

## Supply chain performance, profitability and Liquidity: An analytical study of Indian pharmaceutical sector

Anis Ali<sup>a\*</sup>

<sup>a</sup>College of Business Administration, Prince Sattam Bin Abdulaziz University, Al kharj- 11942, Saudi Arabia

### CHRONICLE

#### Article history:

Received: November 26, 2020

Received in revised format:

January 30 2021

Accepted: March 18, 2021

Available online:

March 18, 2021

#### Keywords:

Supply chain performance (SCP)

Liquidity

Profitability

Indian pharmaceutical

Cash Conversion Cycle (CCC)

### ABSTRACT

The study aims to find out the relationship between Supply Chain Performance (SCP), profitability, and liquidity of selected leading Indian pharmaceutical companies. The study is based upon the secondary data available on the website of the concerned Indian pharmaceutical companies. The SCP defines the operational velocity and is measured by the manufacturing efficiency (inventory days), ability of recovery from the debtors (accounts receivables days), and payment to creditors (account payables days). Profitability is the relative measurement of the earning capacity of the business organization and facilitates the comparison among the business organization of similar industries. The liquidity in a business organization refers to the state of pay ability of the short term liabilities in ordinary business activities. Profitability and liquidity are the bi-polar concepts in the business organization. There is an optimum balance between liquidity and profitability is expected for the growth and development of the business organization. Ratio analysis is to be used to analyze the SCP, profitability, and liquidity while Karl Pearson's correlation and Spearman's rank correlation applied to get the correlation between SCP, profitability, and liquidity of the companies, and relative relationship between a correlation of profitability and profitability to liquidity ratio of all selected companies. It is observed that there is moderate relationship gross profitability, profitability on the owner's fund, and liquidity. But there is a negligible relationship between liquidity and return on total resources or profitability on total assets. The Indian pharmaceutical companies with higher profitability are much sensitive about the co-movement of profitability and liquidity. The SCP of the Indian pharmaceutical companies negatively and positively but negligibly affects the profitability and liquidity of the Indian pharmaceutical companies.

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## 1. Introduction

The SCP defines the operational velocity and is measured by the manufacturing efficiency (inventory days), ability of recovery from the debtors (accounts receivables days), and payment to creditors (account payables days). Generally, the SCP enhances the frequency of production of the business and affects the profitability and the liquidity due the enhancement of the level of operational activities. Johnson et al. (2011) found the positive impact of SCM on the firms' performance. Profitability is the relative measurement and explains the earning capacity of the business while liquidity refers to the short term paying ability of the business organization or how much a firm is able to pay-out its short-term liabilities. Profit is the essence or results of business activities of the business organization while profitability measures the relative performance or operational efficiency

\* Corresponding author.

E-mail address: [ah.ali@psau.edu.sa](mailto:ah.ali@psau.edu.sa) (A. Ali)

and facilitates comparative analysis among similar business organizations. Normally, it is assumed that the extreme liquidity restricts or lowers the profits and blockage of cash or liquid assets in non-economic avenues while low liquidity is the hindrance in the normal course of action of making payments of the dues or liabilities. Ben-Caleb et al. (2013) explained that the polar extreme (highest and lowest) of the liquidity is harmful to the running of the operational activities smoothly while liquidity has a low degree of influence on profitability. So, both the situations avoided and balance is preferred between liquidity and profitability to run the activities smoothly and to make the payments of the dues on time. In the Indian pharmaceutical industry, the profit is affected by the size of the firm while the size of the firm is to be determined by the three determinants i.e. Sales, Total resources, and working capital (Ali, 2020a). The working capital (WC) is the excess of current assets on current liabilities while the working capital ratio is the ratio of current assets and current liabilities which is the current ratio (CR). So, the level of current ratio also defines the size of the business, and the higher level CR indicates the liquidity. In Indian Pharmaceutical companies, the size of the firm affects profits not profitability (Ali, 2020b). In a business organization, WC is the significant size determinant that governs the sales and utilizes the total assets or fixed assets to operate the business activities for the attainment of the ultimate objectives. The WC of the business organization can be bifurcated into two i.e. permanent and seasonal. The permanent WC capital is required throughout the tenure while the seasonal WC is required only for a particular period in a year. Liquidity's point of view, there is only consideration of cash or cash equivalent that is the ingredient of the current assets. So, the current ratio (CR) and the weightage of the cash or cash equivalent in the current assets is also a factor that affects the smoothness of the operational activities and leads towards the profits and finally improves profitability. Pushparaj Kulkarni et al. (2019) observed a significant negative relationship between solvency or liquidity and profitability in the Indian pharmaceutical industry. In the Indian pharmaceutical sector, the firms are either having the liquidity in paying their short term liabilities or enjoying the profitability by lowering the paying ability of the firms. Farhan et al. (2019) found that the third factor i.e. corporate governance affects the relationship between liquidity and profitability of Indian pharmaceutical companies. It refers that the profitability and liquidity of the business organization are highly governed by efficient corporate governance more than the mutual governance of profitability and liquidity. Panigrahi et al. (2018) found a negative relationship between liquidity and profitability in pharmaceutical companies. They explained that all profitable business organizations need not necessarily suffer from liquidity or all liquid businesses need not have low profitability. Indirectly, they denied the clear relationship between the profitability and liquidity in Indian pharmaceutical companies. Further, Panigrahi et al. (2019) studied that the relation of profitability and liquidity varies industry to industry and the profitability and liquidity relation of a particular industry need not be the same in other countries. Srivastva (2017) observed that the Indian pharmaceutical industry's profitability is satisfactory but could not relate to the liquidity or paying ability of the firms Mohanty et al. (2018) carried out a study of the relationship of profitability and liquidity on SMEs in India and found significant relation. The impact of liquidity on profitability is negative in SMEs in India. Sinha et al. (2017) studied the liquidity of the Cipla and Ranbaxy pharmaceutical companies of India and concluded that the long term solvency is stronger than the liquidity in both companies. The present study considers the impact and relationship of liquidity and profitability and additionally measures the average relational movement of profitability and liquidity, and co-movement of relational productivity of liquidity and profitability and liquidity relationship and tries to get the relational impact of liquidity on profitability and facilitates the suggestions to the Indian pharmaceutical industry to enhance the profitability.

## 2. Literature Review

Alagathurai (2013) found a positive and significant relationship between liquidity and profitability of trading companies in Sri Lanka. The profitability of a business organization affects the liquidity and liquidity also facilitates the smooth operation of business activities and enhances profits and profitability. Sinha et al. (2016) found in their study that the efficient liquidity or cash management of the business organization affects the profitability positively. The liquidity of the business should be optimum so that it can pay off its short-term liabilities and avoid to blockade in the neutral options. Kumar et al. (2016) observed in their study that the ingredients of working capital (current assets and current liabilities) and their efficient management positively affect the profitability and maintain the paying ability of the business organization. But, Priya et al. (2013) found a negative relationship between liquidity and profitability and suggested maintaining the equilibrium between liquidity and profitability keeping the moderate paying ability to enhance the goodwill of the business organization. Sodha (2020) observed a negative relationship between liquidity and profitability and explained that either firm's profitability is satisfactory or liquidity. Aminu (2012) advocated the optimum balance between profitability and liquidity for the smooth operation of the business activities. The extreme of the liquidity will be negative for the profitability as it blocks the funds which can be utilized in operational activities. Ehiedu (2014) also observed a positive relationship between liquidity and profitability and suggested a balance between liquidity and profitability for the business organization to achieve the ultimate goal of profitability. Nandi (2012) studied that the companies try to maintain an optimum level of liquidity to run the business activities to earn the maximum possible profit. Bhunia et al. (2011) explained that working capital management is very crucial to manage and suggested the trade-off between liquidity and profitability. The efficient management of current assets and current liabilities will lead the business to attain the goal of expected profit by making payments of their dues on time. Saleem et al. (2011) conducted a study on the impacts of liquidity ratios on profitability and analyzed the liquidity and profitability of gas companies in Pakistan. They

found that profitability and liquidity both are the interrelated and optimum balance between profitability liquidity is expected. Al Nimer et al. (2015) studied the impact of liquidity on profitability in banks of Jordan and found that the liquidity of the banks significantly affects the return on assets (ROA). It refers to the quick liquidity of the banks that governs the profitability of the banks positively. Zygmunt (2013, March) conducted one case study of polish listed IT companies in Poland and found a positive relationship between profitability and ingredients of the cash conversion cycle. He observed lag between the liquidity management and profitability of the organization. Vijayakumar (2011) suggested that shortening the cash conversion period and delay in making payments will enhance profitability. But, he suggested that the optimum balance between the short term inflow and outflow of the cash in the business to get the expected profit without any paying ability obstacles. Safdar et al. (2016) suggested that the firms' profitability can be increased if the liquid assets of the business managed efficiently. Goldmann (2017) revealed the importance of managing the ingredients of the current assets and current liabilities on the profitability of the business organization. He found the positive impact of efficient management of liquidity on profitability in polish businesses in Poland. Saluja (2012) explained that the trade-off between liquidity and profitability is very important in all organizations. The current assets and current liabilities are to be managed to get the optimum profit. The polar extreme level of the current assets and current liabilities will affect the profitability negatively. Bolek et al. (2012) explored that the growth of the liquidity of the business organization negatively affects the profitability because some funds will be unnecessarily blocked in the current assets. There should not be excessive investment in the current assets only to get a high level of liquidity. Rehman et al. (2015) found in their study on 99 companies listed in Saudi stock exchange and concluded only positivity between the liquidity (current ratio) and return on total (return on assets). Further, he found the negative but insignificant relationship between super liquidity (quick ratio) and cash ratio of the companies Bibi et al. (2017) carried out a correlation and regression analysis to assess the relationship profitability and liquidity on merchandising and manufacturing firms listed in Karachi stock exchange and found that significant negative relationship between cash-gap and ROA while liquidity and profitability relationship was positive. Almazari (2013) studied the liquidity and profitability of the cement companies of Saudi Arabia and found that there should be a trade-off between the liquidity and profitability to achieve the optimum objectives of the firms. He, further, found that the size of the firm also affects the profitability of the companies. Trippner (2013) calculated the correlation between the proxies of liquidity and profitability and could not get the relationship to generalize or explain the normal relationship between liquidity and profitability. Madushanka et al. (2018) found the significant impact of liquidity on profitability in manufacturing firms of Sri Lanka.

Janjua et al. (2016) found a positive and significant relationship between profitability and liquidity in cement companies listed in the Pakistani stock exchange. The liquidity governs the profitability of the cement companies of Pakistan. Ajao et al. (2012) conducted a study of the relationship between liquidity management and profitability on manufacturing companies listed in the Nigerian Stock Exchange. They found that the Cash Flow Management, Cash Conversion Cycle positively affected the profitability and suggested that the efficient credit policy, tightening of cash conversion period and cash flow management will be favorable for the business organization for the profitability point of view. Bala et al. (2016) conducted a study on food and beverage companies listed in Nigeria and found a strong positive correlation between liquidity proxies, firm size, and profitability. But, the debtors of the business and cash conversion period found negatively related to return on assets. They suggested shortening of the cash collection period to enhance the profitability of the food and beverage companies of Nigeria. Alom (2018) found in their study that profitability, firm size, and long term debts have a long-run cointegration relationship with the liquidity of the firm. Bagchi (2013) carried out a study on Fast Moving Consumer Goods (FMCG) firms in India and found negativity between firms' liquidity and profitability. He explored that the size of the firm has a positive correlation with the profitability of the FMCG firms. Yameen et al. (2016) found an insignificant relationship between profitability and liquidity of the Steel Authority of India Limited (SAIL) in a period of ten years i.e. 2005 to 2010. In the study period, the profitability of the SAIL lowers due to the increased prices of the raw materials. The short-term solvency of the SAIL decreased due to some other factors. Raykov (2017) explained in their study that the liquidity decisions of the firm minimally affect the profitability and financial performance, ultimately. In the Bulgarian economy, there is a weak and negative correlation between manageable liquidity and the operational profitability of the firms. The liquidity of the firm is not directly governed by the capital gains of the firms in Bulgaria. Ismail (2016) found from their study that liquidity variables and the cash conversion cycle period significantly and positively correlated with the profitability of total resources. Further, he indicated that the high liquidity and longer cash conversion cycle governs the firms' performance positively and suggested the relaxed credit sales policies and adopting the favorable collection system for the debtors to enhance the number of the customers to improve the overall performance of the firms. Anand et al. (2015) found the positivity between SCM and firms' performance and indicated that the inventory management, warehousing, growth of transport industry, advancements in information technology are the considerable aspects. Gunasekaran et al. (2004) advised that the SCM performance is necessary for the companies who are in a growing stage or facing competition. Ali (2021) revealed that the size of the business organization governs the SCF positively but not proportionately and suggested the shortening of the Cash Conversion cycle (CCC) focusing on accounts payable which is the major ingredients of the Working Capital (WC). From the above all studies it is obvious that the relationship between liquidity and profitability varies industry to industry and firm to firm. Some studies reveal the positive and significant relationship between profitability and liquidity while others reveal no relation or negative relation between profitability and liquidity. There is no clear pattern of relationship between profitability and liquidity is seen in previous studies.

### 3. Research methodology

The study is purely based on secondary data extracted from financial statements available on the websites of the Indian pharmaceutical companies. Cipla Limited (CI), Cadila Healthcare Limited (CA), Sun Pharmaceutical Industries Limited (SU), Aurobindo Pharma Limited (AR), Dr. Reddy's Laboratories (DR), Glenmark Pharma Limited (GL), and Lupin limited (LU) pharmaceutical companies selected for the study of impact of supply chain performance on liquidity and profitability. Profitability ratio, Earning before Interest, Depreciation, and tax (EBIDT), Profit Before tax (PBT), and Profit After Tax (PAT), and liquidity ratio i.e. Current Ratio (CR) is the base of the analysis of financial data (Ali & Haque, 2014).

$$1. \text{ EBIDT to Sales ratio} = \frac{\text{EBIDT}}{\text{Sales}} 100; \quad 2. \text{ PBT ratio} = \frac{\text{PBT}}{\text{Total resources}} 100;$$

$$3. \text{ PAT ratio} = \frac{\text{PAT}}{\text{Owners' Fund}} 100; \quad 4. \text{ Current Ratio (CR) \%} = \frac{\text{CA}}{\text{CL}} 100;$$

Where, EBIDT=earnings before interest, depreciation, and tax; PBT= profit before tax; PAT= profit after tax; CA= current assets; CL= current liabilities.

To know the productivity of the liquidity in the context profitability ratios, the following formula is to be applied:

$$\text{Profitability to Current Ratio (P}_{\text{EBIDT/PBT/PAT}} \text{ to CR)} = \frac{\text{Profitability Ratio}}{\text{CR in \%}} 100;$$

Karl Pearson's correlation coefficient is calculated to get the relationship between the profitability ratios and CR. The relational correlation (Spearman's correlation coefficient) is to be calculated in between r (R1) of profitability ratios and CR and the relational productivity of the liquidity (P to CR – R2) to explain the co-movement and sensitivity, mutually.

$$\text{Spearman's Rank Correlation (r}_s\text{)} = 1 - \frac{6 \cdot \sum(D \cdot D)}{n(n^2 - 1)};$$

The cash conversion cycle (CCC) calculated to know the supply chain performance efficiency (Bui, 2020b) or operational velocity of the Indian pharmaceutical companies.

CCC= Inventory Days + Accounts Receivable Days - Accounts Payable Days;

Where,

$$\text{Inventory days} = \frac{365 \cdot \text{Av. Inventory}}{\text{COGS or Net Sales}}; \quad \text{Account Receivable days} = \frac{365 \cdot \text{Av. Account Receivables}}{\text{Credit Sales or Net Sales}};$$

$$\text{Account Payable days} = \frac{365 \cdot \text{Av. Account payables}}{\text{COGS or Net Sales}};$$

(Note: In above formula, Net sales can be used in place of COGS while COGS is Cost Of Goods Sold.

### 4. Analysis, Interpretation and results

The analysis of Supply Chain Performance (SCP) and its impact on liquidity and profitability can be divided into two categories i.e. Relative SCP analysis, and Liquidity and profitability relationship of the Indian pharmaceutical companies.

#### 4.1 Relative Supply Chain performance analyses

The SCP of the company refers the velocity in cash conversion cycle (CCC) or sharpness of the operational activities to investment of cash and getting it again after completing the operational cycle of the business activities.

The supply chain performance can be measured after consider the three ingredients of the CCC i.e. Inventory days, accounts receivables days, and accounts payable days.

##### 4.1.1 Inventory velocity or days

Inventory days refer to the average number of days required to convert the raw material into finished products. The lesser inventory days reflect the velocity or sharpness of the manufacturing activities of the organization and stronger SCP. From the above table 1, it can be explained that the manufacturing velocity of the CA, LU, SU and CI is better than the AR, DR, and GL comparatively. It refers to the manufacturing and selling efficiency and unavailability of the negative factors in manufacturing and selling in the CA, LU, SU and CI pharmaceutical companies.

**Table 1**  
Inventory days in Indian Pharmaceuticals Companies (2013-18)

Years	DR	LU	SU	CI	AR	CA	GL
2013	134	73	81	102	119	69	212
2014	152	68	69	101	106	69	235
2015	145	70	74	120	108	64	218
2016	149	83	81	99	106	53	183
2017	160	76	77	86	104	68	238
2018	154	83	92	88	129	72	205
Av.	149	75	79	99	112	66	215
Ranks	6	2	3	4	5	1	7

Source: Inventory days calculated from the data from the financial statement available on the websites of the concerned companies

#### 4.1.2 Account Receivables velocity or days

Account receivables velocity or days refers the period of collection the cash from the debtors. The lesser period reflects the strong recovery policy and strategy of the organization and stronger SCP.

**Table 2**  
Accounts Receivables days in Indian Pharmaceuticals Companies (2013-18)

Years	DR	LU	SU	CI	AR	CA	GL
2013	90	82	75	72	99	55	119
2014	86	78	48	57	118	57	131
2015	95	74	67	64	83	67	140
2016	99	115	86	61	80	62	120
2017	96	89	82	61	66	86	95
2018	102	119	104	67	68	97	93
Av	95	93	77	64	86	70	116
Rank	6	5	3	1	4	2	7

Source: Accounts' receivables days calculated from the data from the financial statement available on the websites of the concerned companies

From the above Table 2, it is obvious that the recovery policy and strategy of CI, CA, SU, and AR is comparatively better and stronger than the DR, LU, and GL. It also refers that the CI, CA, SU, and AR are efficient in collection from the debtors and there is a positive atmosphere of recovery from the debtors in the normal course of business activities.

#### 4.1.3 Account payables velocity or days

Account payables velocity or days refer the average number of days to make payment to the creditors in normal course of business activities. The maximum amount of inventory days reflects the positive payment strategy or policy of the business organization and stronger SCP.

**Table 3**  
Accounts Payables days in Indian Pharmaceuticals Companies (2013-18)

Years	DR	LU	SU	CI	AR	CA	GL
2013	70	84	33	36	60	37	75
2014	50	73	29	34	61	46	83
2015	42	94	43	50	61	46	108
2016	55	99	44	38	66	49	93
2017	51	98	50	39	52	58	69
2018	62	120	64	46	58	57	74
Av.	55	95	44	40	59	49	84
Ranks	4	1	6	7	3	5	2

Source: Accounts' receivables days calculated from the data from the financial statement available on the websites of the concerned companies

From the Table 3, it can be explained that the payment strategy of LU, GL, AR, and DR is comparatively better than the CA, SU, and CI in Indian pharmaceutical sector. LU, GL, AR, and DR companies enjoy the extended credit policies by their suppliers.

#### 4.1.4 Supply chain performance (SCP) and ranks of companies

The SCP is the aggregative performance of the positivity of the manufacturing velocity, recovery from debtors' velocity and payment strategy or available credit facility by the suppliers. To know the supply chain performance of the business

organization, the average of inventory days and recovery from the debtors' days added while average payment days to creditors are subtracted to get the SCP in form of CCC days.

**Table 4**

Average Cash conversion cycle of Indian pharmaceutical companies (2013-18)

Days	DR	LU	SU	CI	AR	CA	GL
Inventory Days	149	75	79	99	112	66	215
Account receivable Days	95	93	77	64	86	70	116
Account payable days	55	95	44	40	59	49	84
Cash Conversion cycle days	189	73	112	123	139	87	247
Ranks	6	1	3	4	5	2	7

Source: Based on calculation of table 1, 2, and 3

From Table 4, it can be explained that the SCP of the LU, SU, CA, and CI is better than the DR, AR, and GL pharmaceutical companies of India. It reveals that the aggregative manufacturing velocity, recovery policies and strategies, and payment policy and credit availability by the suppliers is favorable in LU, SU, CA, and CI while weaker in DR, AR, and GL in Indian pharmaceutical companies.

#### 4.2 Liquidity and profitability analysis

The mutual relationship of the liquidity and profitability can be explained among the three categories i.e. liquidity and gross profitability or gross earning (EBIDT), liquidity and profitability for total investment point of view (PBT), and liquidity and profitability for owners' point of view (PAT).

##### 4.2.1 Liquidity (CR) and gross profitability or gross earning (EBIDT)

The relationship between liquidity (CR) and gross profitability or gross earning (EBIDT) measures the impact of the liquidity on gross profitability. The relationship between liquidity and gross profitability will reveal the utilization of liquidity to earn gross earnings.

The higher P to CR indicates that the business is managing its manufacturing activities efficiently in the liquidity context. The correlation and relational study explain the governance and impact of the liquidity position on profitability or utilization of the liquidity in the gross profit earning of the companies.

**Table 5**

Relationship and co-movement of EBIDT and Liquidity (CR) of Indian pharmaceutical companies

Years	DR			LU			SU			CI			AR			CA			GL		
	EBIDT	CR	P to CR%	EBIDT	CR	P to CR%	EBIDT	CR	P to CR%	EBIDT	CR	P to CR%	EBIDT	CR	P to CR%	EBIDT	CR	P to CR%	EBIDT	CR	P to CR%
2013	24	151	16	24	242	10	45	405	11	28	303	9	15	121	13	18	120	15	20	169	12
2014	25	178	14	27	276	10	45	312	15	23	221	10	27	133	20	17	123	14	18	161	11
2015	25	174	14	29	237	12	30	179	17	20	195	10	22	135	16	21	129	16	19	141	13
2016	26	173	15	27	264	10	31	233	13	19	114	17	24	134	18	25	130	19	19	145	13
2017	19	115	16	26	267	10	33	184	18	18	264	7	23	139	17	21	114	18	22	254	9
2018	17	152	11	21	238	9	24	159	15	19	282	7	23	140	17	25	135	18	19	213	9
Av.	23	157	14	26	254	10	35	245	14	21	230	9	22	134	16	21	125	17	20	181	11
r		0.74			0.33			0.9			0.41			0.77			0.64			0.7	
R1		3.5			6			3.5			7			2			1			5	
R2		3			7			1			6			2			5			4	
D		0.5			-1			2.5			1			0			-4			1	
D <sup>2</sup>		0.25			1			6.25			1			0			16			1	

Source: EBIDT and CR ratios are calculated from the financial statements of the companies available on websites while R1 and R2 is ranks of r and ranks EBIDT and CR ratio, D is the difference of R1 and D2.

$$\text{Spearman's Rank Correlation } (r_s) = 1 - \frac{6 \cdot \sum(D \cdot D)}{n(n^2 - 1)}, \quad = 1 - \frac{6 \cdot 25.50}{7(7^2 - 1)}, \quad = 0.45$$

The rank correlation of selected Indian pharmaceuticals reveals that there is a moderate correlation ( $r_s=0.51$ ) between utilization of the liquidity for profitability on owners' funds and the co-movement of the liquidity and profitability on owners' funds and

liquidity (CR). It explains that the liquidity of the Indian pharmaceutical companies affects the profitability of owners' capital positively but not so strongly. In individual observation, it is found that some companies with higher utilization of the liquidity on owners' fund (AR-18%, and DR-12%) having a stronger correlation between the PAT and CR (AR-0.59, and DR-0.65) while some companies have a negative trend in between utilization of the liquidity for profitability on owners' fund and the co-movement of the profitability on owners' fund (PAT) and liquidity (CR) i.e CA (16%,  $r_s = 0.22$ ), and GL (9%,  $r_s = 0.34$ ). The individual  $P_{PAT}$  to CR ratio explains that CA (18%), DR (12%), and AR (18%) pharmaceutical companies manage their Taxes, selling & distribution, and administrative expenses including manufacturing expenses effectively.

So, it can be concluded that the Indian pharmaceutical companies utilizing liquidity and enjoying higher gross profitability, much sensitive and strong correlation between gross profitability (EBIDT) and liquidity (CR).

#### 4.2.2 Liquidity (CR) and profitability on total resources (PBT)

The relationship between liquidity (CR) and profitability for the total investment point of view (PBT) measures the impact of the liquidity on the utilization of resources. The relationship between liquidity and profitability on total resources will reveal the utilization of liquidity to earn the profits on total investment in the business organization.

The higher P to CR indicates that the business is managing its selling & distribution, and administrative expenses including manufacturing activities efficiently in the liquidity context. The correlation and relational study explain the governance and impact of liquidity on the profitability of utilization of the total assets or resources of the companies.

**Table 6**

Relationship and co-movement of PBT and Liquidity (CR) of Indian pharmaceutical companies

Years	DR			LU			SU			CI			AR			CA			GL		
	PBT	CR	P to CR%	PBT	CR	P to CR%	PBT	CR	P to CR%	PBT	CR	P to CR%	PBT	CR	P to CR%	PBT	CR	P to CR%	PBT	CR	P to CR%
2013	16	151	11	22	242	9	24	405	6	18	303	6	5	121	4	11	120	9	10	169	6
2014	17	178	9	28	276	10	24	312	8	14	221	6	16	133	12	12	123	10	8	161	5
2015	16	174	9	26	237	11	14	179	8	11	195	5	17	135	12	16	129	13	9	141	6
2016	13	173	8	15	264	6	14	233	6	8	114	7	17	134	13	21	130	16	10	145	7
2017	7	115	6	13	267	5	15	184	8	6	264	2	19	139	13	11	114	9	13	254	5
2018	6	152	4	8	238	3	7	159	4	8	282	3	15	140	11	13	135	10	9	213	4
Av.	12	157	8	18	254	7	16	245	7	11	230	5	15	134	6	14	125	11	10	181	6
r	0.69			0.16			0.89			0.29			0.89			0.59			0.67		
R1	3			7			1.5			6			1.5			5			4		
R2	2			3.5			3.5			7			5.5			1			5.5		
D	1			3.5			-2			-1			-4			4			-1.5		
D <sup>2</sup>	1			12.25			4			1			16			16			2.25		

Source: PBT and CR ratios are calculated from the financial statements of the companies available on websites while R1 and R2 is ranks of r and ranks EBIDT and CR ratio, D is the difference of R1 and D2.

$$\text{Spearman's Rank Correlation } (r_s) = 1 - \frac{6 \cdot \sum(D \cdot D)}{n(n^2 - 1)}, \quad = 1 - \frac{6 \cdot 52.50}{7(7^2 - 1)}; \quad = 0.06$$

The rank correlation of selected Indian pharmaceutical reveals that there is a very low or negligible correlation ( $r_s=0.06$ ) between utilization of the liquidity for profitability on total investment and the co-movement of the profitability on total investment (PBT) and liquidity (CR). It explains that the liquidity of the Indian pharmaceutical companies does not affect profitability. In individual observation, it is found that some companies with higher utilization of the liquidity (DR-8%, AR-6%, and SU-7%) for profitability on total investment are also having a stronger correlation between the PBT and CR (AR-0.89, SU-0.89, and DR-0.69) while some companies have a negative trend in between utilization of the liquidity for profitability on total investment and the co-movement of the profitability on total investment (PBT) and liquidity (CR) i.e CA (11%,  $r_s = 0.59$ ), and LU (7%,  $r_s = 0.16$ ). The individual  $P_{PBT}$  to CR ratio explains that CA (11%), LU (7%), SU(7%), and DR(8%) pharmaceutical companies managing their selling & distribution, and administrative expenses including manufacturing expenses effectively.

So, it can be said that there is a clear pattern of relationship between utilization of the liquidity for profitability on total investment and the co-movement of the profitability on total investment (PBT) and liquidity (CR). The return on total resources (PBT) is not affected by the liquidity status of the companies in the Indian pharmaceutical sector.

#### 4.2.3 Liquidity (CR) and profitability on owners' fund (PAT)

The relationship between liquidity (CR) and profitability for owners' point of view (PAT) measures the impact of the liquidity on the owners' fund or investment. The relationship of liquidity and profitability on the owner's fund will reveal the utilization of liquidity in order to earn the profits on the owner's fund in the business organization. The higher P to CR indicates that the business is managing its taxes including selling & distribution, administrative expenses, and manufacturing activities efficiently in the liquidity context. The correlation and relational study explain the governance and impact of the liquidity on the profitability of owners' funds or owners' investment in the companies.

**Table 7**

Relationship and co-movement of PAT and Liquidity (CR) of Indian pharmaceutical companies

Years	DR			LU			SU			CI			AR			CA			GL		
	PAT	CR	P to CR%	PAT	CR	P to CR%	PAT	CR	P to CR%	PAT	CR	P to CR%	PAT	CR	P to CR%	PAT	CR	P to CR%	PAT	CR	P to CR%
2013	24	151	16	26	242	11	23	405	6	17	303	6	11	121	9	23	120	20	23	169	13
2014	25	178	14	27	276	10	21	312	7	14	221	6	31	133	23	24	123	20	18	161	11
2015	24	174	14	27	237	11	21	179	12	12	195	6	30	135	23	28	129	22	12	141	8
2016	18	173	11	20	264	8	19	233	8	12	114	11	28	134	21	29	130	22	24	145	16
2017	11	115	9	19	267	7	21	184	12	8	264	3	25	139	18	21	114	18	25	254	10
2018	8	152	5	2	238	1	7	159	4	10	282	4	21	140	15	20	135	15	16	213	7
Av.	18	157	12	20	254	8	19	245	8	12	230	5	24	134	18	20	125	16	16	181	9
r	0.65			0.3			0.54			0.11			0.59			0.22			0.34		
R1	1			5			3			7			2			6			4		
R2	3			5.5			5.5			7			1			2			4		
D	-2			-0.5			-2.5			0			1			4			0		
D <sup>2</sup>	4			0.25			6.25			0			1			16			0		

Source: PAT and CR ratios are calculated from the financial statements of the companies available on websites while R1 and R2 is ranks of r and ranks EBIDT and CR ratio, D is the difference of R1 and D2.

$$\text{Spearman's Rank Correlation } (r_s) = 1 - \frac{6 \cdot \sum(D \cdot D)}{n(n^2 - 1)}, \quad = 1 - \frac{6 \cdot 27.50}{7(7^2 - 1)}; \quad = 0.51$$

The rank correlation of selected Indian pharmaceuticals reveals that there is a moderate correlation ( $r_s=0.51$ ) between utilization of the liquidity for profitability on owners' funds and the co-movement of the liquidity and profitability on owners' funds and liquidity (CR). It explains that the liquidity of the Indian pharmaceutical companies affects the profitability of owners' capital positively but not so strongly. In individual observation, it is found that some companies with higher utilization of the liquidity on owners' fund (AR-18%, and DR-12%) having a stronger correlation between the PAT and CR (AR-0.59, and DR-0.65) while some companies have a negative trend in between utilization of the liquidity for profitability on owners' fund and the co-movement of the profitability on owners' fund (PAT) and liquidity (CR) i.e CA (16%,  $r_s$ - 0.22), and GL (9%,  $r_s$  - 0.34). The individual  $P_{PAT}$  to CR ratio explains that CA (18%), DR (12%), and AR (18%) pharmaceutical companies manage their Taxes, selling & distribution, and administrative expenses including manufacturing expenses effectively. So, it can be said that there is a clear pattern of relationship between utilization of the liquidity for profitability on owners' funds and the co-movement of the profitability on owners' funds (PAT) and liquidity (CR). The return on owners' funds (PAT) is not strongly affected by the liquidity status of the companies in the Indian pharmaceutical sector.

#### 4.3 SCP, profitability and liquidity

The comparative relationship between SCP, liquidity and profitability will reveal the coherence and governance of the SCP on the profitability and the liquidity of the business organization.

##### 4.3.1 SCP and profitability

The SCP and profitability relative comparative study will reveal the relationship and impact of the SCP on the profitability of the business organization.

$$\text{Spearman's Rank Correlation } (r_s) = 1 - \frac{6 \cdot \sum(D \cdot D)}{n(n^2 - 1)}, \quad = 1 - \frac{6 \cdot 65.66}{7(7^2 - 1)}; \quad = -0.17$$

From Table 8, it is obvious that there is a weak but negative relationship between the average SCP and the profit earning capacity of the Indian pharmaceutical companies. The SCP may enhance the absolute amount of the profitability but there is no positive impact on the profitability of the Indian pharmaceutical companies.



**Table 8***Relative relationship between av. SCP and profitability*

Ranks	DR	LU	SU	CI	AR	CA	GL
R1 (SCP)	6	1	3	4	5	2	7
R2 ( Profitability)	2.5	6	2.67	6.67	1.83	4	4.33
D (R1-R2)	3.5	-5	0.33	-2.67	3.17	-2	2.67
D <sup>2</sup>	12.25	25	0.11	7.13	10.04	4	7.13

Source: R1 is from table 4 while R2 is the av. of profitability ranks given in table 1, 2, and 3.

#### 4.3.2. SCP and liquidity

The SCP and liquidity relative comparative study will reveal the relationship and impact of the SCP on the liquidity of the business organization.

**Table 9***Relative relationship between av. SCP and profitability*

Ranks	DR	LU	SU	CI	AR	CA	GL
R1 (SCP)	6	1	3	4	5	2	7
R2 (Liquidity)	2.67	5.33	3.33	6.67	2.83	2.67	4.5
D (R1-R2)	3.33	-4.33	0.33	-2.67	2.17	0.67	2.5
D <sup>2</sup>	11.09	18.75	0.11	7.13	4.71	0.45	6.25

Source: R1 is from table 4 while R2 is the av. of liquidity ranks given in table 1, 2, and 3.

$$\text{Spearman's Rank Correlation } (r_s) = 1 - \frac{6 \cdot \sum(D \cdot D)}{n(n^2 - 1)}, \quad = 1 - \frac{6 \cdot 48.49}{7(7^2 - 1)}, \quad = 0.13$$

From the table 9, it is obvious that there is weak but positive relationship between the average SCP and the liquidity of the Indian pharmaceutical companies. The SCP may enhance the short term paying capacity of the business organization negligibly but there is no strong and positive impact on the liquidity of the Indian pharmaceutical companies.

## 5. Discussion of Findings

There is a positive and moderate relationship between liquidity and gross earning or gross profitability, and profitability on owners' funds while there is a negligible relationship between liquidity and profitability on total resources in the Indian pharmaceutical sector. The Indian pharmaceutical companies utilizing liquidity and enjoying higher gross profitability that are much sensitive and strong correlation between gross profitability (EBIDT) and liquidity (CR). There is a positive relationship between liquidity and profitability in Indian pharmaceutical industries (Yameen, Farhan, & Tabash, 2019; Viswanathan, Palanisamy, & Mahesh, 2016). But, there is a clear pattern of relationship between the utilization of the liquidity for profitability on total investment and the co-movement of the profitability on total investment (PBT) and liquidity (CR). Also, there is a similar and a clear pattern of relationship between utilization of the liquidity for profitability on owners' funds and the co-movement of the profitability on owners' funds (PAT) and liquidity (CR). The return on total resources (PBT) and owner's fund (PAT) is not strongly affected by the liquidity status of the companies in the Indian pharmaceutical sector. There is a negative relationship between profitability and liquidity in the Indian pharmaceutical industries (Priya & Nimalathasan, 2013; Panigrahi et al., 2018; Pushparaj Kulkarni, & Pimplapure, 2019; Johny, 2017). The relationship between SCP and profitability is weak and negative while SCP and liquidity are weak but positive. SCP may enhance the absolute amounts of profits due to operational efficiency or velocity but not the profit earning capacity of the Indian pharmaceutical companies. SCP negligibly improves the short term paying ability of Indian pharmaceutical companies.

## 6. Conclusion

### 6.1 Results

Based on the above analysis and results, interpretations, and discussions it can be concluded that there is a positive and moderate correlation between liquidity and gross profitability and profitability on owners' funds. The liquidity and profitability's relationship is satisfactory when compared with the sales turnover and owners' fund while profitability and liquidity ratio is low when compared with total resources. It refers to either the interest and depreciation amounts are heavy or there is heavy investment in total resources or both. The sensitivity can be seen in the Indian pharmaceutical companies utilizing liquidity and enjoying higher gross profitability while low sensitivity in the companies enjoying low gross profitability, proportionately.

There is a low sensitivity of liquidity and profitability on total resources and profitability on owners' funds. The higher utilization of liquidity does not govern the total resources' profitability and owners' profitability. It is revealed in the previous studies there is a negative relationship between liquidity and profitability. The SCP negligibly affects the profitability and liquidity of the Indian pharmaceutical companies positively and negatively, respectively. The velocity of the operational efficiency decreases the profit earning capacity but may enhance the absolute amounts of profit while improving the short term paying ability negligibly.

### 6.2 Limitations

The study considers only limited period data from 2013 to 2018 for the study of the relationship of SCP, profitability, and liquidity, or short-term paying ability. There should be consideration of Inflow and outflow of the cash for the study period to get the exact items of cash expenditures and revenues. Analysis of the SCP in the study will be minutely different because the amount of net sales is to be used in place of COGS. There is scope for further research to consider the comparative analysis of all ingredients of current assets and current liabilities, manufacturing, and selling and distribution of Indian pharmaceutical companies for a period more than 10 years to get a clear trend of the relationship of profitability and liquidity.

### 6.3 Managerial implications

So, after considering the SCP, liquidity, all profitability (EBIDT, PBT, and PAT), and sensitivity of movement of the profitability to CR and relational profitability, it can be concluded that optimum balance should be maintained to run uninterrupted business activities. There is no strong relationship or impact of the SCP that governs profitability and liquidity negligibly. But, the sharpening of the SCP will enhance the absolute amounts of the profits and improve the short-term liquidity also. The relationship between liquidity and profitability and relational sensitivity is not very directional about profitability on total resources and owners' funds (Aminu, 2012; Ehiedu, 2014; Bhunia et al., 2011). There should be an improvement in the profitability of a positive impact on liquidity (Ben-Caleb et al., 2013).

### Acknowledgement

The author would like thank to Deanship of scientific research, Prince Sattam Bin Abdulaziz University, Saudi Arabia.

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