Original Article

A Mathematical Index Model Analysis Of Working Capital Management Efficiency In The Indian Private Healthcare Sector

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Abstract

A hallmark of standard business management is the capability to maintain a strong balance between profitability, growth and liquidity by efficiently utilizing the working capital of the company. This study is an attempt to view the strategic perspective of working capital management policy and practices with respect to efficiency as well as profitability of Indian healthcare sectors. The newness of this study is, it did not use the conventional ratio analysis methods for its analysis, rather used mathematical index-based formula as well as regression to analyze the efficiency of working capital management and their causal relationships. Financial data of 30 companies listed in Bombay stock exchange (BSE) of India, were collected for the period of '2019' to '2022' for this study. Findings suggest that due to Covid -19, it has become challenging for private healthcare providers to maintain the financial health of the healthcare sectors due to over burdens of capacity building for Covid patients in hospitals. In this study period some companies were found less efficient in managing their working capital properly due to the reason the healthcare sector belongs to the service industry and efficient working capital management is a very challenging task for the company. It was suggested that finance managers or policy makers by increasing the utilization index be able to reduce the operating cycle of the company. Several researches were conducted on working capital management in the Indian manufacturing industry using conventional ratio analysis, but very few studies were done using this methodology during Covid -19 period in the private healthcare sector of India which belongs to the service industry. This study will be helpful for policy makers and practitioners of working capital management in various industries. This will give a scope to the future researchers for further study of working capital management practices in both manufacturing and service sectors.

Keywords: working capital management; Healthcare; Service industry; Policy; Practitioner

INTRODUCTION

Efficient working capital management strategy is much broader than business jargon. It is necessary to the success of any business as well as gives a benchmark to a company, how others view the company's business. Correct working capital management policy and practice can make a difference between survival and solvency. In (2022) Das, Sneha claims growth of any business is perfectly correlated to the management of efficient working capital. Simply keeping cash for operating expenses does not imply positive working capital, rather it is much more different than that. She said it is about how the capitalization of assets and efficient money utilization practices are carried out by the companies. For fueling any business growth and to get momentum in the business cycle, efficient working capital is highly essential. A hallmark of standard business management is the capability to maintain a strong balance between profitability, growth and liquidity by efficiently utilizing the working capital of the company. This study was conducted to analyze this ability in private health care companies in India. Because Covid -19 has taken a toll on the financial health of Indian healthcare sectors. As per the report "fewer patients means lower pay for doctors in private hospitals" published on 9th may 2020, in "The Economic Times", Covid -19 has impacted financial health of both the employers and employees of private hospitals in India. Major hospitals have made a huge loss due to overburden to create capacity for Covid patients. In (2022), Das, S. et.al, found that Covid -19 created a mental health problem due to financial losses of employee's working in private hospitals of India. They also found these losses affected their performances and profitability of respective private hospitals in India. In (2022) Das, S. et.al found during Covid-19 private hospitals were practicing delayed payment strategies in working capital management to meet the sudden demand created in healthcare ecosystems in India. This study is an attempt to view the strategic perspective of working capital management policy and practices with respect to efficiency as well as profitability of healthcare sectors.

REVIEW OF LITERATURE

In the research analysis report "Private healthcare Boons and Banes" of 'Institute Montaigne' on 3rd November, four big private hospital chains including Narayana health, Apollo, Forties and Max India booked a very heavy loss around 63

Billion INR in the financial year 2016-2018. In (2022) Das, Sneha et.al in their study "Increase in the prevalence of mental health problems due to the COVID-19 pandemic and its impact on the work performance of Private hospital supervisors in India" found that Covid -19 created a mental health problem due to financial losses of employee's working in private hospitals of India. They also found these losses affected their performances and profitability of respective private hospitals in India. In (2022) Das, S. et.al in their study "Working Capital Management and financial health of private hospitals of India after Covid-19 Pandemic" found that during Covid-19 private hospitals were practicing delayed payment strategies in working capital management to meet the sudden demand created in healthcare ecosystems in India. In (1986) researcher Yadav, found that industrial sickness is majorly due to the inefficiency of the companies towards working capital management. In (1997) Bhattacharya, found reducing the level of current assets is the main objective of modern financial management practices. So efficient management is very vital for the financial health of any organization. In (2006) Rehman, found an existence of strong and significant negative relationship between returns of firms and working capital ratio of the firms under his study. By reducing the time period of the cash conversion cycle, it can be possible for finance managers to create value for their firms. From the review of literature following objectives were made for this study as mentioned below.

OBJECTIVES

- To examine the statistical relationship between profitability and working capital efficiency of companies in private healthcare sector of India.
- To find out the working capital utilizations and performances of private healthcare sector companies on the overall working capital efficiency and profitability.

From the above objectives following hypothesis were drawn as mentioned below.

HYPOTHESIS

Ho: There is no relationships exists between working capital efficiency and profitability of the companies.
H1: There is a relationship exists between working capital efficiency and profitability of the companies.

METHODS

For this study a secondary data collection method was used to collect the data. Financial data of 30 companies listed in Bombay stock exchange (BSE) of India, were collected for the period of '2019' to '2022' for this study. These companies were selected using random sampling methods. After verifying the financial data twenty-four company's data were found relevant for the analysis and hence used for calculations. The efficiency model given by Bhattacharya in 1997 was used a mathematical index-based formula. But in this study regression analysis was carried on to analyze the efficiency of working capital management and to establish their causal relationships.

Efficiency Index Model:

The efficiency index model of working capital management is the multiplication of the performance index of working capital management and the utilization index of working capital management of the company.
Mathematical formula for this model is given in Eq. (1)

$$\mathbf{EI}_{(WCM)} = \mathrm{PI}_{(WCM)} * \mathrm{UI}_{(WCM)} \quad \text{Eq. (1)}$$

Where, working capital management performance index 'PI' represents the average performances of different components of the company's current assets which is mentioned as below.

$$\mathbf{PI}_{(WCM)} = \frac{I_s \sum_{i=1}^{n} W_{i\,(t-1)} / W_{it}}{N}$$

Where, Is = Sales Index St/St–1,
Wi = individual group of current assets,
N = number of current asset group,
i = 1, 2, 3…… N
for any particular period if the ratio of proportionate changes in sales and proportionate changes in current assets of the company was found greater than one then this company will be considered as practicing effective working capital management policy. Moreover, the utilization index 'UI' of working capital management represents the capability of the companies to utilize the optimum level of their current assets for generating sales/services. Utilization index of working capital is described below.

$$\mathbf{UI}_{(WCM)} = \frac{A_{(t-i)}}{A_t}$$

Where, A= Current assets / Sales

For working capital management of any company, utilization index greater than one is considered as effective utilizations of current assets and working capital policy and practices. Finance manager or policy makers by increasing the utilization index able to reduce the operating cycle of the company.

DISCUSSION AND RESULTS

Descriptive Statistics:

Table 1: Descriptive Statistics of Performance index

Name of the company	Minimum value	Maximum value	Mean
Gian Life Care	0.19	0.29	0.2321
Soni Medicare	0.06	0.51	0.3147
Indo-Global Enter	0.14	0.33	0.2124
Dr Agarwals Eye Hsp	0.09	0.33	0.1642
Dr Lalchandani Labs	0.14	0.18	0.1547
Dolphin Medical Serv	0.09	0.19	0.1516
Shalby	0.14	0.2	0.1735
Vijaya Diagnostic	0.1	0.32	0.1987
Narayana Hrudayalay	0.01	0.32	0.2227
Lotus Eye Hospital	0.11	0.23	0.1633
Aster DM Healthcare	0.11	0.46	0.2712
Indraprastha Medical	0.15	0.19	0.1722
Chennai Meena Multi	0.16	0.18	0.1694
Dr. Lal Pathlabs	0.09	0.18	0.1381
Kovai Medical Center	0.14	0.23	0.1898
NG Industries	0.11	0.21	0.1639
Artemis Medicare	0.15	0.19	0.1707
Dhanvantri Jeevan Rek	0.13	0.19	0.1601
Constronics Infra	0.1	0.19	0.1522
Thyrocare Tech.	0.13	0.2	0.1656
Krsnaa Diagnostics	0.11	0.24	0.1839
Metropolis Health	0.15	1.31	0.4645
Medinova Diagnostic	0.01	0.29	0.1623
Aspira Pathlab &Diagn	0.18	0.22	0.1934

[Source: Authors Own Calculations]

From (table -1), it was found that the performance index means of the company 'Metropolis Health' was (0.4645). Which is higher compared to others and all the companies under study have a positive performance index. The study result shows these companies will be considered as practicing effective working capital management policy during the study period.

Table 2: Descriptive Statistics of Utilization index

Name of the company	Minimum value	Maximum value	Mean
Gian Life Care	0.82	1.01	0.924
Soni Medicare	0.71	0.97	0.874
Indo-Global Enter	0.47	1.08	0.8147
Dr Agarwals Eye Hsp	0.56	1.27	0.8435
Dr Lalchandani Labs	0.18	11.34	3.2338
Dolphin Medical Serv	0.85	0.99	0.9208
Shalby	0.2	1.25	0.7287
Vijaya Diagnostic	0.99	0.76	0.8831
Narayana Hrudayalay	0.81	0.96	0.9023
Lotus Eye Hospital	0.92	1.41	1.0897
Aster DM Healthcare	0.76	0.89	0.817
Indraprastha Medical	0.85	1.07	0.9627
Chennai Meena Multi	0.84	1.06	0.9436
Dr. Lal Pathlabs	0.89	1.12	1.017
Kovai Medical Center	1.1348	0.79	1.55
NG Industries	0.88	1.1	1.0027
Artemis Medicare	0.79	1.31	0.9784
Dhanvantri Jeevan Rek	0.13	1.15	0.7491
Constronics Infra	0.58	17.09	5.0963
Thyrocare Tech.	0.75	1.05	0.9292
Krsnaa Diagnostics	0.9	0.93	0.9172
Metropolis Health	0.57	2.7	1.5818
Medinova Diagnostic	0.78	0.99	0.8639
Aspira Pathlab &Diagn	0.49	1.91	1.0281

[Source: Authors Own Calculations]

From the (table -2), it was found that all the companies have utilized the current assets optimally since the utilization index was found to be positive. However, the company 'Constronics Infra' showed higher utilization index mean value i.e. (5.0963) compared to other companies under this study period.

Table 3: Descriptive Statistics of Efficiency index:

Name of the company	Minimum Value	Maximum value	Mean
Gian Life Care	0.12	0.14	0.1341
Soni Medicare	0.09	0.17	0.1387
Indo-Global Enter	0.08	0.21	0.1412
Dr Agarwals Eye Hsp	0.13	0.18	0.148
Dr Lalchandani Labs	0.09	0.17	0.1491
Dolphin Medical Serv	0.11	0.23	0.1513
Shalby	0.09	0.21	0.1516
Vijaya Diagnostic	0.12	0.19	0.1532
Narayana Hrudayalay	0.13	0.17	0.1533
Lotus Eye Hospital	0.08	0.26	0.1561
Aster DM Healthcare	0.11	0.21	0.1571
Indraprastha Medical	0.1	0.22	0.1588
Chennai Meena Multi	0.15	0.17	0.1606
Dr. Lal Pathlabs	0.14	0.18	0.1611
Kovai Medical Center	0.15	0.19	0.1639
NG Industries	0.11	0.21	0.1677
Artemis Medicare	0.14	0.19	0.1704
DhanvantriJeevan Rek	0.16	0.18	0.1713
Constronics Infra	0.17	0.19	0.1778
Thyrocare Tech.	0.13	0.22	0.1804
Krsnaa Diagnostics	0.13	0.3	0.1958
Metropolis Health	0.15	0.24	0.1996
Medinova Diagnostic	0.15	0.24	0.1996
Aspira Pathlab &Diagn	0.11	0.31	0.2203

[Source: Authors Own Calculations]

From the (table -3), it was observed that the average value of the efficiency index of all the companies was found to be less than one. Which implies a lower level of efficiency of working capital management during the study period. To find the causal relationship between the independent variables and dependent variable regression analysis was carried on as mentioned below.

Regression Analysis:

Table 5: Model Summary:

Model	Multiple R	R-Square	Adjusted R-Square	Standard error
1	0.171425	0.029387	-0.06767	0.021464

Independent variables: performance index, utilization index
Dependent Variable: Efficiency Index
[Source: Study findings]

From the (Annexure -1; Table- 6) regression results, it was found that the coefficient of correlation is (0.171425), which is positive. It shows a positive relationship between performance and utilization with efficiency. From the performance index formula, we get, performance is directly related to profitability. So, efficiency and profitability of companies in private healthcare sectors of India under the study are related to each other positively, that means increase in efficiency of working capital will increase the profitability of the company which rejects the null hypothesis of this study. The study results complement the findings of the researchers (2022) Das, Sneha and (2022) Das, Sneha. et. al. Again the 'P 'values from (table -6; Annexure-1) are (0.508647), (0.661865) for performance index and utilization index respectively. so, by removing the utilization index, we get the regression model which is described in (table -7; Annexure-1) can be used to reduce the regression model precisions.

CONCLUSION

This study is an attempt to view the strategic perspective of working capital management policy and practices with respect to efficiency as well as profitability of Indian healthcare sectors. The newness of this study is, it did not use the conventional ratio analysis methods for its analysis, rather used mathematical index-based formula as well as regression to analyze the efficiency of working capital management and their causal relationships. Financial data of 30 companies listed in Bombay stock exchange (BSE) of India, were collected for the period of '2019' to '2022' for this study. Findings suggest that due to Covid -19, it has become challenging for private healthcare providers to maintain the financial health

of the healthcare sectors due to over burdens of capacity building for Covid positive patients in hospitals. In this study period some companies were found less efficient in managing their working capital properly due to the reason healthcare sector belongs to the service industry and efficient working capital management is a very challenging task for the company. In spite of a good utilization index of current assets by the companies under the study period, their management were not focused on working capital management policies and practices well so inefficiency was found during the study period results. Private healthcare service providers can improve their profitability by focusing on the efficiency level of working capital utilizations. It was suggested that finance managers or policy makers by increasing the utilization index be able to reduce the operating cycle of the company. Several researches were conducted on working capital management in the Indian manufacturing industry using conventional ratio analysis, but very few studies were done using this methodology during Covid -19 period in the private healthcare sector of India which belongs to the service industry. This study will be helpful for policy makers and practitioners of working capital management in various industries. This will give a scope to the future researchers for further study of working capital management practices in both manufacturing and service sectors.

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Annexure 1:

Table 6: Regression Analysis of the study variables:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.171425
R Square	0.029387
Adjusted R Square	-0.06767
Standard Error	0.021464
Observations	23

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	0.000279	0.000139	0.302763	0.742101
Residual	20	0.009214	0.000461		
Total	22	0.009493			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.155258	0.015069	10.30302	1.91E-09	0.123824	0.186692	0.123824	0.186692
0.2321	0.043532	0.064683	0.673004	0.508647	-0.09139	0.178458	-0.09139	0.178458
0.924	0.002071	0.004666	0.443921	0.661865	-0.00766	0.011804	-0.00766	0.011804

RESIDUAL OUTPUT

Observation	*Predicted 0.1341*	*Residuals*
1	0.170768	-0.03207
2	0.166192	-0.02499
3	0.164153	-0.01615
4	0.16869	-0.01959
5	0.163765	-0.01246
6	0.16432	-0.01272
7	0.165737	-0.01254
8	0.166821	-0.01352
9	0.164624	-0.00852
10	0.168756	-0.01166
11	0.164748	-0.00595
12	0.164587	-0.00399
13	0.163376	-0.00228
14	0.166731	-0.00283
15	0.16447	0.00323
16	0.164715	0.005685
17	0.163779	0.007521
18	0.172439	0.005361
19	0.164392	0.016008
20	0.165163	0.030637
21	0.178755	0.020845
22	0.164113	0.035487
23	0.165807	0.054493

[Source: Study findings]

Table 7: Regression Analysis of study variable

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.100811
R Square	0.010163
Adjusted R Square	-0.03483
Standard Error	0.021727
Observations	24

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.000107	0.000107	0.225878	0.639282
Residual	22	0.010385	0.000472		
Total	23	0.010492			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.158943	0.013577	11.70718	6.38E-11	0.130787	0.187099	0.130787	0.187099
X Variable 1	0.030845	0.0649	0.475267	0.639282	-0.10375	0.165438	-0.10375	0.165438

RESIDUAL OUTPUT

Observation	*Predicted Y*	*Residuals*
1	0.166102	-0.032
2	0.16865	-0.02995
3	0.165495	-0.02429
4	0.164008	-0.01601
5	0.163715	-0.01461
6	0.163619	-0.01232
7	0.164295	-0.01269
8	0.165072	-0.01187
9	0.165812	-0.01251
10	0.16398	-0.00788
11	0.167308	-0.01021
12	0.164255	-0.00545
13	0.164168	-0.00357
14	0.163203	-0.0021
15	0.164797	-0.0009
16	0.163999	0.003701
17	0.164208	0.006192
18	0.163881	0.007419
19	0.163638	0.014162
20	0.164051	0.016349
21	0.164615	0.031185
22	0.17327	0.02633
23	0.163949	0.035651
24	0.164909	0.055391

[Source: Study findings]