Firm size and supply chain finance in Indian pharmaceutical industry: Relational firm analysis of size determinants and cash conversion cycle

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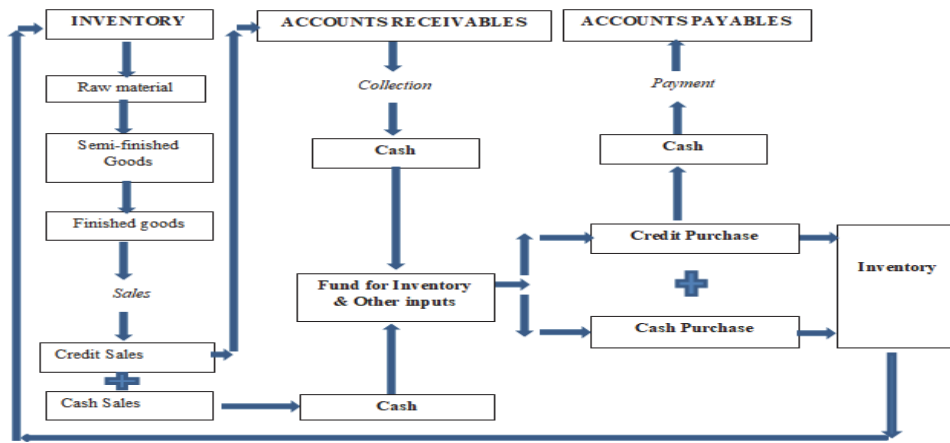| CHRONICLE	ABSTRACT
	The sales revenue, total resources, and Working Capital (WC) of the business organization measure the size of the firms. The Cash Conversion Cycle (CCC) defines the Supply Chain Finance (SCF) of the business organization and is affected by the size determinants of the firms. The components of the WC are considered to measure the CCC and define the status of the SCF of the business organization. The study is based on the secondary data obtained from the financial statements of the selected leading Indian pharmaceutical companies. The objective of the study is to find out the relation and degree of governance of size determinants on the SCF. The analysis is based on the ranks of size determinants and relative ranks of inventory days, accounts receivables days, and accounts payables days. The Spearman rank correlation is applied to get the qualitative relationship between the ranks of size determinants and ranks of components of CCC. The study reveals that size determinants affect the SCF positively but moderately while WC governs directly as WC comprises the components of CCC. The study suggests the shortening of the CCC by focusing on size determinants on WC and especially accounts payables in Indian pharmaceutical companies. © 2021 by the authors; licensee Growing Science, Canada

1. Introduction

The size of firms governs the absolute financial performances of the business organization positively while there is a negative relationship seen in the efficiency of financial performance as the size of the firm enhances (Ali, 2020b). The size of the firm positively but moderately governs the solvency of the Indian pharmaceutical firms (Ali, 2020c). Normally, the size of a firm is measured by applying the three approaches i.e. level of activities, total resources, and available funds to run the operational activities of the business organization. Hence, sales revenue, total assets, and working capital are to be used as proxy to measure the size of the firm (Ali, 2020a). Supply Chain Finance (SCF) refers to the fund needed to run the operational Cycle or Cash Conversion Cycle (CCC) in a business organization (Chand et al., 2020). The CCC of a business organization is a systematic process that starts from the introduction of cash to start the production or service rendering process and ends with the collection from the customers or accounts receivables and payment to the suppliers and accounts payables and ultimately procures cash for the next operational cycle. Keown et al. (2003) explained that the CCC is the sum of the average collection period (days) and days involved in sales of inventory of finished products minus numbers of days to make payment to the account payables. Hence, CCC is a continuous process of the sale of inventory of finished products, collection from the account receivables, and payment to the accounts payables and measured in the number of days, normally (Balasubramanian et al., 2020).

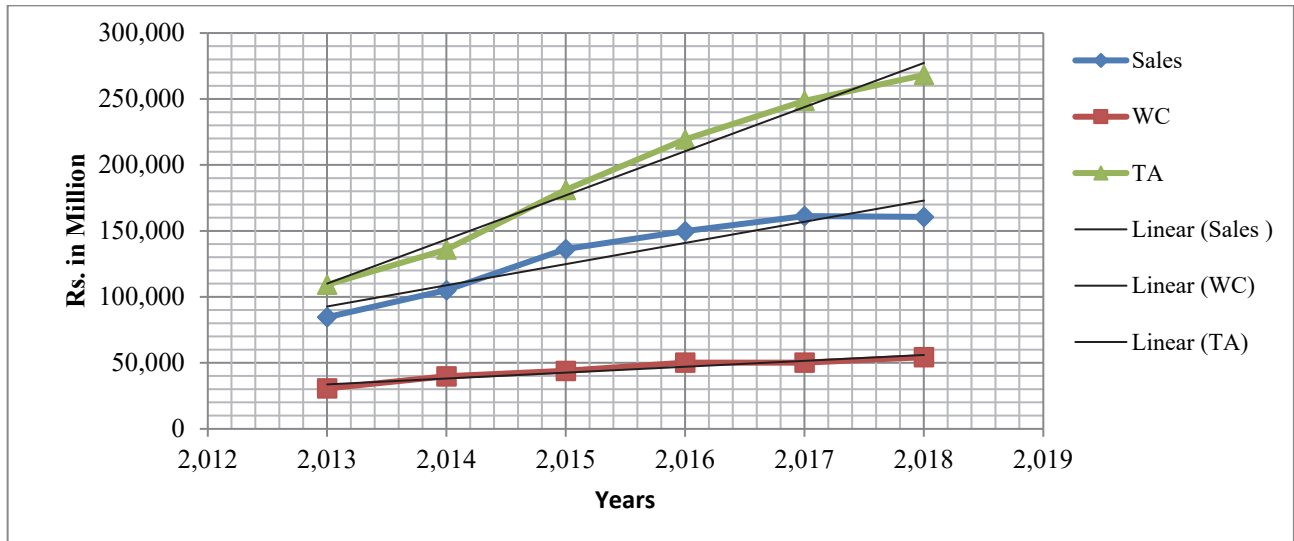Source: Author's formation based on the process of CCC

Fig. 1. Process of Cash Conversion Cycle (CCC)

From Fig. 1, it is obvious that there are components of the WC i.e. inventory, accounts receivables, and accounts payables involved in the process of CCC. The CCC is explained as a span of time or days that are necessary to complete an operational cycle of the business organization. The CCC is measured by inventory, accounts receivables, and accounts payables that are the components of the Working Capital (WC) while WC is one of the size determinants of the firm. So, the level or change in the level of the WC affects the CCC. WC is the subset of the Total Assets (TA) and governs the level of activities of the business or sales revenue. So, the three size determinants of the business govern the CCC or the SCF as the CCC is the technique to measure the SCF (Bui, 2020c; Lin & Lin, 2020; Zhou & Li, 2020). The size determinants (TA, WC, and sales revenue) of the Indian pharmaceutical companies enhance progressively.

Source: Average amounts of size determinants calculated from the financial statements of selected leading pharmaceutical companies

Fig. 2. Growth trend of Size determinants of Selected Ind. Pharmaceutical Companies

Fig. 2 explains the growing trend of the firm size determinants and reveals that the growth rate of the TA leads to the growth rate of sales revenue and WC. So, it is assumed that the TA governs strongly the CCC than WC and sales revenue. Hence, there is a need to find out the size determinants and their relative degree to govern the SCF in Indian pharmaceutical companies. There are very few studies available that explain the relationship of size determinants and CCC applying the three proxies of size i.e. TA, WC, and sales revenue. The outcomes of the study expected to facilitate the entrepreneurs, supply chain managers, and finance managers in-depth insights into CCC to minimize the level of SCF by shortening the CCC period in the Indian pharmaceutical sector.

2. Literature Review

2.1 Supply chain management practices, Supply chain intelligence, and Supply chain performance

Phan et al. (2020) studied the relationship between Supply Chain Management Practices (SCMP) and Supply Chain Performance (SCP) in the textile industry in Vietnam and found that Supply Chain Intelligence (SCI) plays an intermediary role in between SCMP and SCP. The researchers found that the SCMP contributes to the effectiveness of SCM globally.

2.2 Cash conversion cycle, Profitability, Financial development, Size, economic growth, and supply chain performance

Bui (2020a) carried out a study between financial development and profitability and found that SCP and financial development plays a vital role in the enhancement of profitability. The profitability of real estate firms positively correlated with financial development while negatively with the CCC. The profitability of the firm positively correlated with the size of the firm. Bui and Doan (2020) found the negative relationship between the size of the firm, Financial Leverage (FL), Return on Assets (ROA), and GDP on the SCP. Wagner et al. (2012) found a positive relationship between the ROA and supply chain efficiency.

2.3 Financial Leverage, Firm performance, Supply chain finance, and Cash conversion cycle

Bui (2020b) studied that the FL and SCF affect the performance of the construction firms in Vietnam. However, FL is more influential than SCP in the enhancement of firms' performance. Doan and Bui (2020) found a negative relationship between firm performance and CCC. Firms' performance effected by internal factors i.e. Size of the firm, Capital structure, and external factors i.e. macroeconomic factors and economic growth.

2.4 Size, investment, Resource, Organizational performance, Cash Conversion Cycle, Capital Structure, and Supply Chain Finance

Mani et al. (2020) conducted a study between supply chain social responsibility and SCP in SMEs and found a positive relationship. Operational performance (OP), Customers' Performance (CP), suppliers' performance (SP), and supply chain performance (SCP) were determined by the size of the firm and investment. Cho et al. (2019) advocated the importance of supply chain finance (SCF) in the utilization of the resources. Younis and Sundarakani (2019) found a negative relationship between the size of the firm and the operational performance of the business while positivity between economic, environmental, and social performance. Bui (2020c) explained that the CCC measures Supply chain Finance (SCF). The corporate performance is negatively affected by the CCC while positively by the SCF implied that the higher CCC reflects the lower SCF. The SCF is also governed by the capital structure, a firm's growth, and the size of the firm.

2.5 Inventory Management, Accounts Receivables, Accounts Payables and Supply Chain Performance, Cash Conversion Cycle

Upadhyay and Smith (2020) explained that the inventory management affects the CCC of the hospitals and advocated the optimal level of the inventory for uninterrupted activities. Wang et al. (2020) explained that the size and status of the firm affect the inventory performance of the business organization. Gelsomino et al. (2016) bifurcated the concept of the SCF into two categories i.e. finance-oriented and supply chain oriented. The finance-oriented concept considers the short-term solutions by the financial institutions and accounts receivables, payables while the supply chain oriented concept considers the optimization of WC by the accounts receivables, accounts payables, and fixed assets financing.
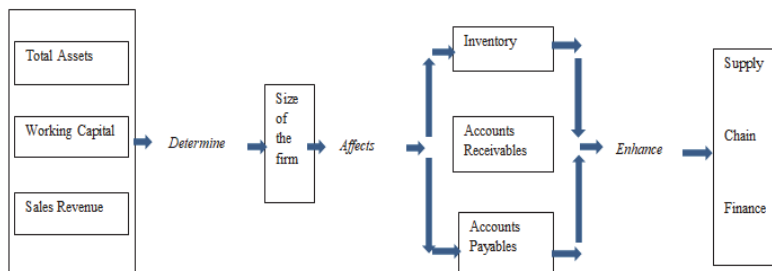
2.6 Supply chain performance, Cash conversion cycle and other factors

Panayides and Lun (2009) found a positive relationship between SCP and trust while the historical performance governs the trust of the customers. Whitten et al. (2012) found that triple-A supply chain strategy (agility, adaptability, and alignment) affects the SCP positively and indicated that the SCP is strongly governed by the marketing performance than financial performance. Also, marketing performance governs the financial performance of the business organization. Sundram et al. (2011) explained that the SCP is positively governed by the SCMP. Hsin Chang et al. (2013) indicated that e-procurement enhances the SCP while the partnership relationship, supply chain integration, and information sharing represent e-procurement.

3. Materials and Methods

The study of the relationship of firms' size determinants and SCF is based on the secondary data taken from the websites of the Indian pharmaceutical companies. Sun Pharmaceutical Industries Limited (SU), Cipla Limited (CI), Cadila Healthcare Limited (CA), Aurobindo Pharma Limited (AR), Dr. Reddy's Laboratories (DR), and Lupin limited (LU), Glenmark Pharma Limited (GL) pharmaceutical companies selected for the study of the relationship of firm's size determinants and solvency or financial soundness. Bui (2020c) explained that the CCC measures the SCF while Gelsomino et al. (2016) bifurcated the concept of the

SCF into two categories i.e. finance-oriented and supply chain oriented. The finance-oriented concept considers the short-term solutions by the financial institutions and accounts receivables, payables. The supply chain oriented (Chen et al., 2020; Maeenuddina et al., 2020) concept considers the optimization of working capital (WC) by the accounts receivables, accounts payables, and fixed assets financing. As per Mani et al. (2020), supply chain performance is governed by the size of the firm positively while Bui and Doan (2020) discovered a negative relationship. Ali (2020b) applied three proxies to determine the financial size of the firms' i.e. total assets (TA), sales revenue, and WC. To find out the relationship between the size determinants of the firm and SCF, the following model can be applied.

Source: Proposed by author
Fig. 3. Suggested research model

The analysis of the study applies the various variables of the financial statements of Indian pharmaceutical companies to establish the relational co-movement of the size determinants and CCC days to get the impact of firms' size determinants on SCF as the SCF is measured by the CCC.

Table 1

Data description and sources

Variables	Descriptions	Sources	Variables	Descriptions	Sources
Net Sales	Sale of Indian pharmaceutical products	Financial statements	CL	Current Liabilities	Financial statements
TA	Total assets	Financial statements	Ac-R	Account Receivables	Financial statements
WC	Working capital (CA-CL)	Financial statements	Ac-P	Account payables	Financial statements
CA	Current assets	Financial statements	Inv.	Inventory/ stock	Financial statements

The average absolute amounts from the financial statements used to determine the size of the Indian pharmaceutical companies, relatively. The average ranks of three proxies i.e. TA, WC, and sales revenue are to be used to determine the size of the selected Indian pharmaceutical companies. Ac- R, Ac- P, and inventory are used to calculate the receivable days, payable days, and inventory days to get the days of CCC, ultimately.

Table 2

Size & Rankings of the selected leading Indian pharmaceutical companies (2013-18)

Size Determinants	Indian pharmaceutical companies						(Rs. in Million)
	SU	LU	DR	CI	AR	CA	GL
TA	464474	179864	187476	176201	137885	112850	97422
R1	1	3	2	4	5	6	7
WC	130960	55724	37184	41462	21521	7593	19358
R2	1	2	4	3	5	7	6
Sales	241128	137190	142354	126912	120157	90097	72660
R3	1	3	2	4	5	6	7
Av. of Ranks	1	2.67	2.67	3.67	5	6.33	6.67
Composite ranks of Size Determinants	1	2.5	2.5	4	5	6	7

Source: Average absolute amounts of TA, WC, and sales are taken from the financial statements of the concerned companies for the period 2013-18.

Table 2 explains the size of the Indian pharmaceutical companies as per the size determinants i.e. TA, WC, and sales. As per table 2, Sun Pharmaceutical Industries Limited (SU), Dr. Reddy's Laboratories (DR), Lupin limited (LU), holds the first, second, third position while Cipla Limited (CI), Aurobindo Pharma Limited (AR), Cadila Healthcare Limited (CA), Glenmark Pharma Limited (GL) hold the fourth, fifth, sixth, and seventh position in the selected pharmaceutical companies. The cash conversion cycle (CCC) calculated to know the performance of SCF efficiency or operational velocity of Indian pharmaceutical companies.

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

where,

$$\text{Inventory days} = \frac{365 * Av.\ Inv.}{COGS\ or\ Net\ Sales}; \quad \text{Account Receivable days} = \frac{365 * Av.\ Ac-\ R}{Credit\ Sales\ or\ Net\ Sales}; \quad \text{Account Payable days} = \frac{365 * Av.\ Ac-P}{COGS\ or\ Net\ Sales};$$

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

Spearman's rank correlation is calculated to get the relative correlation between size determinants and components of the CCC days.

$$\text{Spearman's Rank Correlation } (r_s) = 1 - \frac{6 * \sum (D*D)}{n(n*n-1)}$$

4. Analysis, results and interpretations

To achieve the objectives of the research the analysis can be divided between two broad categories i.e. CCC analysis and relational co-movement of the size determinants (TA, sales revenue, and WC) and components of CCC (Inventory days, Receivables days, and payables days).

4.1 Cash Conversion Cycle (CCC) analysis

The CCC analysis considers the process of the conversion of cash into cash after the completion of a normal course of business activities of the production process, collecting revenue from the customers or receivables and payment to suppliers or the accounts payables. The CCC analysis can be measured by adding the inventory days and accounts receivables days and subtracting the accounts payables days.

4.2 Inventory Days

In the calculation of CCC, inventory days refer to the days of production process or days of conversion of raw material into finished products. The lower inventory days refer to the manufacturing or production efficiency of the business organization.

Table 3
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 financial statement available on the websites of the concerned companies

Table 3 explains the inventory days and relative ranking of the selected leading Indian pharmaceutical companies in India. As per the inventory days ranks, Cadila (66 days), Sun (79 days), and Lupin (75 days) companies manufacturing or production efficiency is better than the Glenmark (215 days), DR. Reddy's, (149 days), Cipla (99 days), and Aurbindo (112 days).

4.1.2 Accounts Receivables days

In the calculation of CCC, Accounts receivables days refer to the days of collection of the amount of credit sales from the customers. The lower accounts receivables days refer to the efficiency or strategy of collection from the debtors or account receivables.

Table 4
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 financial statement available on the websites of the concerned companies

Table 4 explains the accounts receivables days and relative ranking of the selected leading Indian pharmaceutical companies in India. As per days of accounts receivables ranks, Cipla (64 days), Cadila (70 days), and Sun (77 days) and Aurbindo (86 days) companies collection strategy from the accounts receivables is better than Glenmark (116days), DR. Reddy's, (95 days), and Lupin (93 days).

4.1.3 Accounts Payables days

In the calculation of CCC, Accounts payables days refer to the days of payment to the accounts payables or suppliers who supply the raw material or other inputs for the manufacturing or production process on credit. The higher accounts payables days refer to the effectiveness of the strategy of payment to the creditors or accounts payables.

Table 5
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 the financial statement available on the websites of the concerned companies

Table 5 explains the accounts receivables days and relative ranking of the selected leading Indian pharmaceutical companies in India. As per accounts receivables days ranks, Lupin (95 days), Glenmark (84 days), Aurobindo (59 days), and Dr. Reddy's (55 days) companies' payment strategy is better than Cipla (40 days), Sun (44 days) and Cipla (40 days).

4.1.4 Cash conversion cycle (CCC)

The CCC is the period that considers the inventory days and accounts receivables days subtracting the accounts payables days. The lower cash conversion days reflects the manufacturing efficiency, effectiveness of the collection strategy from the accounts receivables, and payment policies of the business organization.

Table 6
Average Cash conversion cycle (CCC) days and Ranks of selected leading Indian pharmaceutical companies (2013-18)

Days	DR		LU		SU		CI		AR		CA		GL	
	Days	R_1	Days	R_2	Days	R_3	Days	R_4	Days	R_5	Days	R_6	Days	R_7
Inventory Days	149	6	75	2	79	3	99	4	112	5	66	1	215	7
Account receivable Days	95	6	93	5	77	3	64	1	86	4	70	2	116	7
Account payable days	55	4	95	1	44	6	40	7	59	3	49	5	84	2
Cash Conversion cycle days	189		73		112		123		139		87		247	
CCC-Ranks	6		1		3		4		5		2		7	

Source: Based on calculation of table 3, 4, and 5

Table 6 reveals that Lupin (73 days), Cadila (87 days), Sun (112 days) companies' CCC reflect manufacturing efficiency, the effectiveness of the collection strategy from the accounts receivables and payment policies to the accounts payables. Glenmark (247 days), Dr. Reddy's (189 days), Aurbindo (139 days), and Cipla (123 days) companies' CCC reveal the negativity of the manufacturing, collection, and payment strategy of selected pharmaceutical companies. The ranks of inventory days, accounts receivable days, and accounts payable days of all selected leading Indian pharmaceutical companies reflect the negativity between the manufacturing efficiency, effectiveness of collection strategy, and payment strategy to the accounts payables. The selected Indian pharmaceutical companies who have better manufacturing efficiency and collection policies their payment strategies to the accounts payables are poor, comparatively.

4.2 Size determinants and Cash Conversion Cycle (CCC) analysis

The relational co-movement of the proxies of size determinants of the firms (TA, WC, and sales) and components of CCC (inventory days, accounts receivables days, accounts payables days) explain the relationship between the size and the SCF or the governance of the size determinants on the CCC components of the business organization. So, the systematic study of the relationship between size determinants and components of CCC can be divided into three categories.

4.2.1 Relational co-movement of Size and Inventory days

The relational co-movement of the size determinants' ranks and inventory days' ranks explains the impact of size proxies on the manufacturing efficiency.

Table 7
Firms' size determinants and Inventory days relational co-movement

Indian Pharm. Companies	R_1	R_2	R_3	R_4	$D_1^2=(R_1-R_4)$	$D_2^2=(R_2-R_4)$	$D_3^2=(R_3-R_4)$
DR	2	4	2	6	16	4	16
LU	3	2	3	2	1	0	1
SU	1	1	1	3	4	2	4
CI	4	3	4	4	0	1	0
AR	5	5	5	5	0	0	0
CA	6	7	6	1	25	36	25
GL	7	6	7	7	0	1	0
					$\Sigma D_1^2=46$	$\Sigma D_2^2=44$	$\Sigma D_3^2=46$

Source: Ranks based on calculation of table 2 (R_1=TA, R_2= WC, R_3= Sales) and table 3 (R_4= Inventory days)

$$r_{s,1.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)} ; \quad 1-\frac{6*\Sigma(46)}{7(7*7-1)} ; \quad 1-\frac{276}{336}= \quad 0.18$$

$$r_{s,2.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)} ; \quad 1-\frac{6*\Sigma(44)}{7(7*7-1)} ; \quad 1-\frac{264}{336}= \quad 0.21$$

$$r_{s,1.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)} ; \quad 1-\frac{6*\Sigma(46)}{7(7*7-1)} ; \quad 1-\frac{276}{336}= \quad 0.18$$

From Table 7, co-relational movement of size determinants proxies' ranks and inventory days' ranks explain that there is a low degree positive relationship between the size determinants and manufacturing efficiency in the Indian pharmaceutical companies. TA and sales revenue similarly governs the inventory days positively lower than the WC.

4.2.2   Relational co-movement of Size and Account receivable days

The relational co-movement of the size determinants' ranks and accounts receivables days' ranks explains the impact of size proxies on the collection efficiency of the business organization.

Table 8
Firms' size determinants and Accounts receivables days relational co-movement

Indian Pharm. Companies	R_1	R_2	R_3	R_4	$D_1^2=(R_1-R_4)$	$D_2^2=(R_2-R_4)$	$D_3^2=(R_3-R_4)$
DR	2	4	2	6	16	4	16
LU	3	2	3	5	4	9	4
SU	1	1	1	3	4	4	4
CI	4	3	4	1	9	4	9
AR	5	5	5	4	1	1	1
CA	6	7	6	2	16	25	16
GL	7	6	7	7	0	1	0
					$\Sigma D_1^2=50$	$\Sigma D_2^2=48$	$\Sigma D_3^2=50$

Source: Ranks based on calculation of Table 2 (R_1=TA, R_2= WC, R_3= Sales) and table 3 (R_4= Accounts receivables days)

$$r_{s,1.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)} ; \quad 1-\frac{6*\Sigma(50)}{7(7*7-1)} ; \quad 1-\frac{300}{336}= \quad 0.11$$

$$r_{s,2.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)} ; \quad 1-\frac{6*\Sigma(48)}{7(7*7-1)} ; \quad 1-\frac{264}{336}= \quad 0.04$$

$$r_{s,3.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)} ; \quad 1-\frac{6*\Sigma(50)}{7(7*7-1)} ; \quad 1-\frac{300}{336}= \quad 0.11$$

From Table 8, the co-relational movement of size determinants proxies' ranks' and accounts receivables days' ranks explain that there is a very low degree positive relationship between the size determinants and the collection efficiency in the Indian pharmaceutical companies. TA and sales revenue similarly govern the accounts receivables days positively more than the WC.

4.2.3   Relational co-movement of Size and account receivable days

The relational co-movement of the size determinants' ranks and accounts payables days' ranks explains the impact of size proxies on the payment strategy of the business organization.

Table 9

Firms' size determinants and Accounts payables days relational co-movement

Indian Pharm. Companies	R_1	R_2	R_3	R_4	$D_1{}^2=(R_1-R_4)$	$D_2{}^2=(R_2-R_4)$	$D_3{}^2=(R_3-R_4)$
DR	2	4	2	4	4	0	4
LU	3	2	3	1	4	1	4
SU	1	1	1	6	25	25	25
CI	4	3	4	7	9	16	9
AR	5	5	5	3	4	4	4
CA	6	7	6	5	1	4	1
GL	7	6	7	2	25	16	25
					$\Sigma D_1{}^2=72$	$\Sigma D_2{}^2=66$	$\Sigma D_3{}^2=72$

Source: Ranks based on calculation of Table 2 (R_1=TA, R_2= WC, R_3= Sales) and table 3 (R_4= Accounts payables days)

$$r_{s,1.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)}; \quad 1-\frac{6*\Sigma(72)}{7(7*7-1)}; \quad 1-\frac{432}{336} = \quad -0.29$$

$$r_{s,2.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)}; \quad 1-\frac{6*\Sigma(66)}{7(7*7-1)}; \quad 1-\frac{396}{336} = \quad -0.18$$

$$r_{s,3.4}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)}; \quad 1-\frac{6*\Sigma(72)}{7(7*7-1)}; \quad 1-\frac{432}{336} = \quad -0.29$$

From Table 9, co-relational movement of size determinants proxies' ranks and accounts payables days' ranks, explain that there is a low degree negative relationship between the size of the firm and payment strategy of the Indian pharmaceutical companies. TA and sales revenue similarly govern the accounts receivables days negatively lower than the WC.

4.2.4   Summary of relational co-movement (r_s) of firm's size determinants and CCC components

The summary of relational co-movement (r_s) of the firm's size determinants and CCC components explains the comparative relationship of size and CCC.

Table 10

Summary of relational co-movement (r_s) of firm's size determinants and CCC components

Size determinants	Components of Cash conversion cycle (CCC)		
	Inventory days	Accounts Receivables days	Accounts payables days
TA	0.18	0.11	-0.29
WC	0.21	0.04	-0.18
Sales	0.18	0.11	-0.29

Source: based on Table 7, 8 and 9

Table 10 explains that size determinants affect the inventory days and accounts receivables days positively but low degree while negatively and the low degree to accounts payables in Indian pharmaceutical companies. The positivity of the inventory days with the size determinants is more than the accounts receivables days.

4.3   Composite relational co-movement of Size and supply chain finance (SCF)

The relational co-movement of the size ranks and CCC day's ranks of the selected Indian pharmaceutical companies' reveals the governance of the performance of SCF by the size of the business organization.

Table 11

Relational co-movement of size and CCC

Indian Pharm. Companies	Sum of Size Det.	R1	CCC days	R2	D	D2
DR	367014	2.5	189	6	-3.5	12.25
LU	372778	2.5	73	1	1.5	2.25
SU	836562	1	112	3	-2	4
CI	344575	4	123	4	0	0
AR	279563	5	139	5	0	0
CA	210540	6	87	2	4	16
GL	189440	7	247	7	0	0
						$\Sigma D2= 34.50$

Source: Sum of size det. from Table 2 and CCC days from Table 6

$$r_{s,1.2}= 1-\frac{6*\Sigma(D*D)}{n(n*n-1)}; \quad 1-\frac{6*\Sigma(34.50)}{7(7*7-1)}; \quad 1-\frac{207}{336} = \quad 0.38$$
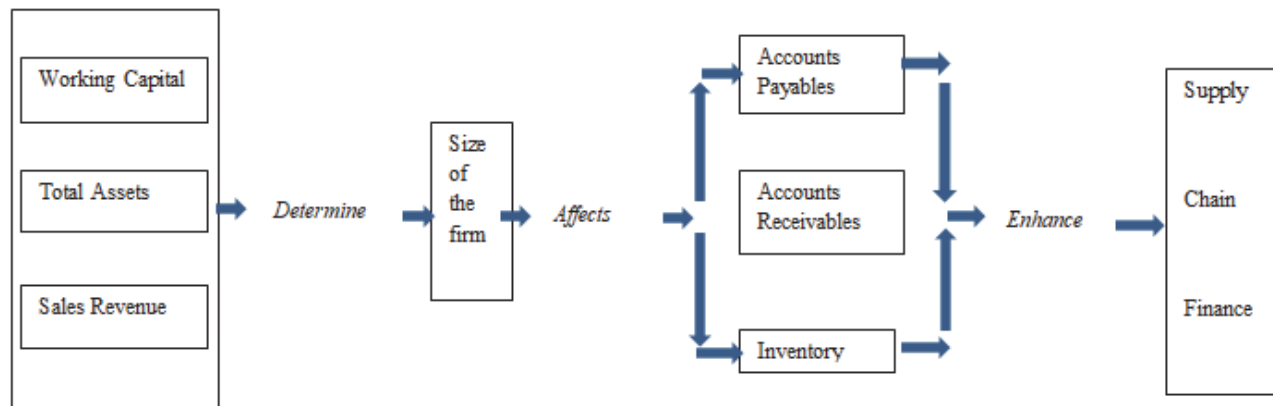
Table 11 explains the composite governance of supply chain finance by the size of Indian pharmaceutical companies. There is positive but moderate relational co-movement between the size and the supply chain finance (r_s=0.38).

5   Discussion

The ranks of inventory days, accounts receivable days, and accounts payable days of all selected leading Indian pharmaceutical companies reflect the negativity between the manufacturing efficiency, effectiveness of collection strategy, and payment strategy to the accounts payables. The selected Indian pharmaceutical companies who have better manufacturing efficiency and collection policies their payment strategies to the accounts payables are poor, comparatively. There is a low degree positive relationship between the size of the firm and manufacturing and collection efficiency while low degree and negative co-relational movement between the size of the firm and payment strategy of the Indian pharmaceutical companies. The WC of the selected Indian pharmaceutical strongly and positively governs SCF than the TA and sales revenue. Indian pharmaceutical companies can improve their CCC by focusing on WC. In current assets, the company has to consider the inventory and accounts receivables while accounts payable in current liabilities (Mangiaracina et al., 2016). Overall, size determinants positively govern the CCC or supply chain finance (Uyar, 2009).

6   Conclusion

Based on the above analysis it can be concluded that there is a negative co-relational movement between manufacturing efficiency, collection efficiency or strategy, and payment system or payment policies of the Indian pharmaceutical companies. The Indian pharmaceutical companies' who have the efficiency in manufacturing and collection form the accounts receivables needed to improve their payments strategy or system to enhance the SCF as it has the negative co-relational movement with the size determinants. The size determinants i.e. TA, WC, and sales revenue govern the CCC positively and moderately. However, WC governs CCC positively and strongly while total assets and sales revenue were lower than the WC. The co-relational movements of size determinants and CCC components also indicate the need of improvement of the payment system or policies to improve the SCF of the business organization. Hence, the suggested model to enhance the efficiency of SCF can be modified as per the findings of the study. The order of the firms' size determinants and the components of the CCC can be re-ordered as per their degree of contribution in the enhancement of the supply chain finance.

Source: Computed by the author

Fig. 3. Results of the research model

In Indian pharmaceutical companies, CCC can be shortened to enhance the SCF by focusing on size determinants and specifically on WC. The revision and change in the payment policy of the Indian pharmaceutical companies necessary to enhance the accounts receivables days. The present study considers only the data for a limited time (2013 to 2018) and quantitative financial variable. The frequency of CCC may be affected by some qualitative managerial factors. So, there is scope for further researches to study the relationship of size determinants and SCF by adding the related qualitative factors of the business organization.

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