LOGISTIC & SUPPLY CHAIN MANAGEMENT IN THE CHEMICAL INDUSTRY

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ABSTRACT

Logistic and supply chain management play a critical role in the chemical industry due to its inherent complexities and safety considerations. Efficient logistics ensure the timely and safe transportation of raw materials and finished products, reducing the risk of accidents and environmental incidents. Additionally, in a globalized market, effective supply chain management helps companies optimize inventory levels, minimize costs, and respond swiftly to market fluctuations. This is particularly vital in the chemical sector, where timely delivery and adherence to stringent regulatory requirements are paramount. In sum, logistics and supply chain management are indispensable components that underpin the success, sustainability, and safety of the chemical industry. The research is based on primary data. A sample of 60 employees in chemical industry is consider. Independent variable are Management Practices, Logistic Process and Supply Chain Integration and dependent variable is Output performance. For analysis of data Spss software is used. Descriptive as well as information statistics are obtained to study the objectives.

KEYWORDS: Chemical Industry, Management Practices, Logistic Process, SCM

INTRODUCTION

In the chemical sector, where the effective and secure management of potentially dangerous products is of the utmost importance, the roles of logistics and supply chain management are of the utmost significance. In this industry, logistics refers to the process of planning, carrying out, and controlling the movement of raw materials, intermediate products, and completed goods from suppliers to producers and, ultimately, to customers. It entails optimising transportation routes, warehousing, and inventory management in order to provide a continuous supply chain that is also cost-effective.

In addition, safety requirements and environmental concerns are of the utmost importance in the chemical business, which makes supply chain management even more difficult. Companies have an additional responsibility to address the transportation of hazardous products, which calls for the use of specialised packaging and labelling as well as various forms of transportation. Because it not only ensures the timely delivery of products to meet market demands but also promotes sustainability and safety, effective supply chain management is a fundamental driver of success in the chemical industry. The following are some important logistics and supply chain management considerations to keep in mind:

➢ **Safety and Compliance**: In the chemical sector, safety is the most important factor to consider. When it comes to the handling, shipping, and storage of hazardous materials, businesses are required to adhere to stringent rules. Professionals working in supply chains are required to maintain current knowledge of these standards and apply safety measures at every stage of the supply chain.

➢ **Inventory Management:** It is essential to have efficient inventory management in order to prevent overstocking or understocking of chemical supplies. It is possible to optimise inventory levels while minimising carrying costs if accurate demand

forecasts, just-in-time inventory management, and safety stock planning are implemented.

> **Transportation:** The transportation of chemicals is an important part of the supply chain for chemical products. Companies have a responsibility to select the most appropriate means of transportation for their chemicals, which may include road, rail, sea, or air, depending on a number of criteria. These include the type of chemicals, the distance to be travelled, the cost, and any delivery standards that must be met.

REVIEW OF LITERATURE

1. **Gao, S. et al. (2021),** In the research titled "Integrating Corporate Website Information into Qualitative Assessment for Benchmarking Green Supply Chain Management Practices for the Chemical Industry," China's chemical industry promotes sustainability. Researchers strive to incorporate sustainability into chemical supply chain management to improve corporate environmental performance and build sustainable business models. This study presents a multi-criteria decision framework with GSCM practices for chemical firms.

2. **Shohan S. et al. (2019),** In the research titled "Green supply chain management in the Chemical Industry: Structural Framework of Drivers," The direct and transitive relationships between drivers will inform top management about their interconnection and how to leverage their dependence for their advantage. Many complex instruments offer similar data, but extracting it for management authority might be challenging.

3. **Aityassine, F. L. Y., et al. (2022),** In the research titled "The effect of supply chain resilience on the supply chain performance of chemical industrial companies," Effective collaboration with partners, quick response to changes, and reduced errors improve customer satisfaction, transparency, and administration costs.

4. **Busse, C. et al. (2017),** In the research titled "Managing Information Processing Needs in Global Supply Chains: A Prerequisite to Sustainable Supply Chain Management," examines how knowledge gaps can lead to insufficient supply chain sustainability in complex supply chains run by buying enterprises.

5. **Rehman Khan et al. (2018)** In the research titled "Green Supply Chain Management, Economic Growth, and the Environment: GMM-based Evidence," The impact of global logistics on economic growth is debated in logistics and supply chain management. The discussion continues with eco-friendly logistics operations using green practices and biofuel sources to solve environmental degradation and poor economic growth.

Research Methodology: The research is based on primary data. An exploratory research designed is used for the study. Primary data is collected using survey method. A sample of 60 employees working is logistics and supply chain management are considered as respondents. For the analysis of data SPSS is used. Descriptive as well as inferential statistics is used for the study of objectives and analysis of data.

DATA ANALYSIS

RESPONSES ON MANAGEMENT PRACTICES IS SHOWN BELOW

Sr No.	Particular	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
MP1	Your organisation rely on few dependable suppliers	12	2	18	15	3
MP2	Your organisation rely on few high quality suppliers	9	13	17	16	5
MP3	Your organisation consider quality as number one criterion in selecting suppliers	8	21	18	12	1
MP4	Your organisation strive to establish long term relationship with its suppliers	15	18	15	9	3
MP5	Your organisation helps its suppliers to improve their product quality	9	26	13	11	1

Descriptive statistics is as follows:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Management Practices	60	36.00	76.00	52.8667	9.49124

Above table indicate that mean score of Management Practices is 52.86 per cent with standard deviation 9.49, suggesting low variation in the responses.

RESPONSES ON LOGISTIC PROCESS IS SHOWN BELOW

Sr No.	Particular	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
LP1	Your organisation strives to reduce time wastage in operations	3	10	16	27	4
LP2	Your organisation has continuous quality improvement program	22	7	7	24	0
LP3	Your organisation produces only what has been ordered by customers (pull production system)	4	14	28	11	0
LP4	Your organisation pushes	16	25	7	12	0

	suppliers for shorter lead times					
LP5	Your organisation streamlines ordering, receiving and other paper work from its suppliers	10	17	15	18	0

Above responses are rated similar to the management practices and same formula for arithmetic mean is applied.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Logistic Process	60	36.00	76.00	54.2667	9.89070
Valid N (listwise)	60				

Above table indicate that mean score of Logistic Process is 54.26 per cent with standard deviation 9.89, suggesting low variation in the responses.

RESPONSES ON SUPPLY CHAIN INTEGRATION IS SHOWN BELOW

Sr No.	Particular	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
SCI1	Firms in our supply chain establish more frequent contact with each other	11	7	21	20	1
SCI2	Firms in our supply chain create a compatible communication and information system	5	13	20	22	0
SCI3	Your firm extends its supply chain beyond its customers/suppliers	15	21	13	10	1
SCI4	Your firm participates in the marketing efforts of its customers	10	13	19	18	0
SCI5	Your firm participates in the sourcing decisions of its suppliers	2	19	16	20	3

The above responses are rated similarly to the management practices and the same formula for arithmetic mean is applied.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Supply Chain Integration	60	40.00	80.00	56.0667	10.81096
Valid N (listwise)	60				

The above table indicates that the mean score of Supply Chain Integration is 56.06 per cent with a standard deviation of 10.81, suggesting moderate variation in the responses.

RESPONSES ON OUTPUT PERFORMANCE IS SHOWN BELOW

Sr No.	Particular	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
OP1	Sales	1	10	36	7	6
OP2	Order fill rate	0	11	35	8	6
OP3	On time deliveries	0	15	26	11	8
OP4	Customer response time	2	14	36	4	4
OP5	Shipping errors	0	15	36	5	4

The above responses are rated similarly to the management practices and the same formula for arithmetic mean is applied.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Output Performance	60	44.00	80.00	61.3333	9.21801
Valid N (listwise)	60				

Above table indicate that mean score of Output Performance is 61.33 per cent with standard deviation 9.21, suggesting low variation in the responses.

Objectives 1 – To study impact of logistic and supply chain management on output performance

Null Hypothesis H_{01}: There is no impact of logistic and supply chain management on out[put performance.

Alternate Hypothesis H_{11}: There is impact of logistic and supply chain management on out[put performance.

To test the above null hypothesis Correlations test is applied results are as follows.

Correlations		Output Performance	Management Practices	Logistic Process	Supply Chain Integration
Output Performance	Pearson Correlation	1	.569**	.374**	.701**
	Sig. (2-tailed)		.000	.003	.000
	N	60	60	60	60
Management Practices	Pearson Correlation	.569**	1	-.033	.375**
	Sig. (2-tailed)	.000		.803	.003
	N	60	60	60	60
Logistic Process	Pearson Correlation	.374**	-.033	1	.222
	Sig. (2-tailed)	.003	.803		.089
	N	60	60	60	60
Supply Chain Integration	Pearson Correlation	.701**	.375**	.222	1
	Sig. (2-tailed)	.000	.003	.089	
	N	60	60	60	60
**. Correlation is significant at the 0.01 level (2-tailed).					

Interpretation: The above results indicate that calculated p-value is less than 0.00. Hence Null hypothesis is rejected and Alternate hypothesis is accepted.

Conclusion: There is impact of logistic and supply chain management on out[put performance.

Findings: To understand the findings of hypothesis of impact of logistic and supply chain management on output performance.

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