Using the Index Method: Working Capital Management Efficiency

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Abstract

In order to better understand working capital management, which includes efficient handling of current assets as well as current liabilities. Efficient management of working capital is a precondition for the success of any kind of firm. The initial study's major goal was to assess the efficiency of working capital management in the automobile industry. The present study deals with the efficiency of working capital management in the selected four-wheeler passenger car manufacturing companies in India. The source of secondary data is the annual report and CMIE Prowess. The database of ten passenger car manufacturing companies in India is drawn at random from the source Statista based on their market share and brand in terms of passenger car manufacturing companies for the 10-year period from 2011–12 to 2020–21. This study employed three parameters to assess the efficiency of working capital management: the performance index of working capital management (PI), the utilisation index of working capital management (UI), and the efficiency index of working capital management (EI). following the model suggested by Bhattacharya (1997). This study's results show most of the companies reviewed did well in terms of working capital performance, current asset usage, and working capital efficiency. Some selected passenger car manufacturers have efficiently managed their working capital and increased sales with existing assets. Companies with a low or negative efficiency index must use current assets efficiently to manage working capital.

Keyword: WCM, Efficiency, Automobile, Passenger Car, Index Method

Contribution/Originality: We feel this is an important topic that would be of interest in decision-making. Company managers in managing the company's finances must be more effective and efficient so that the company does not experience financial distress. For investors, it can be used as a reference in making decisions to invest by looking at companies that show companies that have good financial performance. We confirm that this work is original and has not been published

elsewhere, nor is it currently under consideration for publication elsewhere. We confirm that the manuscript has been read and approved for submission by all the named authors.

Introduction

Working capital management entails the management of the required amount, efficient procurement, and efficient use of these current assets. There should be an optimum investment for each component of current assets. Thus, the management should also design suitable strategies to release excess funds invested in any component of current assets so that such funds can be profitably used elsewhere. The automobile industry is one of the primary mainstays of the world economy, a principal driver of full-scale monetary development and soundness in both developed and developing countries. Firm return is a key indicator of a company's ability to stay in business, and scholars, academics, and policymakers are always looking into how a company's profitability can be increased through normal business operations. The main goal of a financial manager is to make sure that shareholders get as much money as possible. This comes from the firm's return and depends on the financial manager's wise and best decisions about how to keep the level of assets and liabilities (Khalid et al., 2018). One of the operational challenges that businesses always face is how to manage their working capital. Running capital is the capital that a business uses to run its regular business operations. It is measured by the difference between the current assets and current liabilities. When a company doesn't have enough working capital, it loses money. When it has too much, it loses money. The amount of working capital a business needs changes over time based on the type of business, size, production cycle, credit policy, availability of raw materials, etc. This amount of money needs to be invested in different current assets for the long term. For example, because there is a delay between sales and cash receipts, it is always important to have enough working capital to keep sales at the level you want them to be. Research shows that poor management of working capital (Yadav, 1986) is one of the main causes of industrial disease. Modern financial management tries to cut down on current assets and keep from running out of stock (Bhattacharya, 1997). Working capital management is a key indicator of an organization's health because it reduces the amount of capital that is stuck, which lowers the cost of financing. Short-term assets and liabilities need to be looked at in detail. Working capital management is important for a company's value, risk, and profit (Smith, 1980). How current assets and liabilities are managed shows how much working capital is best to have. Most of the time, current assets are seen as an important part of total assets. By renting or leasing equipment, a company can cut down on its investment in fixed assets, but it can't do that with the part of working capital. Money that is invested in long-term assets may have less risk of running out of money because there are so many current assets. So, good management of working capital is a key indicator of the health of an organisation. This is because it reduces squandered capital and lowers finance costs. How well do automobile companies manage their working capital? Accounting ratios have been used a lot in empirical research in the past, but it might be hard to choose the right ratio or set of ratios because there isn't a good ratio analysis theory (Bhattacharya, 1997). Bhattacharya (1997) developed an alternative ratio model for measuring and keeping track of the efficiency of working capital management to solve this problem. He split the overall efficiency index for working capital management into two parts: performance and usage.

A study of efficiency looks at how well different parts of working capital are used. There are several parts to working capital. increasing efficiency and making more money by efficiently rotating parts. Working capital management is important for the success of every business. (Howorth and Westhead, 2003; Deloof, 2003; Afza and Nazir, 2007). Firms try to keep a WC that maximizes value. A company that manages its working capital well can stay in business and do its day-to-day work well, which leads to long-term success. The company will only reach its sales goal if it has enough WC. Research from the past shows that poor management of working capital is a major cause of industrial disease. When managing working capital, a

company must keep the right balance between liquidity and profit. Waste control is the ability of a company to control its waste. Working capital management is the process of managing the different parts of working capital so that a good amount of working capital is kept so that the business can run smoothly and achieve its goals. Three INDEX values are used to measure the efficiency of working capital management: performance, utilisation, and total efficiency. For the empirical study, different parts of CAs, such as trade and bill receivables, are taken into account as variables. Cash, investments with a short time frame, and short-term loans and advances. The research tries to measure three parts of working capital management:

(a) The performance index of working capital (PI)

(b) The UI for working capital utilization.

(c) The overall efficiency index (EI) for working capital.

Since efficient management of working capital is one of the preconditions for the success of any company, the present study deals with the efficiency of working capital management in the Indian passenger car manufacturing companies.

Literature Review

Previous work has analysed WCM using several measures. Mehmet and Eda's (2009) study on working capital management and firm efficiency level showed the effective use of WC by enhancing the management of total assets, which strongly affected firm profitability. This study analysed Istanbul Stock Exchange data from 1993 to 2007 and found a negative relationship between cash conversion period, current ratio, net working capital, and return on total assets. Similar to Chisti (2012), (2012) evaluated the influence of efficiency and profitability for 16 companies in India and showed an inverse association between inventory, A/R, and cash conversion cycle, but a positive relationship for A/P. Ganesan (2007) analysed the working capital management efficiency for the communications systems industry using days sales outstanding, days inventory outstanding, days payment outstanding, days working capital, and current ratio.

Meanwhile, Cash conversion efficiency, current ratio, and income to total assets and income to sales evaluate liquidity and profitability, respectively. According to empirical evidence, liquidity and profitability negatively affect working capital management. Alipour (2011) found a significant relationship between working capital management and profitability. The study suggests reducing receivables and inventory to increase shareholder value. Jayarathne (2014) studied the influence of working capital management on profitability in Sri Lanka listed companies. He concluded that flexible lending policies affect corporate profitability and that manufacturing firms may create more wealth if they manage working capital efficiently. Similarly, to the study done by, Richard et al. (2013) studied the impact of working capital management on profitability in manufacturing firms in Ghana. They reported that working capital management components must be controlled appropriately to avoid liquidity difficulties and short-term obligations, which play a large role in organisations. He used accounts receivable, payable, and cash for this research. Conversion cycle, current asset ratio, size, and current asset turnover are independent factors; return on assets is present for profitability. Afza and Nazir (2011) highlight efficient working capital management by examining the cement business in Pakistan from 1988 to 2008. To analyse business efficiency, he used the Bhattacharya (1997) indicator, which has three parts: the performance index of working capital management; the utilisation index of working capital management; and the efficiency index of working capital management. The industry studied performed well in terms of efficiency over time. Shehzad et al. (2012) studied Pakistani textile firms' working capital management from 2004 to 2009. Instead of the standard technique, this study uses Bhattacharya's (1997) efficiency index and three indicators: the working capital performance index, the utilisation index, and the efficiency index. According to the data, industrial performance was at a high level of efficiency, indicating that they handled working capital well during the research period. According to Press, Valipour, and Jamshidi (2012), the performance index, efficient index, and utilisation index

positively correlate with asset efficiency. The results reveal that the cash conversion cycle negatively affects asset efficiency. He found that Bhattacharya's index is a better way to measure how well a company manages its working capital than the usual way.

Sample And Methodology

The data used for the study are secondary in nature, ten companies taken from the Centre for Monitoring Indian Economy (CMIE) prowess for the purpose of the study. The required data were collected from the Annual report and CMIE prowess. And other relevant data are collected from journals, magazines, article and website. A sample of ten companies has been selected on the basis of availability of data for 10 years and its capitalization. Source:Statista., selected companies are: Maruti Suzuki India Ltd., Hyundai Motor India Ltd., Tata Motors Ltd. Mahindra & Mahindra Ltd., Toyota Kirloskar Motor Pvt. Ltd., Renault India Pvt. Ltd. Honda Carss India Ltd., Ford India Pvt. Ltd., Nissan Motor India Pvt. Ltd., Fiat India Automobiles Pvt. Ltd. "In this study, Bhattacharya's efficiency method has been used to monitor and measure the effectiveness of working capital management. Bhattacharya (1997) developed a composed index showing the total efficiency level including performance index and utilization index in order to determine the efficiency of working capital management. The total efficiency index is calculated by multiplying the performance index and the utility index (Bhattacharya, 2007: 218- 220):"

Conceptual Framework

The following theoretical model explains the overall analysis adopted to understand the how Index works.

Figure1.1 Reseacrh Model
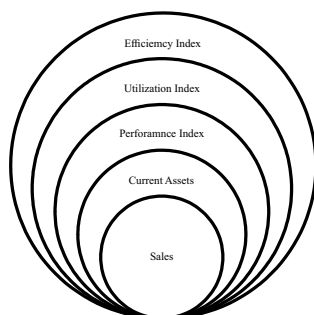
The performance index and utilisation index are computed using the firm's CAs and sales. The combination of PI and UI yields the Efficiency Index, which is compared to the average industry efficiency. The current research has generated the following problem: the study must be empirically examined in the context of a selection of Indian automobile manufacturing passenger car companies.

Questionnaires Of The Study

The main Questionnaires of the study are

1. Is there any significant efficiency in working capital management in utilizing the current assets of selected passenger cars manufacturing companies?

2. Is there any significant overall working capital management efficiency in the selected passenger cars manufacturing companies?

3. Is there any significant speed in achieving the target level of efficiency by an individual selected passenger cars manufacturing companies in the passenger cars manufacturing companies in India?

In conformity with the Questionnaires of the study, the following are the testable hypotheses:

H1: The passenger car manufacturing companies in India have the ability to utilise their current assets to generate sales.

H2: The passenger car manufacturing companies in India have efficiency in managing working capital.

H3: There is significant progress in achieving the target level of working capital efficiency by an individual selected passenger car manufacturing company in India.

Discussion And Results

Performance Index (PI) of working capital management

The PI index of working capital management represents the average performance index of the various components of current assets. A company may be said to have managed its working capital efficiently if the proportionate rise in sales is greater than the proportionate rise in the current assets during the study periods. Numerically, an overall PI of more than 1 indicates efficient working capital

management by the companies. To measure the overall efficiency of working capital management, first the performance index of working capital management (PI) has been calculated by applying the following model.

$$PI_{WCM=} \quad I_s \sum_{i=1}^{n} \frac{\frac{W_{i(t-1)}}{W_{it}}}{N}$$

Where, I_s = Sales index define as = S_t / S_{t-1} (sales in the current period by sales in the previous period)

W_i = It is the different elements of the current assets of the "i" company in the year "t"

N= Number of current assets

In this research, total current assets have been classified into five components, which are Trade & bills receivables Cash & bank balance, short term investment and short-term loans & advance.

Table 1.Performance Index (PI)

Company Name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Maruti Suzuki India Ltd.	0.21	0.24	0.20	0.20	0.21	0.20	0.20	0.19	0.18	0.18	0.20
Hyundai Motor India Ltd.	0.25	0.22	0.20	0.19	0.22	0.19	0.20	0.20	0.20	0.15	0.20
Tata Motors Ltd.	0.25	0.16	0.15	0.19	0.21	0.18	0.23	0.21	0.16	0.20	0.19
Mahindra & Mahindra Ltd.	0.29	0.24	0.19	0.17	0.19	0.18	0.20	0.20	0.17	0.19	0.20
Toyota Kirloskar Motor Pvt. Ltd.	0.30	0.28	0.26	0.16	0.20	0.15	0.25	0.17	0.21	0.15	0.21
Renault India Pvt. Ltd.	0.15	4.82	2.55	0.28	0.14	0.17	0.23	0.16	0.23	0.14	0.89
Honda Carss India Ltd.	0.21	0.23	0.39	0.29	0.18	0.16	0.22	0.18	0.13	0.21	0.22
Ford India Pvt. Ltd.	1.19	0.19	0.12	0.25	0.20	0.23	0.22	0.20	0.01	1.98	0.46
Nissan Motor India Pvt. Ltd.	0.21	0.19	0.24	0.18	0.16	0.16	0.15	0.16	0.21	0.26	0.19
Fiat India Automobiles Pvt. Ltd.	0.27	0.08	0.37	0.19	0.15	0.11	0.59	0.19	0.17	0.15	0.23
Average	0.33	0.67	0.47	0.21	0.19	0.17	0.25	0.19	0.17	0.36	0.30

Source: Annual reports and CMIE Prowess

The above table1. shows the performance index of the selected ten four-wheeler automobile companies in India for the research period from 2011-12 to 2020-21. All the Selected passenger cars manufacturing companies in the automobile industry have average performance index of less than 1 or near to one with an average of 0.30. company wise average ranges from 0.89 to 0.19. This indicates that all the Selected passenger cars manufacturing companies are not able to efficiently manage their current assets. Where Renault India Pvt.ltd. has the highest index of 0.89 and Tata Motor Ltd. and Nissan Motor India Pvt. ltd. shows the lowest index of 0.19.

Utilization Index (UI) of working capital management

PI represents the average overall performance in managing the component of current assets. UI indicates the ability of the company to utilise its current assets as a whole in order to generate sales. As a result, if there is an increase in total current assets greater than a proportionate rise in sales, the degree of utilisation of these assets with respect to sales is said to have improved and vice versa. This finally represents the operational cycle of the automobile industry's passenger vehicle manufacturers. This can be reduced in length by improving the usage rate. Therefore, an index value larger than one is desirable. Utilizing the following methodology, the working capital usage index (PIwcm) is computed:

$$UI_{wcm} = \frac{A_{t-1}}{A_t}$$

Where, A= Current assets / Sales

Table 2.Utilization Index (UI)

Company Name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Maruti Suzuki India Ltd.	0.88	1.21	0.81	1.45	2.60	1.06	1.17	0.67	1.27	0.42	1.15
Hyundai Motor India Ltd.	0.97	1.04	0.88	0.95	1.51	0.82	0.73	0.95	1.13	1.08	1.01
Tata Motors Ltd.	0.93	1.11	1.10	0.83	0.88	0.95	1.05	1.29	0.75	0.87	0.98
Mahindra & Mahindra Ltd.	0.93	1.12	0.79	1.05	0.93	1.00	0.80	0.99	1.01	0.74	0.94
Toyota Kirloskar Motor Pvt. Ltd.	1.21	1.34	0.87	1.13	0.66	0.95	0.94	0.75	0.99	0.84	0.97
Renault India Pvt. Ltd.	0.15	8.67	7.56	2.13	0.83	0.34	1.18	0.75	1.07	1.33	2.40
Honda Carss India Ltd.	0.86	1.51	1.72	1.06	0.74	0.90	0.90	1.18	0.62	1.50	1.10
Ford India Pvt. Ltd.	5.55	0.68	0.48	1.07	0.82	1.29	0.95	1.24	0.05	15.49	2.76
Nissan Motor India Pvt. Ltd.	1.36	0.91	0.78	1.27	1.01	0.83	0.71	0.97	1.06	1.34	1.02
Fiat India Automobiles Pvt. Ltd.	1.05	0.34	1.72	1.06	0.62	0.83	1.65	1.29	0.76	1.04	1.04
Average	1.39	1.79	1.67	1.20	1.06	0.90	1.01	1.01	0.87	2.47	1.34

Source: Annual reports and CMIE Prowess

The above table 2. shows the Utilization index of the selected ten four-wheeler automobile companies in India for the research period from 2011-12 to 2020-21. All the Selected passenger cars manufacturing companies in the automobile industry have average utilization index of more than 1 or near to one with an average of 1.34. except Tata Motors ltd., Mahindra & Mahindra Ltd. and Toyota Kirloskar Motor Pvt. Ltd. hence, company wise average ranges from 2.76 to 0.94. This indicates that all the Selected passenger cars manufacturing companies are able and have an ability of in utilizing its current assets as a whole for the purpose of generating sales except Tata Motors ltd., Mahindra & Mahindra Ltd. and Toyota Kirloskar Motor Pvt. Ltd. Where Ford India Pvt.ltd. has the highest index of 2.76 and Mahindra & Mahindra Ltd. shows the lowest index of 0.94.

Efficiency Index (EI) of working capital management

The Efficiency Index of Working Capital Management (EI) is the product of both PI and UI that helps to measure the ultimate efficiency in working capital management of automobile companies.

Thus,

$$EI_{wcm} = PI_{wcm} \ X \ UI_{wcm}$$

Whereas,

EI wcm = Efficiency index of working capital management

UI wcm = Utilization index of working capital management

PI wcm = Performance index of working capital management

Table 3.Efficiency Index (EI)

Company Name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Maruti Suzuki India Ltd.	0.18	0.29	0.16	0.29	0.55	0.21	0.24	0.13	0.22	0.08	0.24
Hyundai Motor India Ltd.	0.24	0.23	0.17	0.18	0.33	0.16	0.14	0.19	0.23	0.17	0.20
Tata Motors Ltd.	0.23	0.18	0.17	0.15	0.19	0.17	0.25	0.28	0.12	0.17	0.19
Mahindra & Mahindra Ltd.	0.27	0.27	0.15	0.18	0.18	0.18	0.16	0.20	0.17	0.14	0.19
Toyota Kirloskar Motor Pvt. Ltd.	0.36	0.38	0.23	0.18	0.13	0.15	0.23	0.12	0.21	0.13	0.21
Renault India Pvt. Ltd.	0.02	41.84	19.29	0.60	0.12	0.06	0.27	0.12	0.24	0.19	6.28
Honda Carss India Ltd.	0.18	0.35	0.66	0.31	0.13	0.14	0.20	0.22	0.08	0.32	0.26
Ford India Pvt. Ltd.	6.60	0.13	0.06	0.27	0.16	0.29	0.21	0.25	0.00	30.71	3.87
Nissan Motor India Pvt. Ltd.	0.29	0.17	0.19	0.23	0.16	0.14	0.11	0.15	0.23	0.34	0.20
Fiat India Automobiles Pvt. Ltd.	0.29	0.03	0.63	0.20	0.09	0.09	0.97	0.24	0.13	0.16	0.28
Average	0.87	4.39	2.17	0.26	0.20	0.16	0.28	0.19	0.16	3.24	1.19

Source: Annual reports and CMIE Prowess

The above table 3. shows the overall efficiency index of the selected ten four-wheeler automobile companies in India for the research period from 2011-12 to 2020-21. The company wise average efficiency index ranges from 6.28 to 0.19. with an average of 1.19. This indicates that the Selected passenger cars manufacturing companies in the passenger cars manufacturing companies in India are efficient in managing their working capital. Year wise average efficiency index ranges from 4.39 to 0.16. The financial year 2012-13 shows the highest index of 4.39 and financial year 2016-17 and 2019-20 has the lowest index of 0.16. The following table shows the number of efficient Selected passenger cars manufacturing companies in the passenger cars manufacturing companies in India during the research period. The following table 4 and table 5 depict the number of efficient firms and maximum and minimum values of respective index during the research period respectively.

Table 4.Number of Efficiency companies (Index Value >1)

Index	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Performance Index (PI)	1	1	1	0	0	0	0	0	0	1
Utilization Index (UI)	4	7	4	8	3	3	4	4	5	6
Efficiency Index (EI)	1	1	1	0	0	0	0	0	0	1

Source: Annual reports and CMIE Prowess

Performance Index:Table 4. and table 5. exhibits that the performance index varied from year to year, max value 4.82 in year 2012-13 and min value 0.01 in year 2017-18. The maximum index values for performance index of all the companies are less than 1, except Renault India Pvt. Ltd. and Ford India Pvt. Ltd. where, Renault India Pvt. Ltd. has the highest index value and Ford India Pvt. Ltd. keeping the minimum value of performance index.

Utilization Index:Table 4. and table 5. exhibits that the utilization index varied from year to year, max value 15.49 in year 2012-13 and min value 0.05 in year 2019-20. The maximum index values for Utilization index of all the companies are more than 1 and minimum values are below the unity. where, Ford India Pvt. Ltd., Fiat India Automobiles Pvt. Ltd. and Renault India Pvt. Ltd. have the minimum value of 0.05, 0.4 and 0.15 respectively. It shows the inefficiency in utilizing the current assets for generating sales.

Efficiency Index: Apart from the extreme value of 41.84 and 30.71 (Renault India Pvt. Ltd. & Ford India Pvt. Ltd.), efficiency index varied between max value 0.97 in year 2017-18 to min value 0.34 in year 2019-20. Large gap between the maximum and minimum values of efficiency index reveals the degree of inconsistency with the management. The minimum values for all companies are below 1. It shows the poor efficiency in the management of working capital.

Table 5. Minimum and Maximum value of respective index of selected Four-wheeler selected automobile companies in India firms during 2011-12 – 2020-21

Company name	Performance Index (PI)				Utilization Index (UI)				Efficiency Index (EI)			
	Max	Year	Min	Year	Max	Year	Min	Year	Max	Year	Min	Year
Maruti Suzuki India Ltd.	0.24	2012	0.18	2019& 2020	2.60	2015	0.42	2020	0.55	2015	0.08	2020
Hyundai Motor India Ltd.	0.25	2011	0.15	2020	1.51	2015	0.73	2020	0.33	2015	0.14	2017
Tata Motors Ltd.	0.25	2011	0.16	2019	1.11	2012	0.83	2014	0.28	2018	0.12	2019
Mahindra & Mahindra Ltd.	0.29	2011	0.17	2014& 2019	1.12	2012	0.74	2020	0.27	2011& 2012	0.14	2020
Toyota Kirloskar Motor Pvt. Ltd.	0.30	2011	0.15	2016& 2020	1.34	2012	0.66	2015	0.38	2012	0.12	2018

Company name	Performance Index (PI)				Utilization Index (UI)				Efficiency Index (EI)			
	Max	Year	Min	Year	Max	Year	Min	Year	Max	Year	Min	Year
Renault India Pvt. Ltd.	4.82	2012	0.14	2015& 2020	8.67	2012	0.15	2011	41.84	2012	0.12	2015 &201 8
Honda Carss India Ltd.	0.39	2013	0.13	2019	1.72	2013	0.62	2019	0.66	2013	0.08	2019
Ford India Pvt. Ltd.	1.98	2020	0.01	2019	15.49	2020	0.05	2019	30.71	2021	0.00	2019
Nissan Motor India Pvt. Ltd.	0.26	2020	0.15	2017	1.36	2011	0.78	2013	0.34	2020	0.11	2017
Fiat India Automobiles Pvt. Ltd.	0.59	2017	0.08	2012	1.72	2013	0.4	2012	0.97	2017	0.03	2012

Source:Annual reports & CMIE Prowess

Automobile Industry Average of PI, UI and EI

Automobile Industry Average of PI, UI and EI, Table 6. depicts the automobile industry average of the three indices. The level of working capital is a function of sales (Sagan 1955). This statement is tested in H1.

Table 6. Automobile Industry Average of PI, UI, and EI index during 2011-12 to 2020-21

Years	Performance Index		Utilization index		Efficiency Index	
	μ	σ	μ	σ	μ	σ
2011-12	0.33	0.288	1.39	1.420	0.866	1.913
2012-13	0.67	1.387	1.79	2.314	4.387	12.485
2013-14	0.47	0.700	1.67	1.998	2.171	5.710
2014-15	0.21	0.045	1.20	0.348	1.259	0.124
2015-16	0.19	0.026	1.06	0.564	1.204	0.131
2016-17	0.17	0.030	0.90	0.228	1.159	0.060
2017-18	0.25	0.117	1.01	0.264	1.278	0.236
2018-19	0.19	0.018	1.01	0.223	1.19	0.055
2019-20	0.17	0.058	0.87	0.331	0.163	0.075
2020-21	0.36	0.541	2.47	4.351	3.241	9.157

Source:Annual reports & CMIE Prowess

H1: The passenger car manufacturing companies in India have the ability to utilise their current assets to generate sales.

Passenger car manufacturing companies in India average of utilization index ranges from 0.87 in 2019-20 to 2.47 in 2020-21 and 8 out of 10 years have average UI > 1. "The overall UI of the passenger cars manufacturing companies in India for the selected period is 2.47 which indicates that the selected passenger car manufacturing companies in India proved the efficiency in utilizing their CAs as a whole for generating sales. Hence, (Null hypothesis is rejected). A poor and ine cient working capital Managment leads to tie up funds in idle assets and reduces the liquidity and profitability of a company (Reddy and Kameswari 2004). This is tested in H02."

H2: The passenger car manufacturing companies in India have efficiency in managing working capital.

Numerically the overall EI > 1 indicates the working capital management efficiency. Efficiency index of the automobile industry as a whole show average EI > 1 for 3 out of 10 years. The average working capital management efficiency of the automobile industry in respect of EI ranges from 0.159 to 4.387 explains on an average, firms of the industry adopted the aggressive working capital management practices in 2016-17 and followed the conservative Working capital Managment practices in 2012-13. In terms

of mean value of EI (μ =6.275), Renault India Pvt Ltd. is the most efficient firm followed by passenger cars manufacturing companies in India. Therefore, (Null is rejected).

The passenger cars manufacturing companies in India norms as target level of Efficiency

In financial Analysis, average performance of an automobile industry is considered as the yardstick for performance evaluation of the selected four-wheeler automobile company in the automobile industry. In order to measures the selected four-wheeler automobile company in the automobile industry efficiency in achieving the target level of efficiency during the research period from 2011-12 to 2020-21, following model has been used Regression Model.

Regression Model

Pooled ordinary least square model of panel data regression is used for the measurement of selected four-wheeler automobile company in the automobile industry efficiency during the research period from 2011-12 to 2020-21. In the research, the t-test is performed to determine the statistical significance of the regression results. selected passenger car companies' working capital efficiency in the automobile industry Management is identical to the average level of productivity in the automobile sector. The advantage of panel data analysis over time series or cross-section modelling is that it captures variations between individual cross sections considerably more accurately. This study also attempts to quantify the rate of adaptation of chosen passenger car manufacturers in the automobile industry in relation to their sector performance. During the research period from 2011-2012 to 2020–2021, the efficiency of a selected passenger car manufacturer in the automobile industry in achieving the desired degree of efficiency will be assessed. The regression model is used to evaluate the hypothesis.

H1: There is a significant speed in achieving the target level of working capital efficiency by an individual selected passenger cars manufacturing companies in the Automobile Industry.

The equation of Regression Model used

Whereas,

$$\hat{Y}_{i} = \hat{\alpha} + \hat{\beta}X_i + ei$$

$$Yi = Zt - Zt\text{-}1$$

$$Xi = Z^*t - Zt\text{-}1$$

Zt= Index at time 't' for the Selected passenger cars manufacturing companies and

Z*t = Average index of the Automobile Industry at t-1

The coefficient of the above regression equation (β) represents the speed of the individual selected four-wheeler automobile company in improving its efficiency in the passenger cars manufacturing companies in India n norms. In this regard the estimated beta value represents the speed of the individual selected four-wheeler automobile company in improving its efficiency in achieving the automobile industry norms. If β=1 for a selected individual four-wheeler automobile company in the automobile industry indicates that the degree of selected individual four-wheeler automobile company in the automobile industry efficiency in the matter of managing working capital is equal to the average efficiency level of the Automobile industry as whole.

Similarly, if β<1 for a selected individual four-wheeler automobile company in the automobile industry indicates that the degree of selected individual four-wheeler automobile company in the automobile industry efficiency in the matter of managing speaks for the need of further improvements by the selected individual four-wheeler automobile company in the automobile industry in this regard. The regression results have been shown table 6, table 7 and table 8. Further Table 9 shows the rank list of Selected passenger cars manufacturing companies based on beta value.

Table 7.Regression Results (Performance Index)

Name of Company	Constant	Beta	R^2	F value
Maruti Suzuki India Ltd.	0.180 (18.692)	0.650 (2.422) *	0.423	5.868
Hyundai Motor India Ltd.	0.195 (10.426)	0.156 (0.446) *	0.24	0.199
Tata Motors Ltd.	0.215 (9.665)	-0.353 (-1.065) **	0.124	1.135
Mahindra & Mahindra Ltd.	0.170 (7.143)	0.473 (1.517) *	0.223	0.126

Name of Company	Constant	Beta	R^2	F value
Toyota Kirloskar Motor Pvt. Ltd.	0.151 (4.565)	0.598 (2.111) *	0.358	4.455
Renault India Pvt. Ltd.	-1.758 (-3.724)	0.912 (6.298) **	0.832	39.662
Honda Carss India Ltd.	0.152 (3.239)	0.496 (1.617) *	0.246	2.615
Ford India Pvt. Ltd.	0.293 (0.644)	0.144 (0.411) **	0.021	0.169
Nissan Motor India Pvt. Ltd.	0.162 (6.561)	0.440 (1.384) **	0.193	1.916
Fiat India Automobiles Pvt. Ltd.	0.243 (2.189)	-0.059 (-0.166) ***	0.003	0.028

Source: Annual reports and CMIE Prowess
*(t value are shown in the parentheses and * denotes significant at 5% level, ** denotes significant at 1%)*

Table 7. Renault India Pvt. Ltd. shows the greater beta value for the performance index. But it has only third place in Utilizing current assets for generating sales (0.439). Ford India Pvt. Ltd. Shown a greater beta value of 0.770 in utilizing index Table 8. The Selected passenger cars manufacturing companies are shown a low value of beta for both performance index and utilization index. It reveals that all the companies have to improve their working capital policies to achieve their target level.

Table 8.Regression Results (Utilization Index)

Name of Company	Constant	Beta	R^2	F value
Maruti Suzuki India Ltd.	1.866 (3.570)	-0.46 (-1.448) **	0.208	2.098
Hyundai Motor India Ltd.	0.974 (4.619)	0.057 (0.161) *	0.003	0.026
Tata Motors Ltd.	0.967 (6.074)	0.022 (0.062) *	0.000	0.004
Mahindra & Mahindra Ltd.	1.073 (9.660)	-0.420 (-1.309) **	0.176	1.712
Toyota Kirloskar Motor Pvt. Ltd.	0.885 (4.328)	0.152 (0.434) *	0.023	0.188
Renault India Pvt. Ltd.	-1.147 (-0.420)	0.439 (1.381) *	0.192	1.907
Honda Carss India Ltd.	0.357 (1.525)	0.766 (3.375) *	0.587	11.389
Ford India Pvt. Ltd.	-6.821 (-2.286)	0.770 (3.414) *	0.593	11.654
Nissan Motor India Pvt. Ltd.	0.793 (3.722)	0.378 (1.154) *	0.143	1.332
Fiat India Automobiles Pvt. Ltd.	1.056 (2.467)	-0.018 (-0.050) **	0.000	0.003

*Source: Annual reports and CMIE Prowess (t value are shown in the parentheses and * denotes significant at 5% level, ** denotes significant at 1%)*

Using the mean efficiency level of passenger car manufacturers in India as the target level of efficiency for each company, the rate of achieving that level has been evaluated. The significance of empirical study results is determined using statistical tests such as the t-test and F-test. Tables table 8-10 show the results of the regression equations for PI, UI, and EI for all 10 companies.

Table 9.Regression Results (Efficiency Index)

Name of Company	Constant	Beta	R^2	F value
Maruti Suzuki India Ltd.	0.258 (4.756)	-0.234 (-0.681) **	0.055	0.464
Hyundai Motor India Ltd.	0.206 (8.612)	-0.055 (-0.157) **	0.003	0.025
Tata Motors Ltd.	0.198 (9.589)	-0.180 (-0.517) **	0.032	0.268
Mahindra & Mahindra Ltd.	0.181 (9.502)	0.247 (0.721) *	0.061	0.520
Toyota Kirloskar Motor Pvt. Ltd.	0.179 (5.011)	0.460 (1.465) *	0.211	2.145
Renault India Pvt. Ltd.	-2.214 (-0.602)	0.790 (3.647) **	0.624	13.300
Honda Carss India Ltd.	0.185 (3.139)	0.570 (1.963) *	0.325	3.855
Ford India Pvt. Ltd.	0.529 (0.135)	0.450 (1.426) *	0.203	2.034
Nissan Motor India Pvt. Ltd.	0.183 (6.229)	0.329 (0.987) *	0.108	0.973
Fiat India Automobiles Pvt. Ltd.	0.321 (2.559)	-0.168 (-0.481) **	0.028	0.232

*Source: Annual reports and CMIE Prowess (t value are shown in the parentheses and * denotes significant at 5% level, ** denotes significant at 1%)*

R2 is a statistical measure that represents the percentage of the index value that can be explained by the average of the targeted passenger car manufacturing companies in India. The F-value is statistically significant at the 1% level for 5 companies and at the 5% level for 5 companies out of 10 selected passenger car manufacturing companies, indicating that the regression models (the predictors) did a good job predicting the outcome variables. It's proven that the regression models suit the data. Ho3 is denied. The null hypothesis is rejected.

Further Efficiency index is measure of performance, which reflects the combine effects of both the performance index and utilization index. Based on this index Renault India Pvt. Ltd. occupies the first position with the high beta value of 0.790 in the matter of speed in achieving the targeted Passenger car manufacturing companies in India norm over the period Table 9.

Table 10.Rank of Companies according to Beta Value

Name of Company	Performance Index	Utilization Index	Efficiency index
Maruti Suzuki India Ltd.	2	10	10
Hyundai Motor India Ltd.	7	6	7
Tata Motors Ltd.	10	7	9
Mahindra & Mahindra Ltd.	5	9	6
Toyota Kirloskar Motor Pvt. Ltd.	3	5	3
Renault India Pvt. Ltd.	1	3	1
Honda Carss India Ltd.	4	2	2
Ford India Pvt. Ltd.	8	1	4
Nissan Motor India Pvt. Ltd.	6	4	5
Fiat India Automobiles Pvt. Ltd.	9	8	8

Table 10: The order of companies as determined by their beta value. Renault India Pvt. Ltd. ranks first on the Performance Index, while Tata Motors Ltd. ranks tenth. Likewise, Ford India Pvt. Ltd. ranks first in Utilization Index and Maruti Suzuki India Ltd. ranks tenth, while Renault India Pvt. Ltd. ranks first in efficiency Index and Maruti Suzuki India Ltd. ranks tenth.

Conclusions

D. Mukhopadhyay (2004) has suggested the principles of: THREE Es" to manage liquidity, solvency and Profitability, survival and growth of the business. E1 is stands for economy, means at what minimum cost it can produce the goods. E2 stand for efficiency, means to do the thing right and E3 represents the effectiveness which means to do the right things only. This principle is very applicable in the case of automobile industry for the efficient management of working capital. Thus, it can be stated that the analysis reveals ample potential for improvement in managing the components of existing assets in order to enhance sales.

Considering how demanding and competitive the market is right now, this potential should be used in the right way. This study's results show most of the companies reviewed did well in terms of working capital performance, current asset usage, and working capital efficiency. Some selected passenger car manufacturers have efficiently managed their working capital and increased sales with existing assets. Companies with a low or negative efficiency index must use current assets efficiently to manage working capital. Working capital management can be made better by taking better care of each current asset, or all of them together. Empirical data show that selected Indian passenger automobile manufacturers did effectively during the research period. 8 out of 10 years in the car business EI >1. Except for two businesses, all other 18 four-wheeler automakers greatly improved their PI, UI, and EI during the research period. Selected Indian passenger car manufacturers are efficient in terms of PI, UI, and EI of WCM.

This study's findings and conclusion are consistent with those of previous empirical studies by Azhagaiah & Muralidharan (2009), Afza & Nazir (2011), Farhan Shehzad (2012), and Harsh & Sukhdev (2014), but not with those of Ghosh & Maji (2004) and Debdas & Chanchal (2012), which concluded that firms are inefficient at managing working capital. Very little empirical research exists within the automobile manufacturing industry. This study has also been referenced in other disciplines. All regression results are statistically significant at the 1% and 5% levels; hence, it is plausible to conclude that H01 through H03 are all untrue. In order to increase sales, the study suggests that there is sufficient room for improvement in managing the components of existing assets. Given how demanding and competitive the market is currently, this potential should be utilised appropriately.

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