

Impact of Supply Chain Practices on Organizational Performance with Moderating Effect of Supply Chain Performance in Indian Health Care Industry

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Abstract: *Supply chain practices play an important role in healthcare Organizational Performance. Organizational performance, from the perspective of Indian healthcare industry, is concerned with producing and delivering high-quality service at a reasonable cost. On the other hand, is concerned with how stakeholders are observing their organizations in terms of customer satisfaction, return on investment. The aim of this study was to assess the hypothesized relationship between Supply chain practices along with supply chain performance and organizational performance among Indian healthcare industry. The study was conducted by utilizing structured, self-administered questionnaires and collected data was analyzed by using SPSS. Study revealed that there is a positive significant relationship between supply chain practices and supply chain performance is affecting the organizational performance of the Indian healthcare industry. The study has developed four supply chain practices viz. Supplier Integration, Top Management Commitment, Lean Practices and Inventory Visibility. It is further observed that the Supplier Integration with a mediating effect of supply chain performance plays an important role to improve Organizational Performance in Indian healthcare industries.*

Keywords: Top management commitment, Supplier integration, organizational performance, Indian healthcare industry, customer satisfaction.

1. Introduction

Healthcare industry in India is characterized by a dynamic environment and increasingly competitive markets. The supply of medical equipments, devices and other medical supplies are critical to all hospitals to enhance performance in terms of quality, cost, responsiveness, and patient satisfaction [1]. Supply chain management is the backbone of healthcare delivery. It includes variety of practices carried out within an organization to improve healthcare organizational performance through a set of directly linked stakeholders in the chain. The healthcare supply chain has been identified as an opportunity for improving the performance and reducing the cost of healthcare delivery by managing the flow of medical devices and equipments, finished goods & services, and information from point of origin to point of consumption. The effectiveness of health care delivery is dependent on the availability of medical supplies at right time and in the right quantities to the patients. The lack of supply may create customer dissatisfaction. Several researches have been done in literature about healthcare supply chain practices to improve the performance of healthcare supply chain. Ref. [30] proposes that healthcare quality program practices, employee commitment and control initiatives are critical for healthcare supply chain. Ref. [15] categorized SCM practices into demand management, customer relationship management, supplier relationship management, capacity and resource management. Thus it is clearly depicted from the literature that the supply chain practices has a goal of improving supply chain performance thus, improving organization performance of a firm. Although, there are various supply chain practices in literature depending upon the type of organization;

still there are commonalities among practices. This research work thus intends to focus on investigating the impact of supply chain practices for improving supply chain performance and ultimately overall organizational performance in special context to Indian Health care industry.

2. Literature Review

2.1. Research Variables

Research variables in this study include healthcare supply chain practices, supply chain performance, and healthcare organizational performance.

2.2 Healthcare Supply Chain Practices

Healthcare supply chain practices provides a set of activities undertaken in an organization that helps the organization in effective management of its supply chain by integrating its stakeholders such as Manufacturers, Distributors, Suppliers and Customers, thus increasing effectiveness of supply chain performance and overall organizational performance. Ref. [37][52] coined supply chain practices as “A set of activities helps to promote the performance of whole supply chain. Ref. [56] has given various important dimensions for effective supply chain management such as Quality management, supply chain practices and JIT production.

Several dimensions and practices of healthcare SC were proposed in the literature. Ref. [18] discussed SC practices showing positive relationship of organizational performance with practices like information sharing, long term relationships. Ref. [39] focused on five practices of supply chain i.e, outsourcing, strategic supplier partnerships, customer relationship, information sharing, and product modularity that are key to create supply chain responsiveness. Further, [35] identified and validated the following SCM constructs: SC integration, information sharing, customer and supplier relationships, and postponement. Ref. [57] further pointed out that effective information sharing and effective supply chain practice are critical in achieving good supply chain performance. Ref. [33] Identified supplier relationships as a dimension of supply chain practice that link supplier’s level of trust to the buyer’s perception in improves overall supply

chain performance. Ref. [48] measured SCM using the following constructs: supplier and customer relationships, level and quality of information sharing, postponement, agreed goals and vision, and reward/risk sharing. They found that all SCM practices, except customer relationship, positively affected SC performance. Ref. [34] investigated SCM in terms of supplier and customer partnerships, and level and quality of information sharing. They found that SCM practices were positively related to both SC performance and export performance. Further, [1] revealed that top management commitment plays an important role for the effectiveness of supply chain. Further [47] identified coordination and responsiveness factors which consist of top management commitment, organizational factors, mutual understanding, flow of information, relationship & decision making, and responsiveness. Ref. [55] proposed supply chain management practices which include top management leadership, strategic planning, quality information, process management, work force management and product design process to improve supply chain management. Ref. [27] investigated the impact of SC integration on operational and business performance.

Based on our literature review, four healthcare SC practices as the most frequently used practices in the healthcare SC are considered in the study as:

2.2.1 Top Management Commitment (TMC)

The extent of healthcare care performance depends mostly on the attitude of Top management towards the internal and external supply chain of the healthcare. Human factors such as top management commitment have been successfully linked to healthcare service delivery and hence to the HSCM. Important empirical studies of US hospitals have also linked and revealed that top management commitment and customer satisfaction are important for success of supply chain initiatives. This means that they are also important for HSCM deliverables as customer satisfaction come in the domain of HSCM operations [30].

2.2.2 Supplier Integration (SI)

Supplier Integration describes a long-term relationship between a firm and its suppliers that aims at enhancing operational and strategic capabilities of participating firms to help them attain considerable ongoing benefits [40]. SI includes different aspects such as coordinated schedules,

integrated processes, shared information, shared technology, long-term contracts, reinforced quality improvements, improved supplier's overall capabilities, and shared risks and rewards [25] reviewed two forms of supplier integration: first, delivery integration, which is related to the physical forward movement of materials; and second, information integration, which is related to the backward flow of information from the customer to supplier. Supplier Integration, encourages mutual planning and problem solving efforts [31], and is critical in operating a leading-edge supply chain. Ref. [7] has investigated the impact of supplier integration on the performance and found that effective supplier integration is directly related to higher level of performance conformance.

2.2.3 Lean Practices (LP)

Lean practices can be considered as a philosophy, a work culture, a technique, a management concept, a value, a methodology [43] that improves all the processes at each level of an organization [41]. According to [43] lean practices directly link upstream and downstream flow of products, services and information that reduce cost by reducing wastage by providing right quantity of right product at right time according to the need of customer. Lean principles include a set of strategies and tools with the aim of reducing costs, both internally and externally to increase customer satisfaction through value creation in its products and services.

2.2.4. Inventory Visibility (IV)

Inventory insight and visibility helps in providing the real-time data of the stock and goods to make informed decisions and helps in complete inventory at faster pace, increase accuracy of data, update ERP system, and improve client satisfaction with real-time information by controlling remote inventory. Maintaining the right inventory is a challenge for any healthcare organization. It was estimated that a hospital could reduce its total expenses by at least two percent through better inventory management and distribution of finished medical materials [46]. It is nearly impossible to easily track which medications should be used and in what quantities.

2.3 Supply Chain Performance

Improving hospital supply chain performance is increasingly important as organization strive to

improve customer satisfaction at reduced cost. SC performance is measured in different ways in the literature. Healthcare Supply chain performance is carried out by measuring enhancement in order fulfillment process in terms of speed, quality, cost, and flexibility [32]. According to [14] both the financial and non-financial performance of healthcare organizations are expected to be improved for an efficient supply chain performance. Ref. [50] measured SC performance in terms of output, flexibility, and resource performance. Ref. [39] used cost and reliability as SC performance measures. Ref. [33] measured SC performance using responsiveness, delivery reliability, cost, efficiency, and flexibility. Ref. [55] used cost, relationship, responsiveness, and flexibility to measure SC performance. Ref. [17] delineate trust, knowledge exchange, IT integration and supplier integration as the major factors that influence hospital supply chain performance. Ref. [34] measured SC performance using SC flexibility and SC efficiency. Ref. [37] measured SC performance using cost-containment and reliability measures. Ref. [31] argued that flexibility is the most important and critical variable to measure SC effectiveness.

We used in this study the measures of effectiveness to measure SC performance. Effectiveness is reflected by using flexibility performance, delivery performance, customer responsiveness, and time to market [34][39][40].

2.3 Healthcare Organizational performance

Healthcare Organizational performance is the final outcome of the supply chain process. It refers to "How well an organization achieves its targeted goal as well as financial goal"[20]. There is large number of researches in the literature discussing about organizational performance but still no standardized definition has been evolved [33]. Ref.[54] studied that supply chain practices improves collaborative advantage and indeed has a influence on firm performance, and collaborative advantage is an intermediate variable that enables supply chain partners to achieve synergies and create superior performance. (Liu, et.al, 2013) in his study found that Operational coordination is positively associated with operational performance and organizational performance. Ref. [29] argued that organizational performance measures can be considered from various aspects in terms of the relative importance of the performance measures to the organization. Ref.

[15] in their research added new measures for organizational performance such as return on investment, inventory turnover and market share

In healthcare industry the organizational performance is measured both financially and clinically. For financial measurement the variables used are return on investment, return on asset and market share [27]. Whereas, the clinical measurement variables are length of stay & customer satisfaction [24].

We in this study measure customer satisfaction, return on investment, resource utilization and cost to service as the new measures for healthcare organizational performance in context of Indian Healthcare Industry.

3. Research Framework and Hypotheses Development

3.1 Research framework

The proposed framework for this research is illustrated in Figure 1. The framework shows the impact of healthcare SC practices on healthcare organizational performance in terms of customer satisfaction and return on investment. To reflect more accurate analysis between SCM practices and organizational performance, the function of supply chain performance is moderated. The research hypotheses thus are discussed in this section.

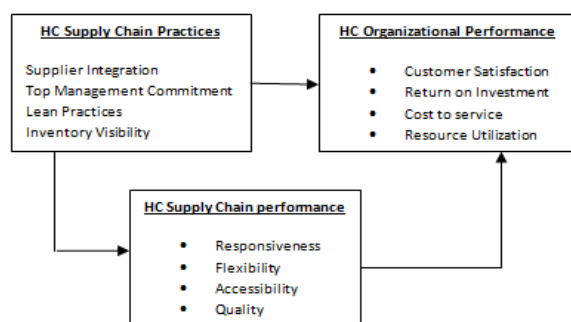


Figure 1 Proposed Framework

3.2 Hypotheses Development

Although there are abundant of literature available on supply chain performance and organizational performance but there are very less literature

available showing linkage between supply chain practices with organizational performance and supply chain performance with organizational performance particularly in the field of medical device health care supply chain. Identifying this as a research gap the research hypotheses generated is:

H1: There is a significant positive relationship between healthcare supply chain practices healthcare organizational performance.

H2: There is a significant positive relationship between healthcare supply chain practices and healthcare supply chain performance.

H3: Healthcare supply chain performance is influencing healthcare organizational performance.

3.3 Methodology

The aim of this research is to explore supply chain practices that effect on organizational performance through survey instrument. The research design consists of data collection through survey questionnaire used to assess the relationship between supply chain practices from different stakeholders of healthcare industry supply chain. Based on primary data pertaining to supply chain related variables and organizational performance. Data were collected using well structured questionnaire survey which was administrated to a total sample of 164 respondents classified by their job functions such as Manufacturer, distributor, supplier and customers.

In order to measure the variables of healthcare performance metrics, the structured questionnaire was designed using a five point likert scale for supply chain practices a set of 16 questions were used to measure the performance metrics as independent variables. A questionnaire was sent to the different stakeholders of healthcare industry as respondent for survey. The responses are collected after proper debriefing and explanation to the respondents as and when required. Finally, 164 usable responses from a survey sample of 718 were received yields a response rate of 22.8% which is sufficient number for further analysis.

The analysis of the survey data was initiated by testing the reliability of the used instrument. The results reveal that the items of the instrument have

satisfying Cronbach's alpha value of 0.911. Further assessment was done by factor analysis of the items and assessing the correlation between the Supply chain practices and supply chain performance and on organizational performance.

4 Results and Discussions

4.1 Respondent and Company Profile:

In the first section of the questionnaire, respondents were introduced with questions regarding their demographic data and data related with their work. Table 4.1 Involves results of the data collected in the first section.

Table 4.1 FREQUENCIES

GENDER		
Variable	Frequency	%
Male	134	81.7
Female	30	18.3
AGE		
25- 34 Years	44	26.8
35- 44 Years	69	42.1
45- 54 Years	36	22
Above 55 Years	15	9.1
EXPERIENCE		
1-5 years	36	22
6-10 years	53	32.3
11-15 years	46	28
Over 16 years	29	17.7
TYPE OF SUPPY CHAIN PARTNER		
Customer	61	37.2
Distributor	31	18.9
Manufacturer	33	20.1
Supplier	39	23.8

According to the results of demographic data, majority of the respondents were male healthcare supply chain partner (81.1%). The age distribution of the respondents is relatively matured group with majority of group is between 35-44 years (69%). Continuously, majority of the respondents are found to have experience of 6-10 years (53%). As a part of the questionnaire, respondents were asked about their role in the supply chain of medical devices such as manufacturer, distributor, suppliers or customers or

end users. Majority of the respondents are found to be end users who actually use the medical devices and equipments for the benefits of patients (61%), and others were as manufacturer (33%), distributors (31%) and suppliers (39%).

4.3 Factor Analysis

For SC practices (SC), a factor analysis was conducted using the 16 items that measure the four dimensions as Supplier Integration (SCF1), Top Management Commitment (SCF2), Lean Practices (SCF3) and Inventory Visibility (SCF4). For simplicity, only loadings above .40 are considered. All items loaded on their respective factors with most loadings above .80 as shown in Table 4.2. The cumulative variance explained by the five factors is 76.702%.

The Supply chain performance (SCP) construct was initially represented by 7 items. Items were factor analyzed and all items loaded on only one factor, with most of loadings greater than .60. The cumulative variance explained by the factor is 77.61%.

The organizational performance (OP) was factor analyzed, one factor emerged. The cumulative variance explained by the factor is 77.61%.

Table 4.2a Factor analysis result for SC practices

Item no.	Questionnaire	SCF1-SI	SCF2-TMC	SCF3-LP	SCF4-IV
SC1	Acceptance for strategic changes in supply chain.	0.89			
SC2	Our company and our key suppliers keep each other informed.	0.967			
SC3	Promotes little or no expediting.	0.908			
SC4	Promotes supplier to manage inventory on their behalf. (VMI system).	0.929			
SC5	Promotes small number of high quality suppliers.		0.476		
SC6	Establishes long term relationship with our suppliers.		0.675		
SC7	Top management is committed for supply chain performance.		0.743		
SC8	Our company work for continuous commitment in providing high quality products and services.		0.915		
SC9	Top management is proactive and systematic in the supply chain management.		0.919		
SC10	Strives to maintain high level of emergency supplies of critical items.			0.847	
SC11	Strive for eliminating duplicate processes and unnecessary procedures.			0.863	
SC12	Emphasis on improving the utilization of available equipment and facilities.			0.803	
SC13	Promotes right product at right time.			0.798	
SC14	Keep track on actual and accurate inventory levels.				0.937
SC15	Provides excellence in reducing frequent use of inventory.				0.91
SC16	Forecast demand and provides this information to our key suppliers.				0.94
	Eigenvalue	3.473	3.108	2.942	2.75
	% of variance	21.706	19.425	18.385	17.186
	Cumulative % of variance	21.706	41.132	59.517	76.702

Table 4.2b Factor analysis result for SC performance

Item no.	Questionnaire	Component SCP
SCP1	Increased Overall product quality.	0.74
SCP2	Increased Responsiveness to customer request.	0.76
SCP3	Reduced Reliability in delivery of materials.	0.32
SCP4	Smaller Order fulfillment lead times.	0.75
SCP5	Increased Flexibility of service to meet customer need.	0.85
SCP6	Acceptance for strategic changes in supply chain.	0.69
SCP7	Improved Accessibility to product supply.	0.76
	Eigenvalue	3.6
	% of variance	51.52
	Cumulative % of variance	51.52

Further it is observed that there is a significant positive correlation between supply chain practices and organizational performance with value of

$R=0.624$ and the correlation results also shows a strong positive relation between supply chain performance and organizational performance with R value= 0.715 . The Positive results thus pointed out the mediating effect of supply chain performance showing that as the level of supply chain practices increases, the level of organizational performance also increases with a significant increase in supply chain performance and as the level of supply chain performance decreases, the level of organizational performance also decreases with the decrease in supply chain performance.

Table 4.2c Factor analysis result for Organizational Performance

Item no.	Questionnaire	Component SCP
OP1	Customer Satisfaction	.828
OP2	Return on investment	.763
OP3	Improved Resource Utilization	.852
OP4	Improved cost to service	.294
	Eigenvalue	2.080
	% of variance	52.012

4.4 Correlation Coefficient

Table 4.3, shows the means of the four variables of SC practices. The correlation coefficient among the variables revealed that the Indian healthcare industry emphasized more on Top management commitment (mean=3.94), followed by Supplier Integration (mean=3.86) The mean of all the four variables is 3.52 concluded that Indian healthcare industry strongly practiced SC practices towards their performance.

Further, the mean for Organizational performance 3.77, indicated that the Indian healthcare industry were concern about their Organizational performance through SCM practices. Further, the correlation matrix table shows the relationship among the organization performance and SC practices along with the mediating effect of supply chain performance mean 3.54.

Table 4.3 Mean, standard deviations, correlations (a) SC practices, (b) supply chain performance and (c) organizational performance

Variables	Mean	SD	SCF1	SCF2	SCF3	SCF4	SCPF	OPF
SCF1	3.8659	.68107	1					
SCF2	3.9482	.65968	.400	1				
SCF3	2.9848	.97542	.163	.137	1			
SCF4	3.3048	.97855	.309	.270	.146	1		
SCPF	3.5489	.74048	.666	.408	.371	.316	1	
OPF	3.7774	.69673	.624	.307	.209	.301	.715	1

According to the results of the correlations as shown in Table 4.3, there is a significant positive relationship between supply chain practice Supplier Integration (SCF1) and supply chain performance with (R=0.666) and moderate positive relation with Top management commitment (SCF2) with (R=0.408).

4.5 Regression Analysis

In order to understand the nature of the relationship between supply chain practices and organizational performance with supply chain performance as mediating effect, Multiple Linear Regression test was applied to the collected data. Supply chain practices and supply chain performance are considered as the independent variable and organizational performance as the dependent variable, as stated in hypothesis. The regression coefficient shows the precision and measures the ability of the model to explain the variation in the dependent variable. The greater the R² is, the better the model explains the variation in the dependent variable.

According to the result of R square, it is possible to comment that 56.2% of the supply chain performance of Indian health care industry is affected by their supply chain performance (R=0.562).

One way ANOVA test also supported the hypothesis by revealing that there is a statistically meaningful relationship between the dependent and independent variable (sig.=0.000). Also, coefficients table of the regression supported the positive significant relationship of the two concepts between supply chain practices and healthcare organizational performance with intermediate effect of supply chain performance.

In addition, from the Table 7 it is depicted that one of the four components in SC practices SCF1 has high beta coefficient correlation (.207) and significantly influenced Organizational Performance. Continuously Supply chain performance component SCPF also have high beta coefficient correlation (.592) and significantly influenced Organizational Performance as mediator. Overall the result explains and supported the hypothesis, that there was a positive relationship between SCM practices and organizational performance with supply chain performance as a mediating effect.

Table 5: Model Summary supply chain practices and healthcare organizational performance with intermediate effect of supply chain performance.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.749	.562	.556	.46421

Table 6: ANOVA TEST

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	44.433	2	22.217	103.099	.000
	Residual	34.693	161	.215		
	Total	79.127	163			

Predictors: (Constant), supply chain practices and supply chain performance
 Dependent Variable: healthcare organizational performance

Also it is possible to comment that supply chain practices are affecting the organizational performance of the Indian health care industry. This indicates that SC practices increase supply chain performance of Indian health care industry in the first place, and supply chain performance will in turn lead to improved organizational performance related to SCM. The findings of this study, then, specify the presence of a mediating impact of supply chain performance between SCM practices and SCM-related organizational performance of Indian health care industry.

Table 7: Coefficients (HC Supply chain practices on organizational performance with mediating effect of supply chain performance)

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.980	.214		4.571	.000
	SCF1(Supplier Integration)	.212	.073	.207	2.899	.004
	SCPF(Supply chain performance)	.557	.067	.592	8.281	.000

5 Results

The results of the proposed regression analysis are also presented in Table 8 indicating support for the hypotheses. The results support Hypothesis 1, which states that healthcare organizations with high levels of SC practices have high levels of organizational performance. The standardized coefficient is .207 which is statistically significant at $P < .05$ ($t = 2.899$). The statistical significance of Hypothesis 1 confirms that SCM practice can have influence on the organizational performance. The implementation of Supplier Integration may directly improve an organizational performance of Indian healthcare industry in the long run.

Table 8 Result of analysis

Hypothesis	Relationship	effect	Hypothesis
H1	SC \rightarrow OP	.207(2.899)	supported
H2	SC \rightarrow SCP	.557(10.165)	Supported
H3	SCP \rightarrow OP	.592(8.28)	Supported

Hypothesis 2 is also supported which indicates that SC practices have positive impact on supply chain performance. The standardized coefficient is .557 which is statistically significant at $P < .05$ ($t = 10.165$).

The results indicate that higher levels of SC practices have high levels of supply chain performance that lead to improved organizational performance.

Hypothesis 3 is also supported which indicates that SC performance have an intermediate impact on organizational performance. The standardized coefficient is .592 which is statistically significant at $P < .05$ ($t = 8.28$). The results indicate that higher levels of SC practices have high levels of supply chain performance that lead to improved organizational performance.

6 Conclusion and Recommendations

This paper has provided empirical justification for a framework that identifies four SC practices and describes the relationship among SC practices, Supply chain performance and organizational performance within the context of Indian healthcare industry. According to the results of the statistical analysis, it is possible to conclude that there is a statistically significant relationship between supply chain practices and organizational performance of the health care. The relationship between the two concepts represents a positive relationship indicating that as the effectiveness of supply chain practices increases, supply chain performance of Indian health care industry increases which will in turn lead to improved organizational performance as well. Continuously, organizational performance is influenced by the level of supply chain performance.

The study was carried out in different privately owned, Indian healthcare industries particularly of northern region and other stake holders involved in the supply chain of medical devices and equipments. Data for the study were collected from respondent and the research framework was tested using multiple regression approach. Based on factor analysis, SC practices were grouped in four factors: SI, TMC, LP and IV. The results indicate that both factors Supplier Integration (SI) and Top Management commitment (TMC) have direct positive and significant impact on supply chain performance. In contrast, only Supplier Integration (SI) has a significant and direct impact on organizational performance. Second analysis of the findings of this study tend to support the view that the implementation of SC practices has a significant impact on supply chain performance Researchers can use the findings herein to generate ideas for future

studies, and top managers can glean important knowledge about how effective SC practices impacts supply chain performance. Third, the analysis of the relationship between SC practices and supply chain performance indicates that SC practices might directly influence organizational performance of Indian healthcare industry or have an intermediating effect of supply chain performance that organizational performance could be enhanced by improving supply chain performance in the first place.

Furthermore, the study noticed some important points regarding SC practices implementation in Indian healthcare industries that is, the level of understanding and implementation of SC practices is not to a very large extent in a way that it could have enabled hospitals to take full advantage of benefits SC concept to offer success of their organizations. This was evidently seen that implementation of some of SC practices was practiced to the very small extent or completely neglected in some of the healthcare, example level of information sharing and outsourcing practices. Finally, Indian healthcare industries realized the importance of supply chain performance and started taking a proactive approach towards implementation of supply chain practices. The validated framework and result findings propose that the study can help to improve the organizational performance of Indian healthcare industries through a proper understanding of supply chain practices implementation among Indian healthcare industries.

7 Limitations and Future Implications

The present study is subjected to some limitations as its narrow focus on Indian healthcare industry thus precluding the generalization of findings to other service sectors. The findings of the study cannot be generalized to all private health care settings of other areas. The study can be repeated by collecting more data from all private and also public health care centers and hospitals in order to generalize the results to all hospitals. Another limitation of our study is that the data were collected from single respondents in an organization which might be a cause for possible response bias. Further studies are needed with multiple respondents so that to allow respondents to address their precise area of expertise

resulting in a greater validity of the findings in order to understand the nature of the relationship more clearly.

In spite of various limitations, the current study is expected to benefit Indian healthcare industries seeking to implement supply chain management practices and formulate appropriate strategies in order to compete effectively in an increasingly turbulent and unpredictable business environment. Practically, the results are expected to be taken into consideration by practitioners in making decisions related to the implementation of supply chain practices. The study may also support the development of research partnerships between academicians and practitioners as a platform for resolving problems in the real world through practical solutions derived from the formulation of appropriate policies and strategies. Furthermore, the results are expected to contribute academically to the development of literature in healthcare supply chain management.

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