ENHANCING SUPPLY CHAIN PERFORMANCE: THE INTERPLAY OF SUPPLY CHAIN INTEGRATION AND FLEXIBILITY

Raymund P. Berdin, MBA, BSChE

Supply Chain Management
Ampleon Phils., Inc., LISP 1, Cabuyao, Laguna
raymund.p.berdin@ampleon.com

ABSTRACT

Global disruptions, including geopolitical tensions and international conflicts, have adversely affected the global supply chain. This study investigated how supply chain integration and flexibility can alleviate these associated risks, by analyzing the complex interplay among integration, flexibility, and performance variables. This study examined how supply chain integration (SCI) and supply chain flexibility (SCF) influenced supply chain performance (SCP) in manufacturing firms within the Light Industry and Science Park 1 (LISP 1), Cabuyao, Laguna.

Using descriptive causal research design, data were collected from 123 purposively selected respondents. Data was analyzed using mean-standard deviation technique, multiple linear regression and mediation analysis. Results showed that SCI has no direct significant effect on SCP ($p>0.05$), while SCF demonstrated a significant positive effect on SCP ($\beta=0.57$, $p<0.01$), with sourcing flexibility emerging as the strongest contributor. Mediation analysis revealed that SCF fully mediates the relationship between SCI and SCP emphasizing flexibility as a critical enabler of performance.

This study underscores that in today's volatile environment, flexibility, not integration alone, serves as the backbone of success. To strengthen resilience, organizations must do a paradigm shift: diversify suppliers, digitize operations, and build agile, empowered teams.

1. 0 INTRODUCTION

In today's globally interconnected economy, supply chain plays a vital role in linking materials, production systems and customer demand. The supply chain serves as the backbone of the global economy, bridging the gap between materials, products, and people. The ever-changing characteristics of worldwide marketplaces, together with the swift innovation in technology, have emphasized the crucial need for efficient supply chain management.

In this increasingly global competitive market, firms must transition from static, efficiency-driven supply chain models to a more resilient and adaptive systems. Two critical capabilities have emerged: supply chain integration (SCI) and supply chain flexibility (SCF)[1]. SCI refers to the strategic alignment and collaboration among internal units and external partners, including customers and suppliers to facilitate a joint decision-making and coordinated flow[2]. On the other hand, SCF refers to the organization's ability to adapt swiftly to changing market conditions, disruptions, and opportunities by adjusting processes and reallocating resources across sourcing, manufacturing, and logistics[3].

Moreover, SCP refers to how efficiently and effectively supply chain operations meet customer expectations and business objectives[2]. It is assessed using various tools like dashboards, scorecards, and key performance indicators (KPIs) that evaluate both internal efficiency and external collaboration with customers and suppliers.

In the context of Light Industry and Science Park 1 (LISP 1) in Cabuyao, Laguna, home to multiple electronics and manufacturing firms, challenges stemming from global supply chain disruptions, which affect the availability of raw materials and components, lead to production delays and increased costs.

This research contributes to sustainable development by aligning with SDG 9 (Industry, Innovation and Infrastructure) and SDG 12 (Responsible Consumption and Production). By identifying the relationships among SCI, SCF and SCP, this study offers empirical evidence and a potential action plan for supply chain professionals to improve operational resilience and long term competitiveness.

2. 0 REVIEW OF RELATED WORK

2.1 Related Literature

Supply chain management plays a pivotal role in the success of a company through supply chain synergies, efficient operations, design of new products and processes, and the financial performance of the firm. Therefore, it is expected that efficient and effective management of the supply chains in the industry will increase the value of a firm through the capital markets[4].

Supply chain integration is essential for globalization, allowing firms to efficiently manage and coordinate both internal and external processes[6]. It involves strategic collaboration among supply chain partners to streamline the flow of information and goods, ultimately maximizing customer value while minimizing costs[5].

Supply chain flexibility is crucial for firm performance, enabling companies to adapt to changes in product mix, volume, variety, and standards to meet diverse customer needs[1]. It spans multiple dimensions—sourcing, manufacturing, and logistics—allowing firms to respond swiftly to market changes, enhance customer satisfaction, reduce lead times, and drive revenue growth[3].

Supply chain performance evaluates the effectiveness with which a network of providers meets consumer requests while managing costs and profits[5]. SCP refers to both tangible (e.g. cost, quality) and intangible (e.g. capacity utilization, resource utilization) results through effective use of supply chain management. On-time delivery, reduced lead time, responsiveness, cost reduction, conformance to specifications, process improvements and time-to-markets were identified as constituents of SCP[1].

2.2 Research Frameworks

The framework in Khanuja and Jain's study in 2021 was adopted for this research. The study primarily aimed to determine how supply chain integration (SCI) has been practiced by having a superior supply chain performance (SCP) through supply chain flexibility (SCF). The findings of the study demonstrated that SCF is essential for enhancing SCP, with logistics flexibility serving as a significant mediator variable. This is illustrated in Figure 1.

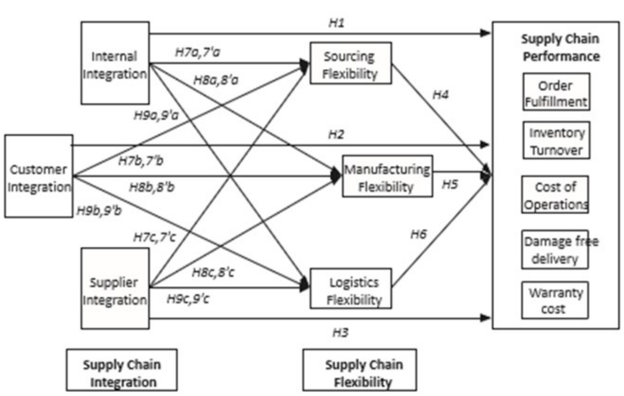

Figure 1. Conceptual Framework

The study examined the relationships among supply chain integration (SCI), supply chain flexibility (SCF), and supply chain performance (SCP). While internal and supplier integration showed no significant direct effect on performance, customer integration did. Similarly, sourcing and manufacturing flexibility were not significantly related to SCP, but logistics flexibility was. Supplier and customer integration positively influenced all flexibility dimensions. Mediation analysis revealed that logistics flexibility fully mediates the effect of supplier integration on performance and partially mediates the effect of customer integration. Overall, the findings highlight the critical role of external integration and logistics flexibility in enhancing supply chain performance.

Following Khanuja and Jain's study, this research provided a new perspective on the interplay of supply chain integration and supply chain flexibility with supply chain performance. The same variables were utilized in the analysis; however, these were assessed collectively. The operational framework is illustrated in Figure 2.

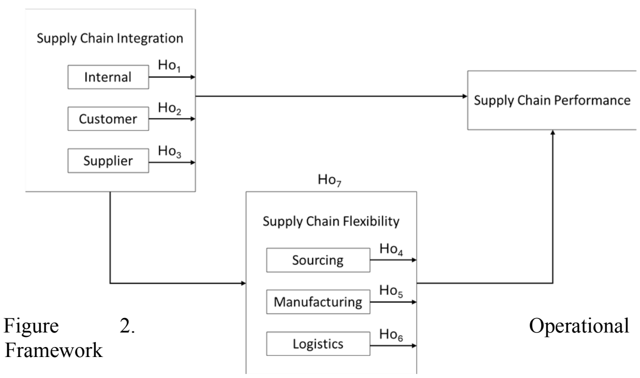

Figure 2. Operational Framework

2.3 Objectives of the Study

In general, this study was focused on examining the effect of supply chain integration (SCI) and supply chain flexibility (SCF) on supply chain performance (SCP). Specifically, it was intended to:

1. describe the level of supply chain integration, supply chain flexibility and supply chain performance;
2. determine the effect of supply chain integration in terms of internal, customer and supplier integration on supply chain performance;
3.determine the effect of supply chain flexibility in terms of sourcing, manufacturing and logistics flexibility on supply chain performance;
4. determine the mediating role of supply chain flexibility between supply chain integration and supply chain performance; and

5. provide an action plan for supply chain managers to enhance their organizations' performance by leveraging the combined power of SCI and SCF.

2.4 Hypotheses

The following hypotheses were derived to be used in this study:

Ho1: Internal supply chain integration has no significant effect on supply chain performance
Ho2: Customer supply chain integration has no significant effect on supply chain performance
Ho3: Supplier supply chain integration has no significant effect on supply chain performance
Ho4: Sourcing supply chain flexibility has no significant effect on supply chain performance
Ho5: Manufacturing supply chain flexibility has no significant effect on supply chain performance
Ho6: Logistics supply chain flexibility has no significant effect on supply chain performance
Ho7: Supply chain flexibility does not significantly mediate the effect between supply chain integration and supply chain performance

3.0 METHODOLOGY

3.1 Research Design

This study used a descriptive causal research design to examine the hypotheses. This design is ideal for exploring both current conditions and cause-and-effect relationships among variables[7]. It is particularly suitable for testing hypotheses involving directional influences and mediating effects, such as the impact of SCI and SCF on SCP and supports strategic decision-making in supply chain management[8].

The three constructs adopted in this study were supply chain integration, supply chain flexibility and supply chain performance. Supply chain integration is measured using three items, namely: internal, customer and supplier integration. On the other hand, measurement items for supply chain flexibility consist of three items, namely: manufacturing, sourcing, and logistics flexibility. Lastly, supply chain performance is measured by five items, namely: order fulfillment, inventory turnover, operations cost, damage-free delivery and warranty cost.

3.2 Locale of the Study

The researcher conducted the survey in Cabuyao City, specifically on the manufacturing companies within Light Industry and Science Park 1 (LISP 1) located at Bo. Diezmo, Cabuyao City, Laguna. LISP 1 is the first privately-owned industrial estate to operate as a Special Export Processing Zone, under the Philippine Economic Zone Authority. It has an area of 178 hectares and homes 92 locators representing various businesses including semiconductors, electronics, logistics, packaging, plastic injection, paint, healthcare, pharmaceutical, dental, automotive, construction, industrial equipment, domestic items, food and appliances. The diverse industries provide the researcher with a compelling rationale to encompass a broad reach across sectors for the study.

3.3 Respondents of the Study

The respondents of the study included 123 members of the top and middle management teams. These respondents are crucial in this research due to their strategic perspective, deep understanding of supply chain operations, access to relevant information, decision-making authority, and direct experiences with real-world issues. The top management team understands the overall business strategy and how the supply chain fits into it, making high-level decisions that impact the entire supply chain. This group consists of the manager and the director level. While the middle management team, which consists of engineers, supervisors and specialists, bridges the gap between top management and operational teams, providing insights into day-to-day operations and potential improvement areas. Both levels have access to critical information and data, making their insights valuable for understanding factors driving change. By targeting top management and middle management, the researcher can gather in-depth data to identify potential improvements, develop effective strategies, and inform future decision-making.

3.4 Sampling Design

The researcher used the purposive sampling technique with predetermined criteria requirements, namely, the respondents must be a permanent employee of a manufacturing company in LISP 1 and a member of the top management or middle management team. Purposive sampling is a non-probability sampling technique that ensures targeted selection of experts with relevant knowledge and experience, allowing for a diverse perspective. This approach also provided insights into the complexities of the research. Using the G power analysis, with effect size of 0.15, probability of 0.05, power of 0.90 and predictors of 6, the sample size is 123 respondents.

3.5 Research Tools and Instruments

This research used the instrument (Appendix A) adapted from the study of Khanuja and Jain (2021). The questionnaire was designed using a five-point Likert scale which was labelled as Strongly Agree (5), Agree (4), Neutral (3), Disagree (2) and Strongly Disagree (1). A pilot test was conducted before the full-scale data collection process to evaluate the reliability of the research instrument. Following this, the data collection was carried out through a structured questionnaire distributed electronically via email utilizing Microsoft Forms. Paper surveys were also distributed to some of the manufacturing firms.

The detailed specifications of the questionnaire and its Cronbach's α results are presented in Table 1. All values were above 0.700 threshold and so with its overall Cronbach's α of 0.961, which means that the research instrument used in the study is reliable.

Table 1. Questionnaire Specifications and Reliability Test Results

Variable	Number of Items	Cronbach's α
Supply Chain Integration	11	0.906
Internal	3	0.749
Supplier	4	0.813
Customer	4	0.714
Supply Chain Flexibility	14	0.942
Manufacturing	4	0.800
Sourcing	5	0.951
Logistics	5	0.875
Supply Chain Performance	5	0.876

3.6 Data Analysis and Interpretation

Descriptive statistics was used to determine the level of integration, flexibility and performance in the responses of the respondents. These were interpreted through mean-standard deviation technique. The responses' means were computed, summarized and classified according to the range as indicated in Table 2.

Table 2. Mean Verbal Interpretation

Mean Range	Verbal Interpretation
1.00 – 1.49	Very Low
1.50 – 2.49	Low
2.50 – 3.49	Moderate
3.50 – 4.49	High
4.50 – 5.00	Very High

Multiple linear regression was used to analyze and estimate the effect of supply chain integration and flexibility variables to supply chain performance. A p-value of < 0.05 indicates significant effect. Standardized beta coefficients were used to identify the factor that has the greatest contribution on performance. Mediation analysis through combined simple and multiple regression, also known as the Baron and Kenny method, was also performed to know the role of supply chain flexibility between the supply chain integration and supply chain performance relationship. A p-value of < 0.05 indicates a significant mediating effect, which can be classified as partial or full mediation.

4.0 RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Out of 123 respondents, the majority (80%) were from semiconductor and electronics firms, with 53% of which from Engineering or Supervisory roles.

Table 3 presents the level of supply chain integration, supply chain flexibility and supply chain performance of the manufacturing companies in LISP 1.

Table 3. Mean and Interpretation of Supply Chain Variables

Variables	Std. Deviation	Mean	Interpretation
Internal Integration (II)	0.495	4.52	Very High
Supplier Integration (SI)	0.518	4.38	High
Customer Integration (CI)	0.519	4.45	High
Supply Chain Integration (SCI)	0.460	4.45	High
Manufacturing Flexibility (MF)	0.552	4.30	High
Sourcing Flexibility (SF)	0.647	3.90	High
Logistics Flexibility (LF)	0.561	4.28	High
Supply Chain Flexibility (SCF)	0.478	4.16	High
Supply Chain Performance (SCP)	0.571	4.22	High

Among the three dimensions of SCI, internal integration (M=4.52, SD=0.495) scored the highest, reflecting a very strong level of internal coordination and information sharing, and active cross-functional collaboration. Customer integration (M=4.45, SD=0.519) and supplier integration (M=4.38, SD=0.518) also received high ratings, indicating effective external partnerships, with ERP tools further facilitating transparency and alignment.

All three dimensions of SCF scored high particularly in manufacturing (M=4.30, SD=0.522) and logistics (M=4.28, SD=0.561) reflecting strong adaptability.
Sourcing flexibility, while still rated high (M=3.90, SD=0.647), lags behind, suggesting limitations in substitute sources and contractual constraints.

SCP was rated high (M=4.22, SD=0.571) reflecting consistent order fulfillment, efficient inventory turnover, and low warranty claims. This performance aligns with integration and flexibility efforts, particularly in quality control and customer service.

4.2 Regression Analyses

Table 4 shows the regression analysis on the effect of supply chain integration in terms of internal, customer and supplier integration on supply chain performance.

Table 4. Regression Analysis of Supply Chain Integration on Supply Chain Performance

Model		Unstandardized β	Standard Error	Standardized	t	p
M_1	(Intercept)	1.182	0.426		2.776	0.006
	Internal Integration (II)	0.154	0.130	0.133	1.182	0.240
	Supplier Integration (SI)	0.269	0.142	0.245	1.903	0.059
	Customer Integration (CI)	0.261	0.137	0.237	1.907	0.059

Dependent variable = Supply Chain Performance
$R^2 = 0.312$, $F(3,122) = 17.989$, $p < 0.001$
* significant at < 0.05

The F-value (3,122)=17.989 and p-value <0.001 confirm the statistical significance of the model, which falls below the threshold of 0.05. It has an R^2 value of 0.312 which indicates that approximately 31.2% of the variance in SCP can be attributed by the combined effects of internal, supplier and customer integration.

While the SCI model was statistically significant (R^2=0.312, p<0.001), none of the individual dimensions: internal, supplier, or customer integration, showed a significant direct effect on SCP.

Table 5 shows the regression analysis on the effect of supply chain flexibility in terms of manufacturing, sourcing and logistics flexibility on supply chain performance.

Table 5. Regression Analysis of Supply Chain Flexibility on Supply Chain Performance

Model		Unstandardized	Standard Error	Standardized	t	p
M_1	(Intercept)	0.818	0.331		2.468	0.015
	Manufacturing Flexibility (MF)	0.277	0.080	0.268	3.442	< .001*
	Sourcing Flexibility (SF)	0.368	0.069	0.418	5.357	< .001*
	Logistics Flexibility (LF)	0.181	0.082	0.178	2.219	0.028*

Dependent variable = Supply Chain Performance
$R^2 = 0.507$, $F(3,122) = 40.752$, $p < 0.001$
* significant at < 0.05

The model is statistically significant with F-value (3,122)=40.752 and p-value <0.001, indicating that the supply chain flexibility variables collectively explain a significant effect on supply chain performance. It has an R^2 value of 0.507 suggesting that approximately 50.7% of the variability in supply chain performance can be accounted for by the flexibility variables.

SCF had a significant impact on SCP (R^2=0.507, p<0.001), with sourcing flexibility (β=0.418) as the strongest contributor, followed by manufacturing and logistics flexibility.

4.3 Mediation Analysis

Table 6 presents the mediating effect of supply chain flexibility between supply chain integration and supply chain performance using the Baron and Kenny method (combined simple and multiple regression method).

Table 6. Mediation Analysis of Supply Chain Flexibility between Supply Chain Integration and Supply Chain Performance

Model		Unstandardized	Standard Error	Standardized	t	P	R^2	F (1,122), p < 0.001
M_1	(Intercept)	1.147	0.419		2.739	0.007		
	SCI	0.690	0.094	0.557	7.371	< .001*	0.310	54.338
Dependent variable – SCP								
M_2	(Intercept)	1.080	0.315		3.428	< .001		
	SCI	0.692	0.070	0.666	9.820	< .001*	0.444	96.437
Dependent variable – SCF								
M_3	(Intercept)	0.718	0.322		2.231	0.028		
	SCF	0.841	0.077	0.705	10.938	< .001*	0.497	119.644
Dependent variable – SCP								
M_4	(Intercept)	0.372	0.371		1.004	0.318		
	SCI	0.194	0.106	0.157	1.829	0.070		
	SCF	0.717	0.102	0.601	7.020	< .001*	0.511	62.654
Dependent variable – SCP								

* significant at < 0.05

SCI significantly influenced SCP (β=0.557, p<0.001) and SCF (β=0.666, p<0.001), while SCF also significantly predicted SCP (β=0.705, p<0.001). When both SCI and SCF were included, SCI lost significance (p=0.070), while SCF remained significant (p<0.001), confirming full mediation.

5.0 CONCLUSION

Performance in LISP 1 manufacturing firms is significantly influenced by internal, supplier, and customer integration. Internal integration scores highest, indicating cross-functional teamwork and information-sharing. Supplier integration and customer integration also show high scores, indicating good external collaboration. Manufacturing and logistics flexibility enhances adaptability to market changes and operational disturbances. However, sourcing flexibility is weak, indicating supplier dependency. Strong SCP indicates the need for continuous improvement in integration and flexibility strategies to ensure sustained performance and resilience.

The findings on the regression analyses proved that SCI, with its corresponding variables: internal, supplier and customer, did not have a significant effect on SCP based on the p-value results. Therefore, the study fails to reject Ho1, Ho2, and Ho3.

On the other hand, SCF, with its corresponding variables manufacturing, sourcing and logistics, has a positive and statistically significant effect on SCP based on the coefficient and p-value results. Therefore, the study rejects Ho4, Ho5, and Ho6.

Moreover, the results on the mediation analysis confirmed that SCF fully mediates the relationship between SCI and SCP. This implies that the impact of supply chain integration on performance is realized primarily through its influence on SCF, highlighting SCF as a critical factor for translating integration efforts into improved performance outcomes. Therefore, the study rejects Ho7.

6.0 RECOMMENDATIONS

Given the findings of the study, it is recommended that organizations may adopt a flexibility-centered supply chain strategy to enhance the overall performance. Organizations should shift their supply chain improvement efforts toward enhancing flexibility, particularly in sourcing, manufacturing, and logistics, as these are the key drivers of performance.

With sourcing flexibility emerging as the most influential factor, here are the key initiatives to enable rapid switching and diversification of suppliers to manage risks and respond to market changes; (1) develop a multi-sourcing strategy across local and international vendors, (2) establish pre-negotiated contracts with backup suppliers, (3) implement supplier performance dashboards to monitor reliability, lead time, and risk in real-time, and (4) use e-procurement systems for agile supplier selection, bidding, and order placement.

To increase manufacturing flexibility, here are some action items to check to intensify its adaptability to production volume, variety, and schedules to match fluctuations in customer demand or supply disruptions; (1) invest in modular or reconfigurable manufacturing systems, (2) apply lean manufacturing and just-in-time (JIT) techniques to reduce excess inventory and increase responsiveness, (3) train a multi-skilled workforce to perform various tasks and shift roles as needed, and (4) leverage demand-driven production planning tools for real-time scheduling.

To strengthen logistics flexibility, here are some key actions to optimize transportation, storage, and distribution to quickly respond to delivery constraints, fuel cost fluctuations, or regional disruptions; (1) partner with multiple logistics service providers (3PLs) for route and carrier flexibility, (2) use AI-powered route optimization tools to respond to real-time traffic, weather, and delivery issues, (3) implement shared warehousing models or regional fulfillment centers to minimize lead times, and (4) build reverse logistics capabilities to manage returns and reprocessing efficiently.

Additionally, organizations may realign their leadership focus and investment toward building a culture of agility and responsiveness, and the establishment of KPIs that track flexibility metrics. The following enablers for strategic execution are recommended for organizations to explore; (1) adopt cloud-based SCM systems, IoT, AI, and blockchain for real-time visibility, traceability and agility, (2) set KPIs for flexibility: supplier lead time variability, changeover time, fulfillment speed, and logistics rerouting success, (3) use data analytics to continuously refine sourcing and production decisions, (4) foster a culture of agility, innovation, and cross-functional collaboration, and (5) empower teams to make decentralized, data-informed decisions to adapt rapidly to change. By investing in these areas, organizations can improve their responsiveness, mitigate risks, and ensure operational continuity – ultimately driving superior supply chain performance in an increasingly dynamic business environment.

In today's age of continuous innovation and change, this study emphasizes a critical truth: the resilience of a supply chain lies not just in its structure, but in its ability to integrate, adapt, and continue. By bridging strategy with agility through a resilient flexibility-centered strategic plan, manufacturing firms can transform uncertainty into opportunity – and ensure that performance doesn't just endure, but excels.

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9.0 ABOUT THE AUTHORS

A seasoned professional with over 20 years of experience in the semiconductor industry, specializing in production, engineering, project management, factory scheduling and supply chain management. A highly motivated and results-oriented individual who is passionate about driving operational excellence and delivering high-quality products. A Chemical Engineering graduate from the University of San Carlos in Cebu and a Master of Business Administration graduate from De La Salle Lipa.

10.0 APPENDIX

10.1 Appendix A – Survey Questionnaire

Instruction:
Please indicate your level of agreement with each statement using the following scale.

1 - Strongly Disagree 2 – Disagree 3 – Neutral 4 – Agree 5 - Strongly Agree

Supply Chain Integration	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
Internal Integration					
II1. We have established an information network across the organization					
II2. We are using an ERP application					
II3. Our cross functional team are working together					
Supplier Integration					
SI1. We are collaborating with suppliers for new product development					
SI2. We do a strategic partnership with the supplier					
SI3. Suppliers participate in smooth procurement process					
SI4. We are using an ERP application					
Customer Integration					
CI1. We do a strategic partnership with customers					
CI2. We are using an ERP application for order management					
CI3. We have a feedback mechanism system for improving customers' suggestions					
CI4. We have an integrated system to track / collect data of demand from customers					

Supply Chain Flexibility	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
Manufacturing Flexibility					
MF1. We are capable of incorporating a wide range of product in manufacturing planning					
MF2. We are capable of accommodating uncertain market demand					
MF3. We can accommodate market demand as and when required					
MF4. We can operate at a high and low production volume					
Sourcing Flexibility					
SF1. We have a wide range of suppliers that provide major materials / components / products					
SF2. Our suppliers can respond efficiently to changes in an order quantity					
SF3. Our suppliers can respond efficiently to changes in an order in terms of range, specifications, etc.					
SF4. Our suppliers can respond quickly to changes in order quantity within the requested timeframe					
SF5. Our suppliers can respond quickly for any changes desired from them in terms of range and specs within requested timeframe					
Logistic Flexibility					
LF1. We/Our logistics service provider (LSP) has different ranges and sufficient numbers of fleet to meet customer requirement					
LF2. We/Our LSP is capable of providing different modes of transportation					
LF3. We/Our LSP is capable of accommodating variations or changes in demand uncertainty					
LF4. We have extensive distribution coverage for our flagship brand / critical product where we serve or planned to serve					
LF5. We/Our LSP can deliver the right products to all customers when and where they need them					

Supply Chain Performance	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
SCP1. We have the ability to deliver customers' orders in full quantity on the required timeframe					
SCP2. We have efficiently managed all our material inventories (inventory turnover management)					
SCP3. We have properly managed the cost of operations (operation cost)					
SCP4. We have the ability to deliver customer orders in damage free or with high quality					
SCP5. We have maintained low frequency of product returns, and cost of rework (warranty cost)					

10.2 Appendix B – Descriptive Statistics

Mean – Standard Deviation

	Mean	Std. Deviation
II1	4.415	0.586
II2	4.602	0.721
II3	4.528	0.533
SI1	4.455	0.576
SI2	4.415	0.572
SI3	4.228	0.663
SI4	4.423	0.849
CI1	4.496	0.518
CI2	4.472	0.750
CI3	4.455	0.631
CI4	4.358	0.679
MF1	4.317	0.605
MF2	4.228	0.638
MF3	4.325	0.607
MF4	4.325	0.695
SF1	4.008	0.805
SF2	3.911	0.736
SF3	3.862	0.739
SF4	3.862	0.681
SF5	3.837	0.729
LF1	4.268	0.641
LF2	4.301	0.613
LF3	4.244	0.632
LF4	4.252	0.673
LF5	4.325	0.580
SCP1	4.374	0.619
SCP2	4.008	0.892
SCP3	4.130	0.724
SCP4	4.358	0.616
SCP5	4.211	0.590

10.3 Appendix C – Regression Analyses

Supply Chain Integration Regression

Model Summary - SCP

Model	R	R^2	Adjusted R^2	RMSE
M_0	0.000	0.000	0.000	0.571
M_1	0.559	0.312	0.295	0.479

Note. M_1 includes II, SI, CI

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	12.395	3	4.132	17.989	< .001
	Residual	27.332	119	0.230		
	Total	39.727	122			

Note. M_1 includes II, SI, CI

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercept)	4.216	0.051		81.943	< .001
M_1	(Intercept)	1.182	0.426		2.776	0.006
	II	0.154	0.130	0.133	1.182	0.240
	SI	0.269	0.142	0.245	1.903	0.059
	CI	0.261	0.137	0.237	1.907	0.059

Supply Chain Flexibility Regression

Model Summary - SCP

Model	R	R^2	Adjusted R^2	RMSE
M_0	0.000	0.000	0.000	0.571
M_1	0.712	0.507	0.494	0.406

Note. M_1 includes MF, SF, LF

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	20.132	3	6.711	40.752	< .001
	Residual	19.596	119	0.165		
	Total	39.727	122			

Note. M_1 includes MF, SF, LF
Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercept)	4.216	0.051		81.943	< .001
M_1	(Intercept)	0.818	0.331		2.468	0.015
	MF	0.277	0.080	0.268	3.442	< .001
	SF	0.368	0.069	0.418	5.357	< .001
	LF	0.181	0.082	0.178	2.219	0.028

10.4 Appendix D – Mediation Analysis

Step 1:

Model Summary - SCP

Model	R	R^2	Adjusted R^2	RMSE
M_0	0.000	0.000	0.000	0.571
M_1	0.557	0.310	0.304	0.476

Note. M_1 includes Imean

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	12.312	1	12.312	54.338	< .001
	Residual	27.416	121	0.227		
	Total	39.727	122			

Note. M_1 includes Imean
Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercept)	4.216	0.051		81.943	< .001
M_1	(Intercept)	1.147	0.419		2.739	0.007
	Imean	0.690	0.094	0.557	7.371	< .001

Step 2:

Model Summary - Fmean

Model	R	R^2	Adjusted R^2	RMSE
M_0	0.000	0.000	0.000	0.478
M_1	0.666	0.444	0.439	0.358

Note. M_1 includes Imean

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	12.374	1	12.374	96.437	< .001
	Residual	15.526	121	0.128		
	Total	27.900	122			

Note. M_1 includes Imean
Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercept)	4.158	0.043		96.422	< .001
M_1	(Intercept)	1.080	0.315		3.428	< .001
	Imean	0.692	0.070	0.666	9.820	< .001

Step 3:

Model Summary - SCP

Model	R	R^2	Adjusted R^2	RMSE
M_0	0.000	0.000	0.000	0.571
M_1	0.705	0.497	0.493	0.406

Note. M_1 includes Fmean

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	19.752	1	19.752	119.644	< .001
	Residual	19.976	121	0.165		
	Total	39.727	122			

Note. M_1 includes Fmean
Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercept)	4.216	0.051		81.943	< .001
M_1	(Intercept)	0.718	0.322		2.231	0.028
	Fmean	0.841	0.077	0.705	10.938	< .001

Step 4:

Model Summary - SCP

Model	R	R^2	Adjusted R^2	RMSE
M_0	0.000	0.000	0.000	0.571
M_1	0.715	0.511	0.503	0.402

Note. M_1 includes Imean, Fmean

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	20.293	2	10.147	62.654	< .001
	Residual	19.434	120	0.162		
	Total	39.727	122			

Note. M_1 includes Imean, Fmean
Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercept)	4.216	0.051		81.943	< .001
M_1	(Intercept)	0.372	0.371		1.004	0.318
	Imean	0.194	0.106	0.157	1.829	0.070
	Fmean	0.717	0.102	0.601	7.020	< .001