Article

Is There a Difference in Supply Chain Management Practices, Competitive Advantage, Organizational Performance, and Supply Chain Agility Between Listed and Unlisted Pharmaceutical Companies?

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Abstract

Effective pharmaceutical supply chain management (SCM) plays a pivotal role as the foundation of organizational success. This study aims to investigate the variations in supply chain management practices (SCMP), competitive advantage (CA), organizational performance (OP), and supply chain management agility (SCMA) between listed and unlisted companies in India's pharmaceutical sector. The data were gathered using a structured questionnaire, developed through a comprehensive literature review and pilot-tested in Goa. A purposive sampling approach was adopted, with responses from 192 senior supply chain professionals analyzed using advanced statistical techniques and neural network models. A holistic analysis using the Mann–Whitney test revealed no significant differences in SCMP, CA, SCMA, and OP between listed and unlisted pharmaceutical companies. The data were further segmented into large-cap, mid-cap, small-cap, and

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unlisted companies. Subsequent analysis with the Kruskal–Wallis test identified significant differences in strategic supplier partnerships (SSP), price, delivery dependability (DD), product innovation (PI) and time to market (TTM) across the categories. Large-cap companies ranked highest in SSP, price, DD, PI, and TTM, followed by mid-cap, unlisted, and small-cap companies. Additionally, large-cap companies exhibited the least variability, with mid-cap, small-cap, and unlisted companies showing progressively greater variability.

Keywords

Supply chain management practices, competitive advantage, organizational performance, supply chain management agility

Introduction

The competitive landscape has intensified due to rivalry among established firms and emerging players. In response, organizations have increasingly prioritized internal factors, such as cost optimization and supply chain efficiency, to boost profitability (Choon Tan et al., 2002). Wisner et al. (2021) highlighted that the core objective of supply chain management (SCM) is to deliver value to end users while enhancing value at every stage of the process to ensure the final product aligns with customer needs. Efficient allocation of resources throughout the value chain helps minimize unnecessary costs and eliminate various forms of waste, thereby improving overall profitability (Kumar et al., 2012).

SCM plays a crucial role in the pharmaceutical industry, acting as a critical link in the production and delivery of medicines to patients (Faggioni et al., 2023). To ensure the continuous availability of essential medications, pharmaceutical companies must develop resilient and shock-resistant supply chains capable of withstanding uncertainties (Pattanshetty et al., 2023). Although optimizing supply chain efficiency presents a significant challenge, organizations with well-structured and streamlined supply chains gain a notable competitive advantage over their peers (Moosivand et al., 2019).

This study aims to examine the differences in supply chain management practices (SCMP), supply chain management agility (SCMA), competitive advantage (CA), and organizational performance (OP) between listed and unlisted pharmaceutical companies in India. SCMPs are delineated through five subconstructs, namely, strategic supplier partnership (SSP), customer relationship (CR), information sharing quality (IQ), information sharing level (IS), and postponement (POS). CA is given by five subconstructs, namely, price, product quality (QL), delivery dependability (DD), product innovation (PI), and time to market (TTM). OP consists of two constructs: financial performance (OP_FP) and market performance (OP_MP). SCMA is represented by two subconstructs, viz., organizational agility (SCMA_OA) and supply chain agility (SCMA_SCA).

In India, listed companies are those whose shares are publicly traded on stock exchanges such as the Bombay Stock Exchange (BSE) and the National Stock Exchange, adhering to regulations established by the Securities and Exchange

Board of India (Al-Homaidi et al., 2021). On the other hand, unlisted companies are privately held entities whose shares are not traded on any stock exchange (Gupta et al., 2022). As per BSE's classification, listed companies are categorized into small-, mid-, and large-cap firms. Market capitalization, which reflects a company's total market value, is calculated by multiplying the price of its shares by the total number of shares outstanding (Kuvshinov & Zimmermann, 2022). According to the BSE classification, companies ranked 1st to 100th based on market capitalization are categorized as large-cap, those ranked 101st to 250th are classified as mid-cap, and companies ranked 251st and beyond fall under the small-cap category (Raju, 2024).

This study examines and compares the differences in SCMP, CA, OP, and SCMA between listed and unlisted pharmaceutical companies. Listed companies, driven by stricter regulatory requirements and greater transparency obligations, often adopt distinct operational strategies, whereas unlisted companies typically enjoy more operational flexibility (Hess, 2019). Figure 1 illustrates the study's framework, adapted from the work of Lee et al. (2006). This comparative analysis offers valuable insights into how a company's listing status impacts its supply chain effectiveness and competitive positioning within the pharmaceutical industry.

The study is divided into two phases. In the first phase, companies are classified as either listed or unlisted, irrespective of their size (market capitalization) and analyzed using the Mann–Whitney *U* test. In the second phase, companies are grouped into four categories—small-cap, mid-cap, large-cap, and unlisted—and further analyzed using the Kruskal–Wallis test. The present study investigates the differences in SCMP, CA, OP, and SCMA between listed and unlisted pharmaceutical companies to provide critical insights into industry dynamics. By classifying companies based on market capitalization, the analysis seeks to highlight how organizational size affects supply chain strategies and performance. The findings aim to enrich the existing literature by offering a holistic view of supply chain operations across diverse pharmaceutical companies.

Literature Review

SCM Practices

SCMP comprises a comprehensive framework that covers strategies and tactics to be adopted by organizations to improve the efficiency, effectiveness and overall performance of the supply chains (Li et al., 2006). The implementation of SCMP is expected to enhance CA across various dimensions like value creation and response rate (Linda & Thabrani, 2021). Li et al. (2006) examined several SCM practices, including SSP, CR, IS and postponement (POS). They found that such practices enhance OP_Fp and organizations' competitiveness. CR involves initiatives and practices aimed at building lasting connections with customers, tracking, and addressing their enquiries and ensuring total satisfaction, thereby fostering long-term loyalty (Choon Tan et al., 2002; Claycomb et al., 1999) and enhancing the organization's brand image (Chen & Popovich, 2003). IS is crucial for sustaining businesses and seamlessly integrating supply chains, as the extent

and quality of this information directly impact an organization's competitive position (Abdulameer & Yaacob, 2020; Dwivedi, 2020; Moberg et al., 2002). POS, a supply chain practice that delays specific actions until the final point, facilitates rapid, and flexible responses to demand variations while enabling cost-effective product customization, offering a CA (Budiman & Rau, 2021; Dong et al., 2023; Yang, 2014). Reducing cost and inventory holding, POS provides for product variety and enhances the overall OP (Prataviera et al., 2020).

Competitive Advantage

CA refers to the unique and valuable strengths, either inherent within an organization or developed over time, that set it apart from its competitors (Prahalad & Hamel, 1990). These specific strengths, which are either exclusive or complex for competitors to replicate (Afraz et al., 2021), outline the crucial elements that organizations influence directly in supply chain production, thereby providing opportunities for CA (Cahyono et al., 2023; Javid & Amini, 2023). Listed companies use benchmarking as a strategic approach to gain a CA (Gichinga & Mukulu, 2015). With increasing consumer demand for quicker access to goods and services, reducing delivery time has become a key CA (Sharabati, 2023). Achieving a CA in one or more business aspects has been shown to enhance the overall OP (Cahyono et al., 2023; Li et al., 2006; Linda & Thabrani, 2021; Singh et al., 2018).

Organizational Performance

OP refers to the measurable outcomes or achievements of a firm, assessed against its set objectives. It is evaluated using specific metrics such as sales, market share, market share growth rate, return on investment, profit, profit margin and the overall position of the firm (Budianto & Dewi, 2023; Hamann & Schiemann, 2021; O'Boyle & Hassan, 2013). Internal factors such as liquidity and leverage significantly impact OP (Purwanto & Purwanto, 2020). Le (2023) expanded the understanding of OP to include organizational effectiveness, while (Al-Madi, 2017) customer satisfaction, operational efficiency, and corporate social responsibility to enhance value and overall OP. Previous studies have confirmed that OP can be improved through CA (Cahyono et al., 2023; Economou & Chatzikonstantinou, 2009; Li et al., 2006; Singh et al., 2018).

SCM Agility

SCMA encompasses the ability to predict, detect and respond swiftly to situations and recognize and adapt quickly to market dynamics (Aslam et al., 2020; Braunscheidel & Suresh, 2018). Agile companies, by rapidly recognizing market changes and implementing synchronous responses, can gain significant first-mover, and other CA while incorporating agility into a supply chain

significantly enhances OP (Abdallah et al., 2021; Braunscheidel & Suresh, 2018; Sturm et al., 2022). The components that enhance the agility within a supply chain include new technologies, speed, accountability, expertise, adaptable systems, and cost-effectiveness, while the SCM architecture determines the extent of an organization's innovative capacity and OP (Baramichai et al., 2007; DeGroote & Marx, 2013; Hamann & Schiemann, 2021; Najar, 2022; Patel & Sambasivan, 2022; Shukor et al., 2021).

Research Methodology

The current study seeks to examine whether there are differences in SCMP, CA, SCMA, and OP between listed and unlisted pharmaceutical companies in India, as well as across various company categories, including large-cap, mid-cap, small-cap, and unlisted companies. The data were gathered using a structured questionnaire, developed through a comprehensive literature review and pilot-tested in Goa. Items for the constructs of SCMP, CA, and OP were adapted from Li et al. (2006), while SCMA items were designed based on the author's understanding of the subject through the literature. The questionnaire consisted of 63 questions assessing the four constructs: SCMP, CA, OP, and SCMA. It was administered to 1,000 pharmaceutical companies using purposive sampling. The 1,000 pharmaceutical companies were chosen from listed and unlisted space ensuring contributions from small-cap, mid-cap, large-cap, and unlisted firms. Data collection resulted in 227 complete responses from supply chain professionals across various pharmaceutical companies, resulting in a response rate of 22.7%. The data were statistically analyzed using IBM SPSS 26 and Smart PLS 4. Various statistical tests were conducted to test for the reliability and validity of the instrument questionnaire. Under these measures, content validity, unidimensionality, multicollinearity (VIF), internal consistency, and discriminant validity were determined. Due to the skewness observed in the data set, statistical tests like the Mann–Whitney *U* test were used to evaluate differences between listed and unlisted companies based on the parameters selected. However, further evaluation was done using the Kruskal–Wallis test to assess differences between listed companies (large-cap, mid-cap, and small-cap) and unlisted companies. The study was based on the following framework for listed and unlisted companies.

The Indian pharmaceutical sector comprises both listed and unlisted companies, as well as companies of varying sizes based on market capitalization. While structural and operational differences exist between these groups, it remains unclear whether these differences significantly affect their SCMP, CA, OP, and SCMA. The following null hypotheses are proposed to assess whether these organizational differences result in statistically significant variations, ensuring an objective evaluation of their influence on supply chain effectiveness and performance outcomes.

H_{01}: There is no significant difference in SCMP, SCMA, CA, and OP between listed and unlisted companies

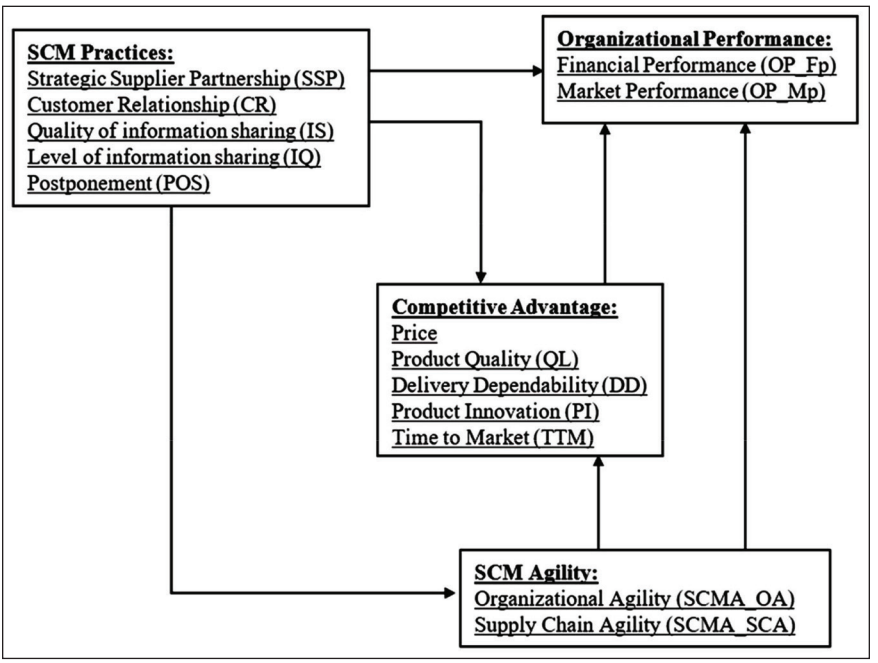

Figure 1. Construct Framework

Source: https://doi.org/10.1016/j.omega.2004.08.002

H_{02}: There is no significant difference in SCMP, SCMA, CA, and OP between small-cap, mid-cap, large-cap, and unlisted companies.

Data Analysis and Interpretation

Demographics

The study surveyed 227 pharmaceutical companies, both listed and unlisted. Of these, 135 companies (59.4%) were unlisted, while the remaining 92 listed companies were categorized as large-cap (12), mid-cap (16), and small-cap (64), according to BSE classification. The companies were further divided by focus areas: 136 (60%) specialized in formulations, 37 (16.3%) in active pharmaceutical ingredients (API), 19 (8.3%) in contract research and manufacturing services (CRAMS), and 35 (15.4%) in other pharmaceutical segments. The majority of the respondents are unlisted on Indian stock exchanges and are primarily involved in pharmaceutical formulations.

Measurement Model

To ascertain the validity of the questionnaire's content, it was evaluated by a panel of four academic experts. Following their suggestions, minor adjustments were

implemented, and a pilot survey was carried out with 10 respondents to validate the content. Unidimensionality was ensured through exploratory factor analysis, with a threshold of 0.5 for factor loadings, as recommended by Hair et al. (2017). The SCMP construct had 28 items over five dimensions. The items that failed to meet the threshold or had cross-loadings were deleted. The CA construct had 17 items spread across five dimensions, while both OP and SCMA had 7 and 11 items across two dimensions each. No items were deleted from the CA, OP, and SCMA constructs. The variance inflation factor (VIF) measure was used to identify collinearity issues (García et al., 2015). All the VIF values ranged from 0.1 to 5; hence, no collinearity issues existed. According to Cronbach (1951), reliability is achieved when all the alpha values are equal to or above 0.70. In this case, all the values were above 0.70, confirming an acceptable level of internal consistency. Fornell and Larcker (1981) proposed that the diagonal elements must exceed 0.5 to establish discriminant validity, reflecting each construct's square root of the average variance extracted. Additionally, they emphasized that the highest loadings within each construct should be prioritized, further supporting the distinctiveness of each construct. The given data set satisfied both conditions, thus confirming discriminant validity. Covariance-based structural equation modeling (CB-SEM) exhibited the following values for the goodness of fit: chi-square value (342.22), *p*-value (.000), RMSEA (0.13), GFI (0.827), AGFI (0.743), SRMR (0.73), NFI (0.865), TLI (0.858), and CFI (0.88). Therefore, according to the framework proposed by Hair et al. (2014), the model displays a satisfactory level of goodness of fit.

Mann–Whitney U Test

Mann–Whitney *U* test was performed to analyze the differences between listed and unlisted companies holistically.

As evident from Table 1, the *p* values for all the subconstructs are greater than 0.05, indicating that no significant differences were observed between listed and unlisted companies across the constructs.

Structural Equation Modeling

SEM analysis compared SCMP OP, CA, and SCMA in listed and unlisted companies.

Figure 2 illustrates the SEM analysis diagram, showing the direct and indirect impact of SCMP, SCMA, and CA on OP in listed pharmaceutical companies. SCMP has a direct impact of 21.4% on OP, 39.1% on CA and 68.3% on SCMA. The impact of CA and SCMA on OP is 29.4% and 39.9%, respectively. Finally, SCMA has an impact of 53.1% on CA.

Figure 3 illustrates the SEM analysis diagram, showing the direct and indirect impact of SCMP, SCMA, and CA on OP in unlisted pharmaceutical companies. SCMP has a direct impact of 5.8% on OP, 25.3% on CA, and 67.7% on SCMA. The impact of CA and SCMA on OP is 48% and 34.8%, respectively. Finally, SCMA has an impact of 53.1% on CA.

Table 1. Independent-samples Mann–Whitney *U* Test.

Subconstructs	Test Statistic	*P*
Strategic supplier partnership (SSP)	0.272	.356
Customer relationship (CR)	0.034	.779
Level of information sharing (IQ)	0.129	.965
Quality of information sharing (IS)	0.066	.203
Postponement (POS)	0.753	.236
Price	0.347	.756
Product quality (QL)	1.951	.857
Delivery dependability (DD)	0.002	.456
Product innovation (PI)	1.737	.231
Time to market (TTM)	0.032	.380
Financial performance (OP_Fp)	1.18	.205
Market performance (OP_Mp)	0.001	.572
Organizational agility (SCMA_OA)	0.025	.529
Supply chain agility (SCMA_SCA)	0.480	.840

Source: Authors' analysis using SPSS 26.

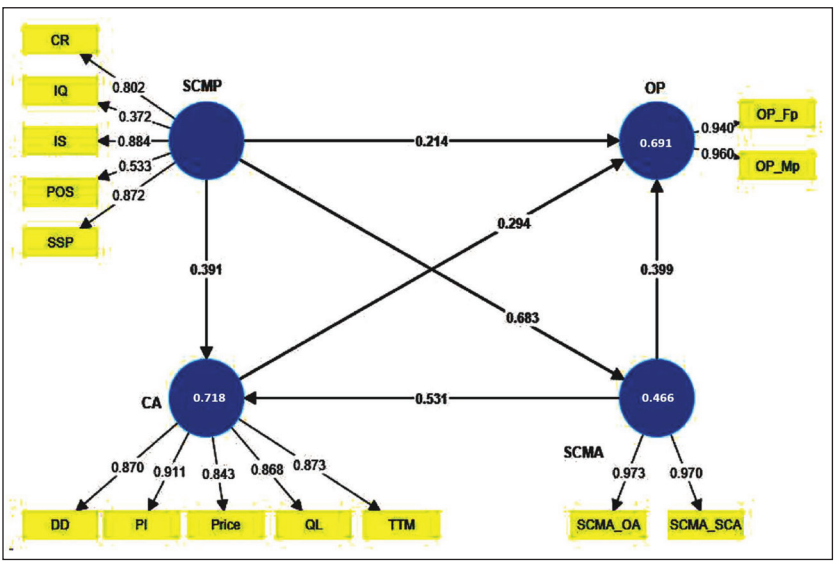

Figure 2. SEM Analysis for Listed Companies.

Source: Authors' analysis using SmartPLS 4.

In Table 2, no significant difference was observed in the regression coefficients of SCMP, CA, OP, and SCMA between the listed and unlisted companies in the second-order SEM analysis.

Kruskal–Wallis Test

The Kruskal–Wallis test was used to analyze the differences between large-cap, mid-cap, small-cap, and unlisted companies.

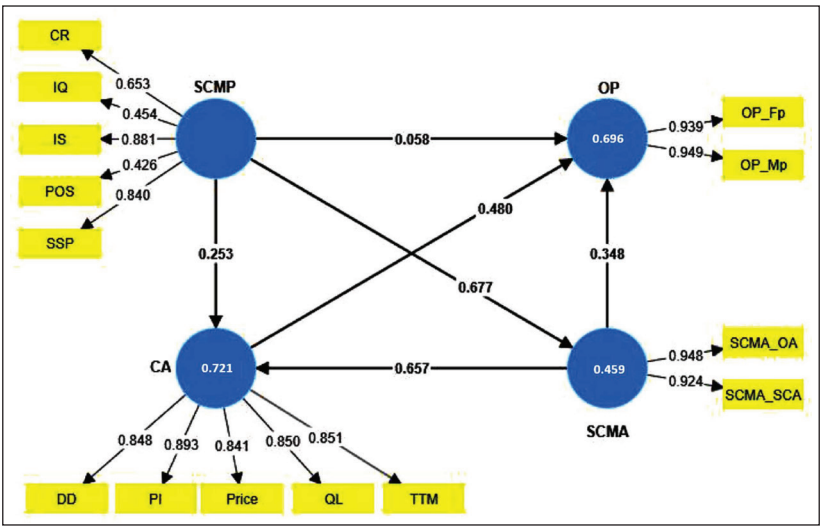

Figure 3. SEM Analysis for Unlisted Companies.

Source: Authors' analysis using SmartPLS 4.

Table 2. Regression Coefficients for Listed and Unlisted Companies Through SEM Analysis.

Construct	Subconstruct	Regression Coefficients (Listed)	Regression Coefficients (Unlisted)
SCMP	Strategic supplier partnership (SSP)	0.872	0.840
	Customer relationship (CR)	0.802	0.653
	Quality of information sharing (IS)	0.884	0.881
	Level of information sharing (IQ)	0.372	0.454
	Postponement (POS)	0.533	0.426
CA	Price	0.843	0.841
	Quality (QL)	0.868	0.850
	Time to market (TTM)	0.873	0.851
	Product innovation (PI)	0.911	0.893
	Delivery dependability (DD)	0.870	0.848
OP	Financial performance (OP_Fp)	0.940	0.939
	Market performance (OP_Mp)	0.960	0.949
SCMA	Organizational agility (SCMA_OA)	0.973	0.948
	Supply chain agility (SCMA_SCA)	0.970	0.924

Source: Authors' analysis from SEM analysis.

Table 3 indicates significant differences in SSP, Price, DD, PI, and TTM, as the *p*-value is less than .05 at a 95% confidence interval. To further explore these differences, pairwise comparisons were conducted.

As seen in Table 4, large and small-cap companies exhibit significant differences in terms of SSP with test statistics (56.979) and *p*-value (.005). Large-cap and unlisted companies also exhibit differences in SSP with test statistics (39.260) and *p*-value (.044). The differences have been presented graphically below.

Table 3. Independent-samples Kruskal–Wallis Test.

Subconstructs	Test Statistic	Sig.	Decision on the Null Hypothesis (H_{02})
Strategic supplier partnership (SSP)	8.694	0.034*	Reject
Customer relationship (CR)	5.122	0.163	Retain
Level of information sharing (IQ)	5.893	0.117	Retain
Quality of information sharing (IS)	4.823	0.185	Retain
Postponement (POS)	4.022	0.259	Retain
Price	11.098	0.011*	Reject
Product quality (QL)	2.658	0.447	Retain
Delivery dependability (DD)	8.062	0.045*	Reject
Product innovation (PI)	8.932	0.030*	Reject
Time to market (TTM)	11.288	0.010*	Reject
Financial performance (OP_Fp)	5.564	0.135	Retain
Market performance (OP_Mp)	5.42	0.143	Retain
Organizational agility (SCMA_OA)	5.703	0.127	Retain
Supply chain agility (SCMA_SCA)	5.774	0.123	Retain

Source: Authors' analysis using SPSS 26.

Table 4. Pairwise Comparison of Listing Status on SCMP.

	SSP	
Sample 1–Sample 2	Test Statistic	Sig.
Small cap–Mid cap	12.594	0.487
Small cap–Unlisted	–17.719	0.072
Small cap–Large cap	56.979	0.005
Mid cap–Unlisted	–5.125	0.765
Mid Cap–Large cap	44.385	0.073
Unlisted–Large cap	39.260	0.044

Source: Authors' analysis using SPSS 26.

Box plots indicate independent-samples Kruskal–Wallis test for various subconstructs.

As evident in Figure 4, SSP has the highest median in large-cap companies, followed by equal importance in mid-cap and unlisted, and finally, the small-cap companies.

In Table 5, differences in price, DD, PI, and TTM as a measure of CA were observed in large-cap, small-cap, and unlisted companies, as the *p*-value is less than .05. As evident in Figure 5, price variations are least in large-cap, followed by mid-cap and small-cap. Unlisted companies are seen to have the highest variations in their prices. The median price for mid-cap, small-cap, and unlisted companies is equal. In Figure 6, large-cap and mid-cap companies have the highest DD, while small-cap and unlisted companies have the same median in DD with higher variations in the unlisted companies. As seen in Figure 7, large-cap companies, followed by mid-cap companies, are the pioneers of PI, followed by

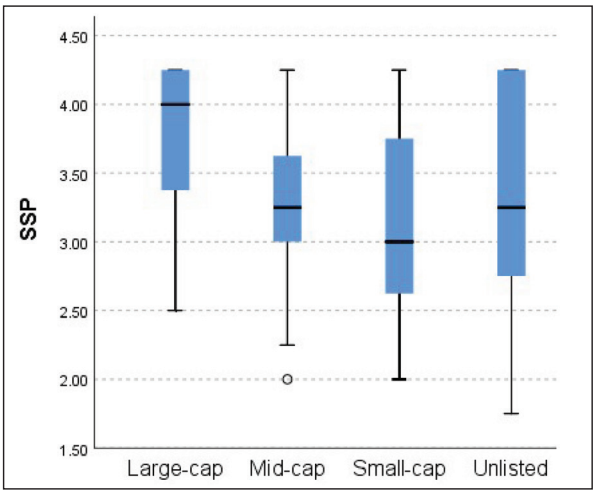

Figure 4. Strategic Supplier Partnership.

Source: Authors' analysis using SPSS 26.

Table 5. Pairwise Comparison of Listing Status on Competitive Advantage.

	Competitive Advantage							
	Price		DD		PI		TTM	
Sample 1–Sample 2	Test Statistic	Sig.	Test Statistic	Sig.	Test Statistic	Sig.	Test Statistic	Sig.
Small Cap–Unlisted	–9.08	0.29	–5.21	0.60	–1.75	0.86	–5.72	0.56
Small Cap–Mid cap	25.88	0.14	30.50	0.09	40.07	0.05	30.95	0.09
Small cap–Large cap	61.91	**0.00**	49.14	**0.02**	40.65	**0.03**	61.98	**0.00**
Unlisted–Mid cap	15.87	0.33	25.29	0.14	38.32	0.05	25.23	0.14
Unlisted–Large cap	51.93	**0.01**	43.93	**0.02**	38.90	**0.02**	56.27	**0.00**
Mid cap–Large cap	36.03	0.13	18.64	0.45	–0.58	0.98	31.03	0.21

Source: Authors' analysis as per the above box plots.

unlisted and small-cap companies, which display wide and similar levels of variation. In Figure 8, large-cap followed by mid-cap companies are the fastest in TTM, while the unlisted and small-cap companies exhibit similar medians and variations throughout the journey from pharmaceutical product development to commercialization.

Results and Discussion

The study aimed to identify any notable differences in SCMP, SCMA, OP, and CA between listed and unlisted Indian pharmaceutical companies and to explain the reasons for these differences. Initially, the Mann–Whitney *U* test revealed no

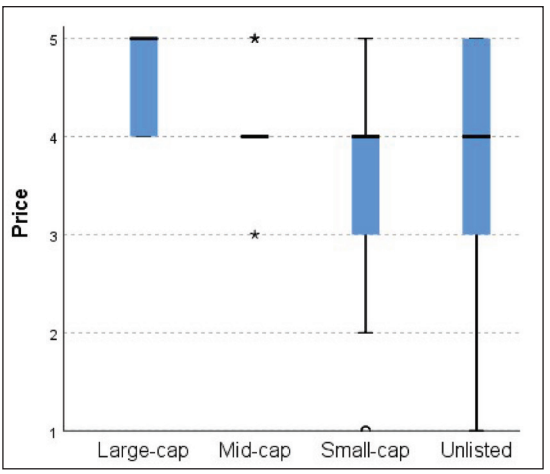

Figure 5. Price.

Source: Authors' analysis using SPSS 26.

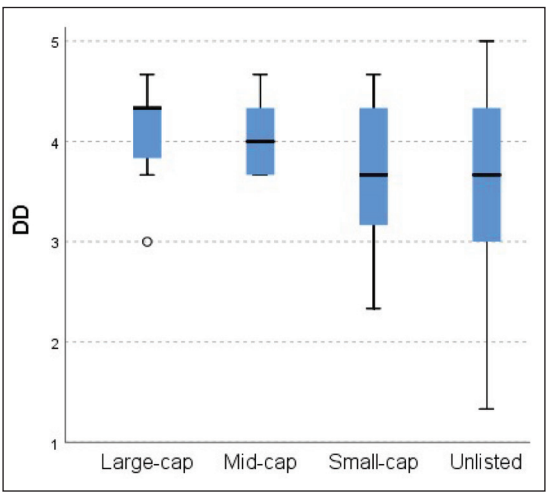

Figure 6. Delivery Dependability.

Source: Authors' analysis using SPSS 26.

significant differences between listed and unlisted companies in SCMP, SCMA, CA, and OP. Consequently, further analysis was conducted by categorizing the listed companies into large-cap, mid-cap, and small-cap companies according to the BSE market capitalization and using the Kruskal–Wallis test.

Upon performing the Mann–Whitney *U* test, the *p*-value for all the subconstructs was more significant than .05. At the same time, no significant difference was observed among the regression coefficients between the listed and unlisted companies in the second-order SEM analysis. Therefore, H_{01} was found to be significant and, thus, accepted. Therefore, we conclude that no significant

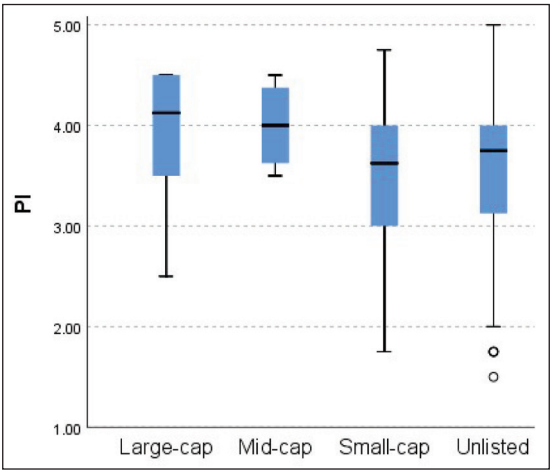

Figure 7. Product Innovation.

Source: Authors' analysis using SPSS 26.

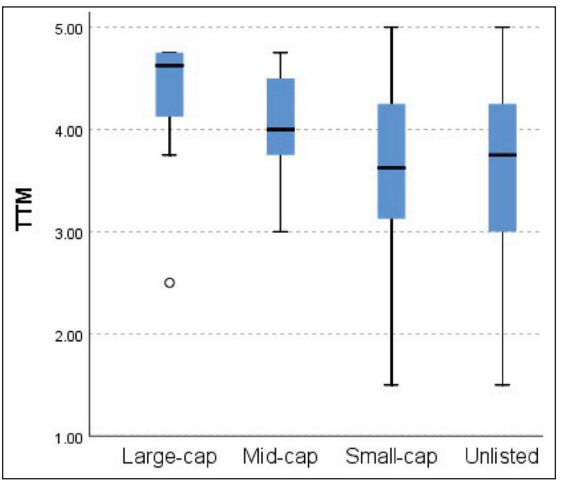

Figure 8. Time to Market.

Source: Authors' analysis using SPSS 26.

difference exists between listed and unlisted companies in SCMP, SCMA, CA, and OP when the two groups were compared holistically.

The data were further analyzed by grouping it into large-cap, mid-cap, small-cap and unlisted companies for analysis through the Kruskal–Wallis test. On performing the Kruskal–Wallis test, the *p* values for SSP (.034), price (.011), DD (.045), PI (.030) and TTM (.010) were found to be less than .05 at a 95% confidence interval indicating significant differences between large-cap, small-cap, and unlisted companies. H_{02} is not significant and, thus, not supported. Significant

differences exist between SSP, price, DD, PI, and TTM among large-cap, small-cap, and unlisted companies.

In SCMP, differences exist in SSP among large-cap, small-cap, and unlisted companies. Large-cap and unlisted companies have higher SSP levels followed by mid-cap and small-cap companies. Unlisted companies, followed by small- and mid-cap, exhibit the highest variation, with large-cap having the lowest variations in SSP.

For CA, price, DD, PI, and TTM differences exist among large-cap, small-cap, and unlisted pharmaceutical companies. The box plot shows that large-cap companies have the highest median prices, while mid-cap, small-cap, and unlisted companies have similar median prices. Unlisted companies exhibit greater price variability, while large-cap companies have a similar price range. Large-cap companies display the highest median DD value, followed by mid-caps, while small-cap and unlisted companies display similar levels of DD. Unlisted companies are ranked highest, while all the other categories show moderate variability in DD. All the companies display similar levels of PI, with the large-cap having the highest PI and the small cap the lowest. The highest variations in PI are seen in small-cap and unlisted companies. Large-caps lead the race in TTM followed by the mid-caps, unlisted and small-cap companies. The highest variation is seen in small-cap and unlisted companies.

Conclusion and Managerial Implications

The study finds that (a) there are no significant differences in SCMP, SCMA, CA, and OP between listed and unlisted Indian pharmaceutical companies when examined comprehensively. The results of the Mann–Whitney U test and second-order SEM analysis corroborate this, with p values and regression coefficients showing no substantial variation between the two groups. Both listed and unlisted companies exhibit uniformity in these areas. (b) Notable differences were identified in SCMP and CA across large-cap, small-cap, and unlisted pharmaceutical companies. Large-cap companies are ranked highest in SSP, price, DD, PI, and TTM, followed by mid-cap, unlisted, and small-cap companies. While unlisted and small-cap companies exhibited the greatest variability in these metrics, large-cap companies showed greater stability, with mid-cap companies falling between large-cap and unlisted firms.

The findings of this study provide key managerial insights for pharmaceutical companies. Notably, large-cap companies capitalize on economies of scale to optimize pricing, foster product innovation, and ensure timely delivery, thus securing a competitive edge. Smaller companies, on the other hand, may need to concentrate on forming strategic partnerships and strengthening their supply chain capabilities to compete with the performance of larger firms.

For mid-cap and small-cap companies, investing in research and development (R&D) and adopting advanced supply chain technologies can improve product offerings and boost operational efficiency. Additionally, it was observed that the implementation of DD and PI strategies is crucial for achieving CA. Managers

should focus on refining SCMP, pricing strategies, and innovation efforts to improve OP.

The limitations of this study include its cross-sectional design, which captures data at a single point in time, thus limiting the ability to track trends or changes over time. Additionally, integrating qualitative methods, such as case studies or interviews, could provide a deeper understanding of the contextual factors influencing these variables. Future research could further explore the impact of emerging technologies, regulatory changes, and market disruptions on the pharmaceutical sector's supply chain and competitive strategies.

Declaration of Conflicting Interests

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Appendix

A. Questionnaire instrument for SCMP, SCMA, CA, and OP

Please tick the option that most precisely reflects your organization's present conditions concerning SCM wherein '1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree.'	
I. Supply Chain Management Practices	
1. Strategic supplier partnership (SSP)	
SCMP_SSP1*	We value quality as an essential criterion in supplier selection.
SCMP_SSP2	We resolve queries/issues with suppliers regularly.
SCMP_SSP3	We support our suppliers to improve product quality.
SCMP_SSP4	We organize continuous improvement programs to help our key suppliers.
SCMP_SSP5*	We allow our key suppliers to participate in organizational planning and goal-setting activities.
SCMP _SSP6	We encourage the involvement of key suppliers in new product development processes/decisions.
2. Customer relationship (CR)	
SCMP_CR1	We include our customers in our planning.
SCMP_CR2	We regularly interact with customers to set reliability, responsiveness, and other organizational standards.
SCMP_CR3	We frequently measure and evaluate customer satisfaction on repeated intervals.

(Appendix continued)

(Appendix continued)

Please tick the option that most precisely reflects your organization's present conditions concerning SCM wherein '1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree.'	
SCMP_CR4	We take feedback from our customers to improve the quality of our products.
SCMP_CR5	We encourage customers to seek assistance from the organization.
SCMP_CR6*	We have a dedicated system for handling customer complaints.
SCMP_CR7*	We try to build long-term relationships with our customers.
3. Level of information sharing (IS)	
SCMP_IS1	Our trading partners and we discuss any changing needs in advance.
SCMP_IS2	Our trading partners provide all types of information which affect our business.
SCMP_IS3	Our trading partners ensure that shared information helps in developing business processes.
SCMP_IS4	We exchange information with trading partners that helps in business planning.
SCMP_IS5	We share information about events or changes that may affect our business (trading) partners.
SCMP_IS6	Our internal processes are integrated with our partners to ensure smoother operations.
4. Level of information quality (IQ)	
SCMP_IQ1	Timely
SCMP_IQ2*	Accurate
SCMP_IQ3*	Complete
SCMP_IQ4*	Adequate
SCMP_IQ5*	Reliable
5. Postponement (POS)	
SCMP_POS1	We go for utilization of modular assembly as far as possible.
SCMP_POS2*	We go for final product assembly/manufacturing only on receipt of customer order.
SCMP_POS3*	We delay final product manufacturing until the nearest customer position in the supply chain.
SCMP_POS4	'Our supply chain postponement strategies enable customization of products.'
II. Competitive advantage	
1. Price	
CA_Price1	We offer products at competitive prices.
CA_Price2	We offer products at prices that are lower than our competitors.
2. Quality	
CA_QL1	We are able to compete based on quality.
CA_QL2	We offer highly reliable products.
CA_QL3	The products we offer are highly durable.
CA_QL4	We offer high-quality products.

(Appendix continued)

Please tick the option that most precisely reflects your organization's present conditions concerning SCM wherein '1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree.'	
3. Delivery dependability	
CA_DD1	We manufacture and deliver the kind of products as needed by our customers.
CA_DD2	We are dependable as we ensure order delivery within the specified time.
CA_DD3	We accept and deliver ad-hoc orders.
4. Product innovation	
CA_PI1	We provide customized products depending on customer needs.
CA_PI2	We alter our products according to customer requirements.
CA_PI3	We respond well to customer demand for new potential features.
CA_PI4	We select and involve key suppliers to maintain innovativeness.
5. Time to market	
CA_TTM1	We quickly deliver products to market.
CA_TTM2	We are first to introduce new products in the market.
CA_TTM3	We offer lower time to market than our competitors.
CA_TTM4	We are faster in product development than our competitors.
III. Organizational Performance	
OP_Fp1	We fetch a decent return on investment.
OP_Fp2	We manage a decent return on investment growth.
OP_Fp3	We ensure improvement in our profit margin.
OP_Mp1	We are able to achieve a defined market share every time.
OP_Mp2	Our market share growth is in accordance with our expectations.
OP_Mp3	We ensure our sales growth every quarter.
OP_Mp4	We dominate the market in terms of overall competitive position.
IV. Supply Chain Agility	
SCMA_OA1	We timely capture market information.
SCMA_OA2	We embrace change and learning through continuous improvement, top management support, and staff empowerment.
SCMA_OA3	We take decisions quickly using the available information.
SCMA_OA4	We implement decisions quickly.
SCMA_OA5	We quickly detect changes, opportunities, threats, and seize competitive market opportunities.
SCMA_OA6	We are flexible in responding rapidly and cost-effectively to customer needs by information sharing.
SCMA_SCA1	We enhance our operational capabilities through production planning, process integration, inventory management, and postponement.
SCMA_SCA2	We make use of technology that reduces overall time required.
SCMA_SCA3	Our processes are highly integrated.
SCMA_SCA4	Our supply chain uses rapid response initiatives.
SCMA_SCA5	Our supply chain is capable of responding to real market demand.
*Marked questions were deleted from the final questionnaire	

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