Working Capital (In Million Dollars)

VOLKSWAGEN AG							
(In Million US Dollar) (1 EURO = US \$1.20)							
Year	Working Capital	Current Assets	Current Liabilities	Receivables	Inventories	Cash & Cash Eqv	Accounts Payables
2010D	23733	59273	35540	12535	19672	20903	11681
2011D	18125	71706	53581	18593	30454	17357	18294
2012D	21109	73538	52429	18199	31042	18554	18796
2013D	22603	81984	59381	19750	30696	24540	18898
2014D	13227	83017	69790	18812	33923	19799	21046
2015D	9775	88823	79048	18378	37643	18826	22451
2016D	132	97299	97167	21073	41936	17438	24904
2017D	12599	96252	83653	20825	43335	16591	24596
2018D	28067	109645	81578	15640	49562	29003	25154
2019D	35833	111697	75864	21363	50278	23615	23524
Working Capital	1						
Current Assets	0.1380	1					
Current Liabilities	-0.4238	0.8386	1				
Receivables	-0.2693	0.5239	0.6272	1			
Inventories	0.1185	0.9853	0.8359	0.5369	1		
Cash & Cash Eqv	0.6909	0.4090	-0.0060	-0.3073	0.3216	1	
Accounts Payables	-0.2221	0.9055	0.9502	0.6585	0.9263	0.1036	1

Note: Observations

- Exhibits correlation between working capital and six sample variables with the existence of a few high collinearities (>0.75) confirming multi-collinearity on the samples.

Volkswagen has positive operating and cash conversion cycles throughout with an average of 102 days and 60 days, indicates holding strong position. While working capital is positively correlated with five variables and negatively correlated with one variable, the correlation is considered to be highly satisfactory and signifies maintaining efficient working capital management process.

As an out-come of the data analysis (Table 1 through 10), it is found that a number of pair of predictable variables are greater than 0.75, indicates that both the variables in that particular pair united a large amount of common shared variance and may reflect same attribute. Therefore, there are thoughtful problems of multicollinearity, and the model is not fully supportive in concluding decision. Therefore, to ascertain the influence of working capital components in managing working capital, an additional test “quantitative factor matrix technique” is used. Impact of working capital components on working capital management are numerically presented as +ve and -ve in developing working capital quantitative factor matrix to examine and to evaluate the key factors (receivables, inventories, cash and accounts payables) that influence firm’s working capital management process.

Table 11. Summary of Working Capital Quantitative Factor Matrix

Particular	Relationship with working capital	Automotive Company	Outcome
Current Assets	Favourable (Positive)	All the ten automotive companies	Efficient management of working capital due to the outcome of prudent current assets management.
	Unfavourable (Negative)	Nil	Nil
Current Liabilities	Favourable (Negative)	Ford, GM, Hyundai, SAIC, Suzuki & Volks	Recognize efficient management of current liability financing, resulted efficient working capital management.
	Unfavourable (Positive)	BMW, Renault, Tata & Toyota	Lack in establishing well balanced policies towards cash inflows and outflows, creating mismatch in current liability management.
Receivables	Favourable (Positive)	BMW, Ford, GM, Hyundai, Renault, SAIC, Tata, Toyota	Realization of cash at a faster speed from customers, contribute more to profitability in establishing prudent working capital management.
	Unfavourable (Negative)	Suzuki & Volks	Fails to realize cash quickly from customers, due to week collection mechanism or having liberal credit policy, prone to lose business.
Inventories	Favourable (Positive)	BMW, GM, Hyundai, Renault, SAIC, Tata, Toyota, Volks,	Inventories turn to cash quickly resulting reduction in holding costs besides contributing more to profitability and establishing efficient working capital management.
	Unfavourable (Negative)	Ford & Suzuki,	Fails to manage inventory effectively resulting in high inventory holding costs and minimal contribution to productivity and profitability.
Cash & Cash Equivalent	Favourable (Positive)	BMW, GM, Hyundai, Renault, SAIC, Suzuki, Tata, Toyota & Volks	Shows high effectiveness in generating funds internally besides managing liquidity and profitability trade-off prudently.
	Unfavourable (Negative)	Ford	Exhibits in-effectiveness in generating funds internally due to lack in managing liquidity and in maintaining profitability in tune with business volume.
Payables	Favourable (Negative)	Ford, Hyundai, SAIC & Volks	Shows efficiency in establishing well netted supplier's policy, creating positive liquidity in supporting working capital management.
	Unfavourable (Positive)	BMW, GM, Renault, Suzuki, Tata & Toyota	Displays in- efficiency in establishing requisite supplier's policy, prone to high liquidity problem.

Note: Working capital quantitative factor matrix is developed to examine how the key factors positively or negatively influence working capital management process. It is evident from the matrix that the factors (working capital components) relate to assets, policies, convertibility and operations.

RANKING: QUANTITATIVE FACTOR MATRIX

On the basis of working capital factors matrix (Table 1 through Table 10) influencing working capital management process, ranking is developed (Table 12) by symbolizing quantitative factors effect as +ve or -ve as depicted in table 11. As an outcome of the ranking, based on quantitative factors matrix, it is possible to rank automotive companies on how each company has deployed working capital components in managing working capital.

Table 12. Ranking of Quantitative Factors Matrix

Automotive Manufacturer	Current Assets	Current Liabilities	Receivables	Inventory	Cash	Accounts Payables	No of + VE	Rank
Bayerische Motoren Werke AG (BMW)	+ve	-ve	+ve	+ve	+ve	-ve	4	3
Ford Motor Company	+ve	+ve	+ve	-ve	-ve	+ve	4	3
General Motors Company	+ve	+ve	+ve	+ve	+ve	-ve	5	2
Hyundai Motor Company	+ve	+ve	+ve	+ve	+ve	+ve	6	1
Renault	+ve	-ve	+ve	+ve	+ve	-ve	4	3
SAIC Motor Corpn Ltd	+ve	+ve	+ve	+ve	+ve	+ve	6	1
Suzuki Motor Corporation	+ve	+ve	-ve	-ve	+ve	-ve	3	4
Tata Motors Limited	+ve	-ve	+ve	+ve	+ve	-ve	4	3
Toyota Motor Corporation	+ve	-ve	+ve	+ve	+ve	-ve	4	3
Volkswagen AG	+ve	+ve	-ve	+ve	+ve	+ve	5	2

Note: As an out-come of (Table 12), Hyundai Motor Company and SAIC Motor Corporation Ltd, both are placed in the top, followed by General Motor Company and Volkswagen AG while Bayerische Motoren Werke AG(BMW), Ford Motor Company, Renault, Tata Motors Limited and Toyota Motor Corporation, all are placed in 3rd position, rest i.e., Suzuki Motor Corporation takes 4th position.

FINDINGS

- Correlation matrix (Table 1 through Table 10) displays the presence of reasonable level of collinearity with a few existences of high collinearity (>0.75), resulting the need to carefully scrutinize the impact of multi-collinearity on the samples. It is also important to examine for detecting the problem of multicollinearity i.e., existence of high correlation between pair of predictor variables. As an outcome of the analysis, it is found that a number of pairs of predictable variables are greater than 0.75, therefore, there are thoughtful problems of multicollinearity, and the model is not fully supportive in accomplishing the research

objectives. The findings from these studies indicate a definite relationship between working capital management and the components of working capital that contributes firm survival, liquidity, solvency and profitability.

- The findings of this study also have important practical (managerial) implications towards the purpose of using inputs for exploratory factor analysis to find out, in what way, key factors (working capital components) complement the automotive companies in taking decision on working capital management.
- The findings of the study can be concluded that automotive companies are lacked in maintaining uniformity in managing working capital and companies also have different techniques of deploying working capital components in managing working capital.

SECOND OBJECTIVE

“To evaluate and compare the efficiency level of major global automotive companies in managing working capital.”

To come up with a concluding decision, the author looks for additional factors by embracing robustness test. Sandhar & Janglani (2013), explained that working capital management could be evaluated using either static or dynamic measures. Static measures include key ratio analysis whereas dynamic measures are based on working capital components. To conclude on the outcome of research objectives and to arrive at a conclusive conclusion, a further study is contemplated to analyze the key ratios of ten global automotive companies.

ACTIVITY RATIO

Activity ratios indicate the utilization of assets to generate revenues and occupy an important role in assessing business operational efficiency. The ratios are not only present how the firm generate revenue but also shows how well a firm has been managing its working capital components i.e., whether the existence of each working capital components as shown in the balance sheet are justified, too high or too low in view of current and projected sales level. Achieving and maintaining activity ratios at an optimal level indicates efficiency in managing working capital. Some of the key activity ratios influencing working capital management are examined.

CURRENT ASSETS TURNOVER RATIO

Current asset turnover ratio indicates how efficiently a firm uses its current assets to generate revenue. A high current assets turnover ratio indicates the capability of a firm to achieve maximum revenues with the minimum investment. The ratio is thus used as an indicator towards firm’s efficiency in using current assets to maximize revenue. The ratio is arrived by applying the formula,

$$\text{Current Asset Turnover Ratio} = \frac{\text{Net Revenue}}{\text{Average Current Assets}}$$

(Eq. 1)

The ratio facilitates investors to evaluate company’s overall efficiency performances to taking investment decision.

Table 13. Single Factor ANOVA for Ten Major Global Automotive Companies Current Assets Turnover Ratio (Expressed in Decimal)

	Current Assets Turnover Ratio (Ten Major Global Automotive Companies)									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bayerische Motoren Werke AG (BMW)	1.7254	1.8044	1.8692	1.8265	1.8557	2.0160	1.9597	1.8453	1.6854	1.5872
Ford Motor Company	3.3997	3.6684	3.2225	3.3651	3.4017	3.4566	3.3023	3.3619	3.4863	3.5417
General Motors Company	2.5291	2.6671	2.5546	2.6825	2.6448	2.4872	2.3361	2.4674	2.7547	2.5342
Hyundai Motor Company	2.7329	2.6723	3.0894	2.7280	2.6382	2.4993	2.4074	2.3219	2.3948	2.7491
Renault	2.4489	2.2956	2.1737	2.1994	2.1159	2.1538	2.2024	2.3418	2.2802	2.2266
SAIC Motor Corporation Ltd	2.0744	2.3591	2.5156	2.6741	2.8189	2.4724	2.4833	2.3782	2.1022	1.732
Suzuki Motor Corporation	1.7949	1.6052	1.6471	1.7202	1.5541	1.7095	1.7288	1.8897	2.1259	2.1506
Tata Motor Corporation	2.7047	2.9557	2.4858	2.7840	2.669	2.5807	2.3721	2.3436	2.3280	2.1486
Toyota Motor Corporation	2.3499	2.4726	2.7414	2.8778	2.6359	2.4545	2.3544	2.5278	2.4886	2.4884
Volkswagen AG	2.4081	2.6036	2.8557	2.7006	2.5823	2.5689	2.3986	2.4281	2.3437	2.3038

Table 13. Continued

Anova: Single Factor Summary						
Groups	Count	Sum	Average	Variance	Coefficient of Variation	Ranking
Bayerische Motoren Werke AG (BMW)	Current Assets	18.1747	1.8175	0.0160	6.9544	6
Ford Motor Company	Current Assets	34.2061	3.4206	0.0158	3.6750	1
General Motors Company	Current Assets	25.6576	2.5658	0.0152	4.8068	3
Hyundai Motor Company	Current Assets	26.2333	2.6233	0.0515	8.6521	7
Renault	Current Assets	22.4838	2.2438	0.0099	4.4319	2
SAIC Motor Corporation Ltd	Current Assets	23.6093	2.3609	0.1006	13.4313	10
Suzuki Motor Corporation	Current Assets	17.9261	1.7926	0.0420	11.4338	9
Tata Motor Corporation	Current Assets	25.4024	2.5402	0.0616	9.7703	8
Toyota Motor Corporation	Current Assets	25.3915	2.5391	0.0280	6.5871	4
Volkswagen AG	Current Assets	25.1935	2.5194	0.0302	6.9017	5

Anova						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	18.8854	9.0000	2.0984	56.5957	0.0000	1.9856
Within Groups	3.3369	90.0000	0.0371			
Total	22.2223	99.0000				

Note: Observations at 5% level of significance

- As the computed F statistics (Table 13) is greater than the tabled F value and p value (Almost 0) is also less than α (0.05), the null hypothesis is rejected.
- As per single factor ANOVA test (Table 13), the coefficient of variation (CV) depicts that Ford Motor Company has maintained the lowest value, which indicates that Ford Motor Company possess highest efficiency level in managing current assets.

Therefore, the hypothesis that,

H₁: All the automotive companies are uniformly focused on two aspects, one - fixation of current assets level, second - maintaining efficiently the optimal investment level of each type of current assets components in managing working capital, is accepted.

RECEIVABLES TURNOVER RATIO

Receivables turnover ratio measures the speed of average collection period of trade credits. The ratio quantifies a firm's effectiveness in collecting receivables and signifies possession of high proportion of quality customers that pays debts quickly. Conversely, a low receivables turnover ratio may be due to firms having a weak collection process coupled with bad credit policies in place or having financially unviable and less creditworthy customers. The ratio in the study is defined,

$$\text{Receivables Turnover Ratio} = \frac{\text{Net Revenue}}{\text{Average Receivables}} \quad (\text{Eq. 2})$$

The average collection period or average age of receivables, showcase firm's receivable management policies and influence the magnitude of receivables besides providing one of the key contributing factors in managing working capital.

Table 14. Single Factor ANOVA for Ten Major Global Automotive Companies Receivables Turnover Ratio (Expressed in Decimal)

Receivables Turnover Ratio (Ten Major Global Automotive Companies)										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bayerische Motoren Werke AG (BMW)	28.9697	24.6892	25.7869	30.5434	35.5863	37.9996	33.7922	35.2187	38.6120	42.1828
Ford Motor Company	32.3691	31.2186	26.4232	25.3352	23.7589	25.6460	29.3969	34.2471	38.2842	39.2562
General Motors Company	16.6876	15.9659	14.7754	16.0689	17.1569	16.7582	16.4589	15.8452	18.0987	18.3871
Hyundai Motor Company	10.3043	7.9253	10.7600	10.7760	9.9642	9.3371	9.5354	10.8962	11.8937	12.7637
Renault	28.6763	27.9651	29.2069	34.8409	31.8634	30.1106	26.9826	26.8261	31.6043	38.8256
SAIC Motor Corporation Ltd	34.38888	38.3495	34.9221	32.5004	33.1225	25.0582	24.8784	26.2468	23.7035	20.2545
Suzuki Motor Corporation	11.2966	10.7411	9.9677	10.2235	9.4103	9.5465	9.0634	9.9767	9.0761	7.7886
Tata Motor Corporation	18.4258	23.1205	31.4446	21.9827	23.0417	21.9067	20.2792	17.3915	15.5294	17.3095
Toyota Motor Corporation	10.2214	9.6697	10.0456	11.4987	11.7072	12.1727	11.7185	11.7423	11.2976	11.5667
Volkswagen AG	11.4878	10.9554	11.2734	11.0676	11.0495	11.8700	11.3163	11.2168	13.2335	13.7809

Table 14. Continued

Anova: Single Factor Summary						
Groups	Count	Sum	Average	Variance	Coefficient of Variation	Ranking
Bayerische Motoren Werke AG (BMW)	Receivables	202.8274	20.2877	96.2501	15.3083	7
Ford Motor Company	Receivables	200.6002	20.0600	110.4457	15.7340	8
General Motors Company	Receivables	204.6058	20.4606	99.9562	5.5931	1
Hyundai Motor Company	Receivables	204.8373	20.4837	96.2118	10.9507	6
Renault	Receivables	206.6608	20.6661	104.9605	8.5265	5
SAIC Motor Corporation Ltd	Receivables	200.4058	20.0406	94.2376	18.3715	9
Suzuki Motor Corporation	Receivables	193.4216	19.3422	81.3867	7.7350	2
Tata Motor Corporation	Receivables	199.6074	19.9607	96.9931	21.7608	10
Toyota Motor Corporation	Receivables	211.3330	21.1333	127.3791	8.0357	4
Volkswagen AG	Receivables	222.1155	22.2116	165.5062	6.0260	2

Anova						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	54.3027	9.0000	6.0336	0.0562	1.0000	1.9856
Within Groups	9659.9426	90.0000	107.3327			
Total	9714.2453	99.0000				

Note: Observations at 5% level of significance

- As computed F statistics (Table 14) is lessor than the table value of F and p value is greater than 0.05, the null hypothesis is accepted.
- As per single factor ANOVA test, (Table 14) the automotive companies do not have the same averages of receivables turnover ratio while coefficient of variation (CV) depicts that amongst ten automotive companies, General Motors Company has maintained the lowest value, which indicates that General Motor Company possess the highest efficiency level in managing its receivables.

Therefore, the hypothesis that,

H₂: While managing working capital, all the automotive companies possess uniform efficiency level in striking balance between returns that they receive out of receivables financing in the form of increased sales, profits and the cost incurred is rejected.

INVENTORY TURNOVER RATIO

Inventory turnover ratio represents the number of times inventory is “turned” to or sold during a specified period to achieve a revenue level. The higher the ratio, the greater the efficiency of inventory management. However, the presence of inventory involves two major risks, first, running out of stock due to low inventory (high turnover), second, excessive carrying costs because of high inventory (low turnover). The ratio is derived by applying the formula,

$$\text{Inventory Turnover Ratio} = \frac{\text{Costs of Goods Sold}}{\text{Average Inventory}} \quad (\text{Eq. 3})$$

Objective of inventory management, being the first component of cash conversion cycle, is to turn inventory as quickly as possible and not to lose sales from stock out.

Table 15. Single Factor ANOVA for Ten Major Global Automotive Companies Inventory Turnover Ratio (Expressed in Decimal)

Inventory Turnover Ratio (Ten Major Global Automotive Companies)										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bayerische Motoren Werke AG (BMW)	6.4035	5.9101	5.9729	6.1193	6.0594	6.4973	6.3416	6.0422	5.5964	5.5687
Ford Motor Company	19.0639	19.2268	17.0387	16.6151	16.0515	15.3241	14.7045	13.6983	12.6780	12.2415
General Motors Company	10.6844	10.7535	9.7903	9.3851	9.9767	9.3644	8.7936	10.5855	11.7233	10.8469
Hyundai Motor Company	7.1396	6.6323	10.0266	9.8386	9.6799	8.8713	9.1432	7.5755	7.7802	7.8731
Renault	7.2139	7.7492	8.2814	10.6436	11.4806	11.0658	9.5417	8.9583	7.2986	7.5904
SAIC Motor Corporation Ltd	14.3648	15.2425	17.1584	19.6506	18.2828	16.1835	19.6957	19.3114	16.0265	14.4806
Suzuki Motor Corporation	8.4896	8.1229	7.6605	7.9715	7.4169	7.7049	7.3157	7.7413	7.7726	7.1100
Tata Motor Corporation	5.5504	6.2438	5.8013	5.6120	5.3042	4.8654	4.6779	4.4907	4.4921	4.0015
Toyota Motor Corporation	11.7265	10.7960	10.7921	11.0735	10.3762	10.2218	9.6834	9.1724	9.0030	9.0912
Volkswagen AG	6.3655	5.6427	5.5478	5.6165	5.4341	5.2166	4.5497	4.4620	4.1672	4.0980

Table 15. Continued

		Anova: Single Factor Summary				Coefficient of	
Groups	Count	Sum	Average	Variance	Variation	Ranking	
Bayerische Motoren Werke AG (BMW)	Inventory	97.0021	9.7002	18.6583	5.1614	1	
Ford Motor Company	Inventory	96.3198	9.6320	20.2463	15.4521	9	
General Motors Company	Inventory	98.0699	9.8070	18.1311	8.6455	3	
Hyundai Motor Company	Inventory	102.5257	10.2526	21.7633	14.2956	7	
Renault	Inventory	100.0623	10.0062	19.1957	18.0153	10	
SAIC Motor Corporation Ltd	Inventory	95.3151	9.5315	14.8925	12.2612	5	
Suzuki Motor Corporation	Inventory	94.4472	9.4447	21.5751	5.1943	2	
Tata Motor Corporation	Inventory	92.0375	9.2038	20.4243	13.8348	6	
Toyota Motor Corporation	Inventory	86.5379	8.6538	14.4743	9.1416	4	
Volkswagen AG	Inventory	82.9018	8.2902	11.8381	14.6904	8	

		Anova				
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	32.2306	9.0000	3.5812	0.1976	0.9939	1.9856
Within Groups	1630.7918	90.0000	18.1199			
Total	1663.0224	99.0000				

Note: Observations at 5% level of significance

- As computed F statistics (Table 15) is lessor than the table value of F besides p value is greater than 0.05, the null hypothesis is accepted.
- As per single factor ANOVA test (Table 15), the automotive companies are not having the same averages of inventory turnover ratio while coefficient of variation (CV) depicts, BMW has maintained the lowest value, which indicates that BMW possess highest efficiency in managing its inventory level.

Therefore, the author hypothesizes that,

H3: All the automotive companies while managing working capital, uniformly optimize their investment in inventory and knock uniform balance between costs of holding inventory and stock out costs, is rejected.

CASH RATIO

Cash ratio is a stricter and more conservative measure as it only considers a firm's highly liquid assets to meet the firm's current liabilities and is the most severe measure of liquidity. Large values of cash ratio may be an indicator of more profitability than liquidity. Also, by economic prudence a high cash ratio indicates that the firm has paid off creditors before investing surplus in marketable securities. High cash ratio indicates reduced utilization of short-term loans, lessor deployment of surplus funds and to carry a scenario of losing high opportunity cost. Although the ratio is used less for a firm's financial analysis, investors can use it to predict business standing. The ratio is determined by applying the formula,

$$\text{Cash Ratio} = \frac{\text{Cash \& Cash Equivalent}}{\text{Current Liabilities}} \quad (\text{Eq. 4})$$

The ratio is more useful in making comparative study such as industry averages, or when looking at changes in the same firm over time. It is very informative to creditors in taking decision, how much money they would lend to a firm besides to have an indication about firm's value under worst-case scenario when the firm is likely to go out of business. A low cash ratio may not matter if the firm enjoys short term guaranteed line of credit.

Table 16. Single Factor ANOVA for Ten Major Global Automotive Companies Cash Ratio (Expressed in Decimal)

	Cash Ratio (Ten Major Global Automotive Companies)									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bayerische Motoren Werke AG (BMW)	0.2112	0.2081	0.2501	0.2193	0.1689	0.1104	0.1337	0.1857	0.2111	0.1683
Ford Motor Company	0.2367	0.3048	0.2196	0.1694	0.1417	0.1709	0.2417	0.2567	0.2106	0.2611
General Motors Company	0.5230	0.3665	0.4335	0.4895	0.4390	0.3413	0.2346	0.3532	0.5254	0.4889
Hyundai Motor Company	0.2674	0.2225	0.2524	0.2629	0.2436	0.2179	0.2179	0.2538	0.2474	0.2231
Renault	0.6709	0.8372	0.8372	0.9180	0.8869	0.7646	0.6759	0.6996	0.7672	0.7583
SAIC Motor Corporation Ltd	0.4880	0.4582	0.4005	0.4938	0.4561	0.2915	0.3689	0.3191	0.3057	0.2825
Suzuki Motor Corporation	0.9252	0.8046	0.9480	0.9190	0.9918	0.6778	0.8692	0.7624	0.5216	0.4931
Tata Motor Corporation	0.2913	0.2982	0.2933	0.3660	0.3861	0.3568	0.1567	0.1249	.01813	0.1603
Toyota Motor Corporation	0.2593	0.1746	0.1765	0.2021	0.2271	0.3065	0.2766	0.2817	0.3282	0.3553
Volkswagen AG	0.5882	0.3239	0.3539	0.4133	0.2837	0.2382	0.1795	0.1983	0.3555	0.3113

Table 16. Continued

		Anova: Single Factor Summary				Coefficient of	
Group	Count	Sum	Average	Variance	Variation	Ranking	
Bayerische Motoren Werke AG (BMW)	Cash Ratio	4.4612	0.4461	0.0553	22.5916	7	
Ford Motor Company	Cash Ratio	3.9987	0.3999	0.0560	22.4205	5	
General Motors Company	Cash Ratio	4.1649	0.4165	0.0700	22.4370	6	
Hyundai Motor Company	Cash Ratio	4.4535	0.4453	0.0755	7.8805	1	
Renault	Cash Ratio	4.2250	0.4225	0.0861	11.0445	2	
SAIC Motor Corporation Ltd	Cash Ratio	3.4760	0.3476	0.0449	21.6882	3	
Suzuki Motor Corporation	Cash Ratio	3.3547	0.3355	0.0595	22.3157	4	
Tata Motor Corporation	Cash Ratio	3.4354	0.3435	0.0462	37.1857	10	
Toyota Motor Corporation	Cash Ratio	3.6540	0.3654	0.0347	24.2053	8	
Volkswagen AG	Cash Ratio	3.5023	0.3502	0.0340	36.3778	9	

Anova						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.1711	9.0000	0.0190	0.3382	0.9598	1.9856
Within Groups	5.0587	90.0000	0.0562			
Total	5.2298	99.0000				

Note: Observations at 5% level of significance

- As computed F statistics (Table 16) is less than the table value of F and p value is greater than $0.05(\alpha)$, the null hypothesis is accepted.
- As per single factor ANOVA test (Table 16), the automotive companies do not have the same averages of cash ratio while coefficient of variation (CV) depicts that Hyundai Motor Corporation has maintained the lowest value, which indicates that Hyundai possess the highest efficiency level in managing cash ratio.

Therefore, the hypothesis that,

H4: All the ten automotive companies while managing their working capital, are uniformly capable to maintain an optimal balance in paying off their current obligations with available cash and cash equivalent, is rejected.

CURRENT LIABILITIES -LIQUIDITY RATIOS

Liquidity generates out of the routine operations or payments towards financial charges and entails firm's ability to meet short term debt obligation. Short term liquidity of a firm involves the relationship between current assets and current liabilities while a firm having sufficient net working capital, normally possesses high liquidity. Liquid asset is one that trades in an active market and hence can be quickly converted to cash at the going market price.

The ability of the firm to meet short-term obligations is denoted by liquidity ratios. Current Ratio, an important liquidity ratio, specifies the extent to which current liabilities are covered by those assets expected to be converted to cash in the near future. A high current ratio means that the firm has a lot of assets tied up as non-productive assets such as excess cash, marketable securities and large inventory holding. A low current ratio may indicate a higher risk of distress or default. The ratio can be defined as under,

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}} \quad (\text{Eq.5})$$

Current ratio indicates how a firm is able to cover its short-term obligations with the support of its current assets. The ratio varies from industry to industry and plays an important role in making comparisons among industry players. The ratio indicates to both investors and analysts how a firm can make best use of current assets and simultaneously can satisfy current debt.

Table 17. Single Factor ANOVA for Ten Global Major Automotive Companies Current Ratio (Expressed in Decimal)

	Current Ratio (Ten Major Global Automotive Companies)									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bayerische Motoren Werke AG (BMW)	1.2978	1.3322	1.3158	1.2836	1.2694	1.2189	1.3028	1.3423	1.2863	1.2192
Ford Motor Company	1.2431	1.4079	1.4679	1.4031	1.2022	1.3505	1.3335	1.2502	1.2314	1.2228
General Motors Company	1.2536	1.4459	1.3300	1.3906	1.3291	1.3429	1.1209	1.0980	1.2211	1.2408
Hyundai Motor Company	1.1780	1.0453	1.4185	1.4416	1.4598	1.3006	1.3141	1.3936	1.2796	1.1798
Renault	1.3160	1.3925	1.4816	1.4954	1.4776	1.3691	1.3284	1.4337	1.5217	1.4528
SAIC Motor Corporation Ltd	1.2134	1.2144	1.2451	1.2870	1.2293	1.0829	1.1525	1.0234	1.1197	1.1046
Suzuki Motor Corporation	1.7040	1.4557	1.7637	1.6943	1.7428	1.4248	1.6463	1.5625	1.2110	1.2563
Tata Motor Corporation	1.3034	1.0541	1.0300	1.1809	1.2233	1.2516	1.3011	1.1538	1.0381	1.0383
Toyota Motor Corporation	1.2976	1.1443	1.2205	1.2697	1.3712	1.4573	1.2605	1.2490	1.3131	1.3353
Volkswagen AG	1.6678	1.3383	1.4026	1.3806	1.1895	1.1237	1.0014	1.1506	1.3441	1.4723

Table 17. Continued

		Anova: Single Factor Summary				Coefficient of	
Group	Count	Sum	Average	Variance	Variation	Ranking	
Bayerische Motoren Werke AG (BMW)	Current Ratio	13.4746	1.3475	0.0338	3.2622	1	
Ford Motor Company	Current Ratio	12.8306	1.2831	0.0247	7.1378	4	
General Motors Company	Current Ratio	13.6756	1.3676	0.0376	8.7599	6	
Hyundai Motor Company	Current Ratio	13.8268	1.3827	0.0207	10.3486	8	
Renault	Current Ratio	13.4941	1.3494	0.0298	5.0370	2	
SAIC Motor Corporation Ltd	Current Ratio	12.9222	1.2922	0.0151	7.1581	5	
Suzuki Motor Corporation	Current Ratio	12.7615	1.2761	0.0290	12.9785	9	
Tata Motor Corporation	Current Ratio	12.6572	1.2657	0.0280	9.5968	7	
Toyota Motor Corporation	Current Ratio	12.5662	1.2566	0.0170	6.6389	3	
Volkswagen AG	Current Ratio	12.5222	1.2522	0.0189	14.8637	10	

Anova						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.2182	9.0000	0.0242	0.9521	0.4848	1.9856
Within Groups	2.2914	90.0000	0.0255			
Total	2.5095	99.0000				

Note: Observations at 5% level of significance

- As the computed F statistics (Table 17) is less than the tabled value of F and p value is greater than α , the null hypothesis is accepted.
- As per single factor ANOVA test (Table 17), the coefficient of variation (CV), depicted that BMW has the lowest value, which indicates that BMW possess the highest efficiency level in managing current ratio.

Therefore, the hypothesis that,

H₅: While managing working capital, all the automotive companies maintain uniform level of current ratio that makes them appropriate to meet their all-current potential demands in a manner that minimize cost and maximize value, is rejected.

ACCOUNTS PAYABLES TURNOVER RATIO

Accounts payables turnover ratio portrays firm's short-term liquidity to quantify the rate at which it pays off its suppliers and signifies how many times a firm can pay off payables during a year. The ratio highlights creditors to analyze the liquidity position of a firm by evaluating how comfortably the firm can pay off its current suppliers and vendors. A high ratio indicates that the firm pays off its credit purchase obligations on regular basis and can be used in negotiating favorable credit terms with lenders. Accounts payables turnover ratio is arrived by dividing "Net Credit Purchase by the average accounts payables".

$$\text{Accounts Payable Turnover} = \frac{\text{Net Credit Purchase}}{\text{Average Accounts Payable}} \quad (\text{Eq. 6})$$

Ideally, a firm's average time to collect receivables should be significantly shorter than its average time to settle suppliers.

Table 18. Single Factor ANOVA for Ten Global Major Automotive Companies Accounts Payables Turnover Ratio (Expressed in Decimal)

Accounts Payable Turnover Ratio (Ten Major Global Automotive Companies)										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bayerische Motoren Werke AG (BMW)	13.8051	11.7330	10.7055	9.1409	8.8842	10.1040	9.7433	8.8943	8.3799	8.9181
Ford Motor Company	7.4401	7.1546	6.4752	6.9195	6.7744	6.5209	6.4244	6.2016	6.4065	6.7167
General Motors Company	5.9056	5.6630	5.6414	5.5312	5.9841	5.5084	5.0849	4.8609	5.1937	5.0620
Hyundai Motor Company	5.6028	4.4133	5.9601	5.9543	6.0616	6.2671	6.4035	6.7189	6.6389	6.5718
Renault	4.9610	5.4275	5.2191	5.6817	5.4783	5.2755	5.2284	5.5035	4.4868	4.4755
SAIC Motor Corporation Ltd	5.3860	5.9161	7.5314	10.0809	10.0222	7.4515	7.1798	7.4459	7.0891	6.2561
Suzuki Motor Corporation	6.0280	6.1570	5.4423	5.4645	4.7937	5.2435	5.4465	6.0826	7.1028	8.5919
Tata Motor Corporation	2.8245	3.1212	2.7904	2.6519	2.6143	2.5190	2.6399	2.6727	2.5934	2.3152
Toyota Motor Corporation	9.2637	8.4663	8.3248	9.3559	9.1888	9.0749	8.7996	8.8691	9.0436	9.2192
Volkswagen AG	8.8703	9.4361	9.1984	9.1992	8.7910	8.5828	7.6457	7.6865	7.7812	8.4051

Table 18. Continued

		Anova: Single Factor Summary				Coefficient of	
Group	Count	Sum	Average	Variance	Variation	Ranking	
Bayerische Motoren Werke AG (BMW)	Accounts Payable	70.0872	7.0087	9.2685	16.6312	8	
Ford Motor Company	Accounts Payable	67.4880	6.7488	6.4178	5.6724	2	
General Motors Company	Accounts Payable	67.2888	6.7289	5.1542	6.9305	3	
Hyundai Motor Company	Accounts Payable	69.9799	6.9980	5.6357	11.1854	7	
Renault	Accounts Payable	68.5925	6.8593	5.4295	8.0056	6	
SAIC Motor Corporation Ltd	Accounts Payable	66.5478	6.6548	4.9542	20.9226	10	
Suzuki Motor Corporation	Accounts Payable	64.5961	6.4596	4.1344	18.2223	9	
Tata Motor Corporation	Accounts Payable	64.9361	6.4936	3.5874	7.8897	5	
Toyota Motor Corporation	Accounts Payable	64.7159	6.4716	3.7108	3.8477	1	
Volkswagen AG	Accounts Payable	66.5316	6.6532	4.9781	7.7526	4	

		Anova				
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	3.6889	9.0000	0.4099	0.0769	0.9999	1.9856
Within Groups	479.4354	90.0000	5.3271			
Total	483.1243	99.0000				

Note: Observations at 5% level of significance

- As computed F statistics (Table 18) is less than the table value of F besides p value is greater than 0.05, the null hypothesis is accepted.
- As per single factor ANOVA test (Table 18), the automotive companies do not have same averages of accounts payables turnover ratio while coefficient of variation (CV) portrays that Toyota Motor Corporation has maintained the lowest value, which indicates that Toyota possess the highest efficiency level in managing its accounts payables.

Therefore, the hypothesis that,

H6: While managing working capital, all the automotive companies have established uniform efficiency level in utilizing trade credits that the cost of availing the credit is lesser than the sourcing costs, is rejected.

Therefore, to draw a conclusion on robustness test, the following table (Table-19) is made based on the outcome of the key ratios (Table 13 through Table 18) contributing working capital management process.

Table 19. “Outcome of Ratio Analysis”

Automotive Companies	Current						Mean	Rank
	Assets Ratio	Receivables Ratio	Inventory Ratio	Cash Ratio	Current Ratio	Payables Ratio		
BMW	6	7	1	7	1	8	5.00	5
Ford Motor Company	1	8	9	5	4	2	4.83	4
General Motors Company	3	1	3	6	6	3	3.67	1
Hyundai Motor Company	7	6	7	1	8	7	6.00	6
Renault	2	5	10	2	2	6	4.50	3
SAIC Motor Corporation Ltd	10	9	5	3	5	10	7.00	8
Suzuki Motor Corporation	9	3	2	4	9	9	6.00	6
Tata Motors Limited	8	10	6	10	7	5	7.67	9
Toyota Motor Corporation	4	4	4	8	3	1	4.00	2
Volkswagen AG	5	2	8	9	10	4	6.33	7

Note: Ranking is made on the key ratios contributing working capital management. The result recognizes (Table 19) that General Motors Company takes the lead followed by Toyota Motor Corporation.

FINDINGS

- Six key ratios are analyzed using single factor ANOVA test. As an outcome, it has come out with a general observation that working capital components do not have the same characteristics in influencing working capital management process.
- As an outcome of the hypothesis analysis, it is found that out of six developed hypotheses, five hypotheses have rejected the alternative hypothesis.
- Alternative hypotheses relating to key components of current assets managements (receivable management, inventories management and cash management) are rejected, however, alternative hypothesis pertaining to current assets management, on standalone basis, is accepted.

- Current assets management comprehends overall management of receivables, inventories, cash and cash equivalent, prepaid expenses, loans and advances, investments and accrued income. The disconnects are due to the varied contribution of the components of other current assets such as prepaid expenses, loans and advances, investments and accrued income.
- Other key reasons for the rejection of hypothesizes are that automotive companies are lacked in maintaining uniformity in managing working capital and companies also have different techniques of deploying working capital components in managing working capital.

THIRD OBJECTIVE

“To find out the global automotive leaders who are the most successful companies in managing working capital”.

The computed duly analyzed value (Table 1 through Table 10), exhibits that the problem of multi-collinearity is present for which an additional test “Quantitative factors matrix” is adopted. However, to draw a conclusive conclusion, robustness test is conducted based on the analysis of key ratios (Table 13 through Table 18) that contribute working capital management process. An overall ranking of ten automotive companies is worked out by combining the findings of both working capital factors matrix and key ratios analysis in contributing working capital management (Table 12 and Table 19) process.

Table 20. Overall Ranking Based on the Efficiency Level in Managing Working Capital

Automotive Companies	Ranking Based on the Influence of Working Capital Components	Ranking Based on the Contribution of Ratio Analysis	Mean	Overall Ranking
BMW	3	5	4	5
Ford Motor Company	3	4	3.5	4
General Motors Company	2	1	1.5	1
Hyundai Motor Company	1	6	3.5	4
Renault	3	3	3	3
SAIC Motor Corporation Ltd	1	8	4.5	6
Suzuki Motor Corporation	4	6	5	7
Tata Motors Limited	3	9	6	8
Toyota Motor Corporation	3	2	2.5	2
Volkswagen AG	2	7	4.5	6

Note: Combining the ranking of both quantitative factors matrix (Table 12) and key financial ratios matrix (Table 19) in managing working capital, overall ranking representing the industry, is made (Table 20).

FINDINGS

- The study has continued the discussions of statistical inference by showing how hypothesis testing could be used to determine whether the statement of uniformity on the influence of working capital components and the efficiency level based on ratio analysis in managing working capital, should or should not be rejected.
- The overall efficiency level is arrived at by combining both the rankings i.e., ranking based on the influence of working capital components and ranking based on the contribution of ratio analysis in managing working capital by global automotive companies.

- The combined ranking establishes that in managing working capital, General Motor Company takes the lead followed by Toyota Motor Corporation.

The efficiency level of the global automotive companies is ranked as per their overall performance (Table 20) wherein General Motor Company takes the lead followed by Toyota Motor Corporation.

FOURTH OBJECTIVE

“Create investor’s confidence while deciding investment proposal on automotive industry”.

A combined ranking is made to identify the leaders wherein General Motor Company takes the lead followed Toyota Motor Corporation. Investor focuses more on General Motor Company for any potential investments.

The global automotive manufacturing market size stood at about 2.7 trillion U.S. dollars in 2021 and is projected to grow at around 2.8 trillion U.S. dollars in 2022. European countries Investments in the innovation in auto industry was the world’s largest (€58.8 billion per year), surpassing Japan (€32 billion), USA (€14.9 billion) and China (€9.9 billion).

FINDINGS

- There is huge investment potential in the automotive industry but investors, while investing in a particular industry, quantify the expected outcomes in numeric terms. Presently the industry maintains a CAGR of 4.8%.
- As managing working capital at a higher efficiency level, contributes highly in creating firm’s value that facilitates investors to take decision for potential investments.
- From an investor’s point of view, the research outcome will definitely display confidence while deciding any investment proposal.

LIMITATIONS AND FUTURE RESEARCH POTENTIALS

Due to the research design and data availability, the study has passed through the following limitations, which has served an additional opportunity for future research.

1. The study accedes to the limitation of developing hypothesis on the basis of yearly data whereas working capital management takes place on daily basis, even every moment of the business cycle.
2. Receivables turnover ratio is calculated on the basis of net revenues instead of net credit revenues.
3. Accounts payables turnover ratio is achieved by adopting costs of goods sold instead of net credit purchases.
4. The study is made on ten automotive companies based on past ten years audited data, out of which, financials of seven companies are closed in December and rest three are closed in March, every year.

As automotive companies have dependence on foreign sales, in measuring internationalization, the study does not account for how those sales are distributed across countries with different industry environments like potential for internationalization via foreign direct investment or trade ties while those has direct effect on the role of working capital components. Future research could be to use qualitative case analysis comprising automotive operations of selected countries with finer-grained data.

CONCLUSION

Automotive companies normally manufacture products in a few specific countries and ship intermediate and finished products globally to other centers for completion and distribution. In the process, the industry faces unique challenges in managing working capital as the firms are required to reposition funds in different locations in line with business needs. The industry also come across with a striking characteristic due to rapid increase in international interdependence for which there is an urgent necessity to have a well-designed economy friendly and modest global regulations that support smooth transfer of funds, ease of doing business in optimizing working capital financing cost. As these scenarios have other way been continuously incentivizing automotive companies to invest in a global value-maximizing manner, it is the high time to think uniformity on global tax regime besides smoothening regulations, which will not only improve the predictive level of cash flows but reduce one of the major concerns in managing working capital components.

Recent move by the group of seven (G-7) advanced economies to secure a landmark deal on taxing multinational companies at a minimum global tax rate of 15 per cent, is appreciated. In the process the inclination of MNCs to save billions of dollars in tax bills by shifting jurisdictions will be restricted.

The industry is likely to face major changes in connectivity and digitalization besides running into a restructuring phase, complex trade policy, geopolitical turmoil and regional shifts. It has already been witnessed where automobiles production and sales have been reduced to a great extent due to disrupted supply chain, slow customer demand, deferred off line sales besides massive cash outflow pressure. The weakness is expected to continue for some more time as the impact of Covid-19 is across-the-board, momentous and grave in nature. Around the world, 2020 was defined by responding to the once-in-a-century challenges presented by the COVID-19 pandemic. The regional governments at that crucial time, was initiated quick policies like creating reorientation fund for workers and enterprises, incentivizing and encouraging mergers both nationally and internationally besides establishing an international commission to control regional automotive production and investment with the cooperation of global companies in formulating a mechanism for opening their capital to local investors to aim in resolving the foreign vs local capital conflict. Further, the industry as a whole was taken prompt steps on recovery of supply chain, seizing first purchase demand, integrating online-offline besides enhancing cash flow management in smoothening working capital management process.

However, the international automobile markets bounced back remarkably well in the first quarter 2021, with registrations up by 20.6%. The scale of the increase has been attributed to the massive slump recorded in the corresponding period of the previous year in the wake of corona-related lockdowns worldwide.

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