Supply Chain Management Practices and Supply Chain Performance Effectiveness in Manufacturing TMT Industries in Kerala

Manu Krishnan[1], Dr. Ashok Kumar Katta[2*]

[1]Research Scholar, School of Management Studies, Vels Institute of Science Technology and Advanced Studies (VISTAS), India.
[2]Associate Professor of Management Studies, Vels Institute of Science, Technology and Advanced Studies (VISTAS), India email id: yoursashok1984@gmail.com

Supply chain management and its efficiency is directly impacting the competence to generate and bring in more and better value added solutions obviously to consumers, the actual end users. When strategically handled, the improved supply chain performance effectiveness benefits every part and portion of the chain, viz, the producer, the distributor and other people along the supplier networks. Supply chain management practices (SCMP) and the corresponding variations in Supply chain performance effectiveness (SCPE) in TMT steel companies have been the central theme of the study for which strategically formulated questionnaires containing 202 questions were circulated to receive feedback from relevant manufacturing companies in Kerala. Suitable theories with appropriate resource perspectives have been adopted in the study. Numerous empirical observations result out of various explorations demonstrate that the management practices of the merchant or supplier has a significant constructive brunt on the efficiency of supply chain performance. The final results of the factor analysis provide us with extremely new and fresh ways and strategies for supply chain management, despite the limitation of shrinking the study only to manufacturing industries. The study has its impact in a practical way that will help decision-makers to understand the value of adopting SCMP in order to improve SCPE. The outcome of factor analysis also gives industrial enterprises supply chain management practices a new dimension. The study's weaknesses, on the other hand, stem from its emphasis on the manufacturing industry. Additionally, just one responder from each organization was used to obtain the data.

Keywords: Supply chain performance, supply chain efficiency, and supply chain efficacy.

1. Introduction

Supply Chain Management (SCM) focuses on optimizing the flow of information, materials, resources, and services from manufacturers to end-users. It increases productivity, saves money and time, and is a key tool for enhancing management practices. Strategic supply chain management integrates stakeholders to enhance performance and customer satisfaction.

Research emphasizes the importance of SCM practices for business success. Supply chain managers facilitate communication for optimal performance, and technology is increasingly used for efficiency measurement. This study focuses on TMT steel bar manufacturing firms to improve their understanding of SCM practices in real-world applications. Despite limitations, the research offers valuable insights for enhancing supply chain management in different industries.

2. Review of Literature

Vonderembse et al. (2021) the author explains that different supply chain configurations are necessary to support conventional, hybrid, and innovative products. Standard products require a lean supply chain, while innovative products need a flexible one. Agile supply chains adapt to global market changes quickly. Hybrid products, which consist of multiple suppliers and components, require a hybrid supply chain that combines features of both agile and lean supply chains. Various supplier connections may be necessary for complex goods.

Gunasekaran et al. (2021) the author state that broadened the application of supply chain management (SCM) to incorporate elements of comprehensive quality management, including managerial commitment, organizational structure, training, and behavioral challenges. SCM used to be restricted to information technology, partnerships, and material management. For every organization to be sustainable, integration and a deep understanding of the integration process are essential. SCM is therefore the key to any company's success.

Chen, H., & Khan, A. (2022) this review synthesizes research on supply chain resilience practices and their effects on supply chain performance effectiveness. It identifies key resilience strategies, such as risk identification, mitigation, and adaptation, and evaluates their impact on organizational resilience and performance.

Lummus & Vokurka (2022): The term "supply chain management" refers to the gamut of actions performed in an array in delivering a product from the point of sourcing the component and raw material to the point of reaching the end user along with the information systems that are basically required to monitor all of these activities in order to maximize the objective of better efficiency."

Lee, S., & Patel, R. (2023) this literature review explores performance measurement frameworks and metrics tailored to sustainable supply chain. It examines how companies assess and evaluate their environmental, social, and economic performance to drive continuous improvement and demonstrate sustainability leadership.

Smith, J., & Nguyen, T (2023) the authors research on supply chain collaboration practices and their impact on supply chain performance effectiveness. It examines collaboration mechanisms such as information sharing, joint planning, and coordinated decision-making, highlighting their role in enhancing supply chain agility and responsiveness.

Concept of Supply Chain

Supply chain Management (SCM) can be defines as the strategic amalgamation and integration of parameters of any commercial activity looked into with the eyes of the end user through various operational aspects like procurement of raw materials, product manufacturers,

assemblers, packers, distributors, dealers, and logistical transporters to ultimately deliver goods or services, and information that increases the value as well as the delight to the customers. The simple term supply chain alone is widely adopted to define the management practices in this regard. It involves various peoples and entities at various stages and the integration of their operational aspects is the main aim of the SCM.

RBV Theory:

The Resource-based view (RBV) analysis shows that smaller businesses may not benefit as much from SCM practices as larger ones. RBV has been used for the past 20 years to examine organizational competitiveness. Sezen emphasizes the importance of integration, data sharing, communication, and collaboration in supply chains. Improved SCM practices can provide quicker access to customer needs, respond faster to demands, and give companies a competitive edge.
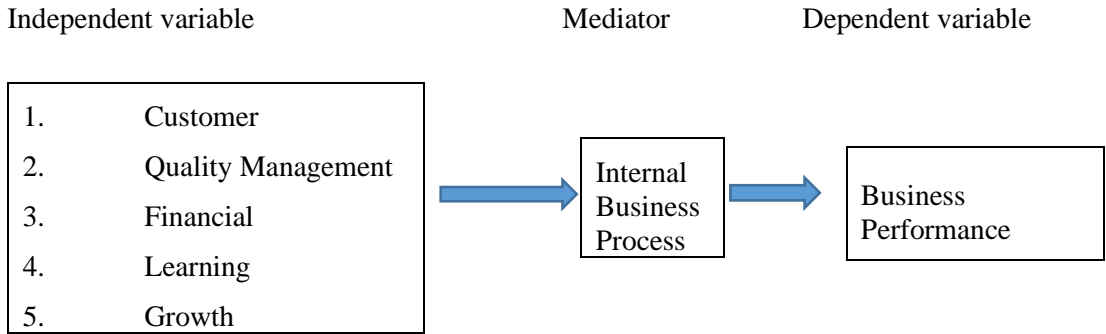
Objectives:

1.   To establish the fact that the efficiency of the supply chain system is solely on the strategized Internal business practices.

2.   To establish the Supply chain management efficiency is influenced by parameters such as client relationships, quality management, financial optimization, and growth monitoring.

3.   To substantiate the hypothetical postulates assumed to be valid by a survey and statistical analysis through appropriate metrics

Hypothesis:

1. Implementing advanced digital technologies in supply chain management positively influences supply chain performance effectiveness.

2. Supply chain integration across partners leads to improved supply chain performance effectiveness.

3. Sustainable supply chain management practices positively impact supply chain performance effectiveness.

Conceptual Framework:

The basis of the conceptual framework for this study has been depicted in the diagram below. According to this paradigm, SCM strategies will have an impact on an organization's performance in all 360 degrees. The corpus of research makes it simpler to comprehend the present connections between SCM strategies, advantage over competition, and unit's functional efficiency. A survey with 202 replies has been carried out in connection with the study.

Independent variable   Mediator   Dependent variable

1. Customer 2. Quality Management 3. Financial 4. Learning 5. Growth	Internal Business Process → Business Performance

Pilot Study

1.   65 samples from the respondents were collected for the pilot study to test the reliability of the Questionnaire.

2.   The Cronbach's alpha was greater than 0.864.

3.   The Pilot study provided degree of confidence that the proposed model is based on appropriate constructs and measurement scales.

4.   35 questions taken for pilot study, whereas 5 questions have been removed due to below 0. 5 results.

Results

Cronbach's Alpha	No of Items
0.854	35

CRONBACH 'S VALUE VARIABLE WISE

Customer	0.765
Quality Management	0.781
Financial	0.821
Learning	0.801
Growth	0.854
Internal Business Process	0.834
Business Performance	0.843

STATISTICAL DATA ANALYSIS

Two hundred and two (202) complete responses have been chosen out of the total number of questionnaires which represents a response rate of 90 percent and this has been done after the rejection of incomplete responses. The Normality, SEM, and correlation tests conducted

Tests of Normality

|	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
C	.357	6	.260	.856	6	.561
QMT	.256	7	.362	.935	7	.773
F	.340	5	.471	.764	5	.587
L	.235	6	.569	.821	6	.962
G	.287	5	.382	.718	5	.684
IBP	.315	7	.176	.886	7	.787
BP	.251	5	.469	.782	5	.676

a. Lilliefors Significance Correction

A noteworthy and a mentionable connection has been established between the chosen independent variables and the dependent variable through the normality test results.

Descriptive Statistics

	Mean	Std. Deviation	N
BP	4.8557	.43626	202
C	4.2921	.45585	202
QMT	4.5297	.50036	202
F	4.7277	.45725	202
L	4.7376	.45763	202
G	4.9359	.26556	202

Interpretation

The mean value of the BP was 4.85 with standard deviation of 0.43, C was 4.029 with the standard deviation of 0.45, QMT was 4.52 with the standard deviation of 0.50, F was 4.72 with the standard deviation of 0.45, L was 4.73 with standard deviation of 0.45 and G was 4.93 with standard deviation of 4.93.
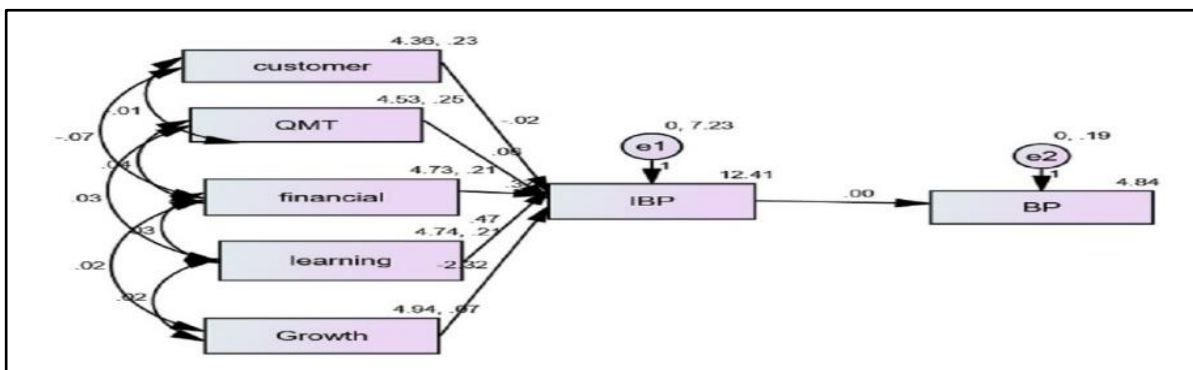
STRUCTURAL EQUATION MODEL(SEM)

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
IBP	<---	L	.466	.429	1.086	.277	par_2
IBP	<---	G	.324	.743	-3.127	.002	par_3
IBP	<---	f	.374	.456	.820	.412	par_4
IBP	<---	QMT	.561	.391	.157	.875	par_5
IBP	<---	c	-.023	.419	-.054	.957	par_13

			Estimate	S.E.	C.R.	P	Label
BP	<---	IBP	.004	.011	.335	.738	par_1

Means: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
L	4.738	.032	146.654	***	par_14
QMT	4.530	.035	128.685	***	par_17
f	4.728	.032	145.950	***	par_18
G	4.936	.019	264.172	***	par_19
c	4.361	.034	128.712	***	par_20

Model Fit Summary – SEM

TEST	THRESHOLD VALUE	STUDY MEASURES
X ²	p>0.05	P=0.000
CMIN/DF	<5	2.107
RMSEA	<0.080	0.023
RELATIVEFIT MEASURES		
GFI	>0.90	0.00
CFI	>0.90	0.00
NFI	>0.90	.670
RFI	>0.90	.759
IFI	>0.90	.986

Parsimonious Fit Measures

Parsimonious Fit Measures		
Test	Threshold Value	Study Measures
PCFI	>0.50	.584
PNFI	>0.50	.695
PRATIO	>0.50	.624

Note: The Chi-Square Test and Degree of Freedom (CMIN/DF), Root Mean Square

Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Suggested CMIN/DF 5 are all based on Hair et al. (2000) and Ullman (1996). Normed Fit Index, Relative Fit Index, Incremental Fit Index, Parsimonious Comparative Fit Index, and PNFI are the acronyms for these measurements, respectively.

Research Methodology

The study utilized a quantitative approach and convenience sample to gather and analyze data on supply chain activities in manufacturing businesses in Kerala. Questionnaires were distributed to supply chain managers or senior executives in listed manufacturing companies, both in person and via Google format. The majority of respondents were top-level executives responsible for supply chain policies and business strategies in sales, production, or planning divisions.

Conclusion

Supply chain management practices are essential for improving efficiency and performance in industries like TMT manufacturing in Kerala. Collaboration with suppliers helps reduce costs

and improve effectiveness, but concerns about exploitation can hinder information sharing. Customer relationship management and organizational integration also contribute to supply chain efficiency and overall success in industrial companies. Client management strategies can both positively and negatively affect supply chain performance. Future research should explore different SCM practices for diverse participant involvement.

References

1. Angulo, A., Nachtmann, H. and Waller, M.A. (2004), "Supply chain information sharing in a vendor managed inventory partnership", Journal of business logistics, Vol. 25 No. 1, pp. 101-120.
2. Asamoah, D., Andoh-Baidoo, F.K. and Agyei-Owusu, B. (2015), "Impact of ERP implementation on business process outcomes: a replication of a United States study in a Sub-Saharan African
3. Nation", AIS Transactions on Replication Research, Vol. 1 No. 1, pp. 1-19.
4. Barclay, D., Higgins, C. and Thompson, R. (1995), "The partial least squares (PLS) approach to causal modeling: personal computer adoption and use as an illustration", Technology Studies, Vol.2 No. 2, pp. 285-309.2280BIJ26,
5. Barney, J. (1991), "Firm resources and sustained competitive advantage", Journal of Management,
6. Vol. 17 No. 1, pp. 99-120.
7. Blank, S. (2013), The Four Steps to the Epiphany, K&S Ranch Press, Pescadero, CA.
8. Burgess, K., Singh, P.J. and Koroglu, R. (2006), "Supply chain management: a structured literature
9. review and implications for future research", International Journal of Operations & Production Management, Vol. 26 No. 7, pp. 703-729.
10. Chang, W., Ellinger, A.E., Kim, K.K. and Franke, G.R. (2016), "Supply chain integration and firm
11. Financial performance: a meta-analysis of positional advantage mediation and moderating
12. Factors", European Management Journal, Vol. 34 No. 3, pp. 282-295.
13. Chin, W.W. (1998), "Commentary: issues and opinion on structural equation modeling", MIS Quarterly, Vol. 22 No. 1, pp. 7-16.
14. Christopher, M. (2016), Logistics & Supply Chain Management, Pearson Educational Limited, Harlow. Cohen, J. (1988), Statistical Power Analysis for the Behavioral Sciences, Lawrence Erlbaum, Mahwah, NJ.
15. Cook, L.S., Heiser, D.R. and Sengupta, K. (2011), "The moderating effect of supply chain role on the relationship between supply chain practices and performance: an empirical analysis", International Journal of Physical Distribution & Logistics Management, Vol. 41 No. 2, pp. 104-134.
16. Davila, A., Foster, G., He, X. and Shimizu, C. (2015), "The rise and fall of startups: creation and
17. destruction of revenue and jobs by young companies", Australian Journal of Management,
18. Vol. 40 No. 1, pp. 6-35.
19. Dr. Siddig Balal Ibrahim1, Abdelsalam Adam Hamid2(2011) Supply Chain Management Practices and Supply Chain Performance Effectiveness
20.
21. Droge, C. and Germain, R. (2000), "The relationship of electronic data interchange with inventory and financial performance", Journal of Business Logistics, Vol. 21 No. 2, pp. 209-

230.
22. Fawcett, S.E., Ellram, L.M. and Ogden, J.A. (2013), SCM: Pearson New International Edition: From Vision to Implementation, Pearson Educational Limited, Harlow.
23. Feldmann, M. and Müller, S. (2003), "An incentive scheme for true information providing in supply chains", Omega, Vol. 31 No. 2, pp. 63-73.
24. Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable
25. variables and measurement error", Journal of Marketing Research, Vol. 18 No. 1, pp. 39-50.
26. Geisser, S. (1974), "A predictive approach to the random effect model", Biometrika, Vol. 61 No. 1, pp. 101-107.
27. Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2017), A Primer on Partial Least Squares
28. Structural Equation Modeling (PLS-SEM), Sage, Los Angeles, CA.
29. Henseler, J., Ringle, C.M. and Sarstedt, M. (2015), "A new criterion for assessing discriminant validity invariance-based structural equation modeling", Journal of the Academy of Marketing Science, Vol. 43 No. 1, pp. 115-135.
30. Holmberg, S. (2000), "A systems perspective on supply chain measurements", International Journal of Physical Distribution & Logistics Management, Vol. 30 No. 10, pp. 847-868.
31. 2281 Effect of supply chain management practices
32. Inda Sukatia*, Abu Bakar Hamida, Rohaizat Baharuna, Rosman Md Yusoffa (2012) The Study of Supply Chain Management Strategy and Practices on Supply Chain Performance.
33. Jajja, M.S.S., Kannan, V.R., Brah, S.A. and Hassan, S.Z. (2016), "Supply chain strategy and the role of suppliers: evidence from the Indian sub-continent", Benchmarking: An International Journal, Vol. 23 No. 7, pp. 1658-1676...
34. Kaliani Sundram, V.P., Chandran, V.G.R. and Awais Bhatti, M. (2016), "Supply chain practices and performance: the indirect effects of supply chain integration", Benchmarking: An International
35. Journal, Vol. 23 No. 6, pp. 1445-1471.
36. Kane, L. (2010), "Sustainable transport indicators for Cape Town, South Africa: advocacy, Mr. Shubham Uddhav Sutar1, Mr. Sahil Yeshwant Lahamge2 Supply Chain Management Practices and Performance Effectiveness International Research Journal of Engineering and Technology.