# Impact of E-Commerce on Supply Chain Management (SCM) of Start-Ups

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**Abstract.** SCM entails overcoming obstacles to increase shareholder value and profitability. Long demand planning cycles, unpredictable production schedules, excess inventory throughout the long order-to-delivery lead times, SC (supply chain), and supplier visibility issues all necessitate greater management attention. Technology advancements have caused a significant change in SCM. As a result of the implementation of e-business procedures, corporate practices have changed. The design of goods and services is drastically changing, and the economy is becoming more knowledge intensive. Purpose of this article is to evaluate how success of SC in context of startups is affected by operational efficiency, inventory management, logistical performance, SC adaptability, as well as SC integration.

## 1. Introduction

The last 20 years, there was a massive global revolution in information technology (IT), computing, and telecommunications. These quick changes encourage business executives to consider creating the best strategies for implementing technological improvements in an efficient and effective way to improve their firms' performance (Auramo J, et al., 2002). The most important foundation for the survival and competitiveness of the majority of firms is IT and e-business processes. Any organization's lifeblood is information, all organizations require precise, timely, as well as thorough information. At all organizational levels, it is critical to have the appropriate information available when needed to enhance the decision- making process (Beynon-Davies, 2009). Most effective as well as economical logistical network is SCM, and utilizing IT and e-business processes enhances overall organizational performance. It helps the company build a collective understanding of its major network, suppliers, distributors, and customers (Fasanghari and Kamal, 2008). Companies like Dell, GE, as well as Wal-Mart are able to establish an integrated system which encompasses both upstream as well as downstream



A. Jain and S. Gupta (eds.), *Proceedings of the International Conference on Policies, Processes and Practices for Transforming Underdeveloped Economies into Developed Economies (PPP-UD 2025)*, Advances in Economics, Business and Management Research 357,
https://doi.org/10.2991/978-94-6463-894-3_6

operations thanks to innovative IT architecture and solutions. Because of the latest advancements, the automotive industry is in an exciting time. With the emergence of technology such as Artificial Intelligence (AI) in e-commerce, start- ups are facing huge competition. Start-ups must prioritize cost reduction, customer happiness, on-time delivery, enhanced after-sales support, technology use, communication system utilization, productivity, and quality improvement if they want to stay in the market (Gubi et al., 2003). SCM plays a remarkable role in achieving such goals to meet severe competition faced by manufacturers and suppliers.

E-business process and IT created more powerful and digitized SCM which transformed the traditional SCM activity into a highly integrated IT-based activity which encompasses all SC activities, both upstream as well as downstream. Start-ups must produce more sophisticated and cutting-edge designs in order to compete globally, which presents challenging obstacles for its SCs (Harland et al., 1999). Knowledge, technology, adoption of new design, investment in product, tailored goods as well as services, value addition in goods as well as services, aggressive marketing, astute strategies, as well as adaptability will all become increasingly important to the economy.

Startups need components and raw materials from a wide range of other sectors. Performance of SC in the SCM was significantly impacted by AI in e-business processes (Humphrey et al., 2002). SCM techniques based on technology can be implemented to increase operational effectiveness, which will boost output and revenue.

## 2. Literature Review

This section looks at the main ideas and methods used to investigate how e-business affects SC's performance in Indian start-ups. According to Croom (2005), SCM and IT tools assist industries in expanding their market share in developing nations, breaking into foreign markets, and becoming more globally competitive. E-business gives industries the chance to successfully compete in global markets. The SC's performance would improve as a result of the advancements in internet technology, which make data movement faster and more affordable. As a result, startups are demonstrating a strong desire to create e-businesses that use artificial intelligence (Gall. M. D, Borg, et.al., 2003).

In order to improve SC efficiency (reducing expenses and getting rid of inefficiencies), SCM techniques have created additional lean process approaches. The performance of SC has improved, especially in terms of cost reduction, thanks to ideas like JIT(Just-in-Time), outsourcing, virtual inventory, global networks,

customized as well as supplier base rationalization, minimizing buffers in material, capacity, time, as well as minimizing number of distribution facilities (Intaher and Johanna, 2011).

SCM has grown in importance as a management tool for businesses looking to enhance their SC operations (Markus, 2000). SCM is movement of goods, information, as well as funds via a network of manufacturers, distributors, suppliers, as well as consumers. Over the past 20 years, inter-organizational connections have changed from being standard arm's-length, market-based relationships to being more like strategic partnerships (Bensaou and Anderson, 1997; and Scott et al., 2000).

According to Gentjan (2016), introduction of Manufacturing Resource Planning(MRP) was one element of these enlarged operations. The development of a new tool called Enterprise Resource Planning(ERP) in the 1990s accelerated the progress of SC by strengthening the customer-supplier relationship. Movahedi et al. (2009) argued, ERP systems were primarily focused on intra-organizational integration, whereas Electronic Data Interchange(EDI) systems were mostly focused on inter-organizational integration. With creation of increasingly complex IT systems (internet-based solution systems) that address both intra- as well as inter-organizational integration, evolution continues in the 21$^{st}$C. Furthermore, throughout this time, the buyer-supplier relationship has been an advanced from a typical collaboration to a long-term cooperation as well as strategic alliances (Golicic et al., 2002). The idea of mass production emerged at the start of the 20$^{th}$ century as result of sequencing of the assembly and concept processes. The management of SC toward the end of the 19th century was greatly influenced by the ideas of lean manufacturing, MRP, ERP, as well as JIT.

## 3. Objective

The study aims to determine the impact of e-commerce processes on supply chain performance of the start-ups.

## 4. Research Methodology

### 4.1 Hypotheses

The following hypotheses are formulated for the purpose:

$H_1$: There is a significant impact of e-commerce process on the operational efficiency of supply chain.

$H_2$: There is a significant impact of e-commerce process on the inventory management of supply chain.

$H_3$: There is a significant impact of e-commerce process on the logistics performance of supply chain.

$H_4$: There is a significant impact of e-commerce process on supply chain flexibility.

$H_5$: There is a significant impact of e-commerce process on supply chain integration.

### 4.2 Data and Methodology

Staying ahead of the curve is critical for start-ups in an ever-changing world. In this dynamic e-commerce era, embracing technology, data-driven decision-making, and sustainability will be critical to achieving success. A well-managed supply chain can decrease costs, improve customer satisfaction, and ensure start-up scalability.

Key Components of SCM for Start-ups:

- Supplier Selection – Select reliable suppliers who provide quality materials at competitive prices.
- Inventory Management – Avoid overstocking or stockouts using just-in-time (JIT) or demand forecasting.
- Logistics & Fulfilment – Decide between in-house shipping, third-party logistics (3PL), or dropshipping.
- Demand Planning – To forecast consumer demand, use market trends and sales data.
- Technology & Tools – Leverage software (e.g., ERP, inventory management tools) for automation.
- Customer Returns – Establish a smooth reverse logistics process for refunds/exchanges.

Figure 1 shows the generalized SCM for a start-up.

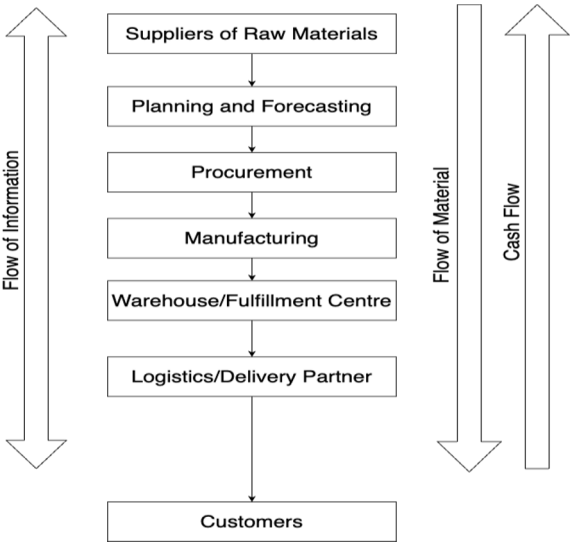


**Fig. 1.** Generalized SCM for a start-up

Figure 2 illustrates a conceptual framework in which Supply Chain Performance is a dependent variable. To validate research, independent variables include Inventory Management, Logistics Performance, Operational Efficiency, Supply Chain Flexibility, and Supply Chain Integration.

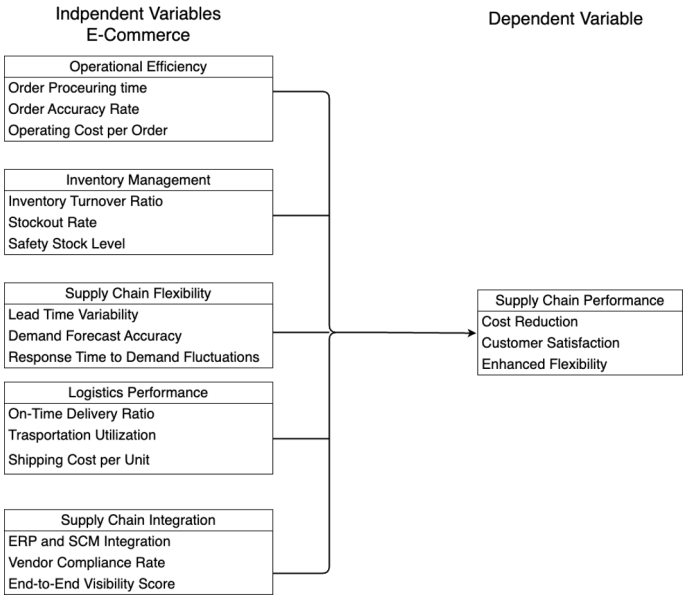


**Fig. 2.** Conceptual framework

Current research utilizes a descriptive research methodology and is predicated on the examination of survey data gathered via a questionnaire. The purpose of the questionnaire was to determine how e-commerce procedures affected SC performance. Based on a review of the literature, expert discussions, as well as interviews with SC and IT specialists, the survey questionnaire was validated. The information was gathered from middle-level managers in a few Indian automakers, including SC managers and their subordinates. A response rate of around 66.86% was obtained from 115 responses out of a total population of 170. Purposive sampling was employed because the responses were gathered from a specific target set of respondents. A 5 point Likert scale was used to rate responses.

### 4.3 Statistical Methods

Analysis of descriptive statistics, including mean, standard deviation, as well as frequency distribution, was done in order to achieve goals (SPSS 23). Regression modeling has been utilized forecast the relationship among variables as well as expectations among the elements being studied. Multiple regression analysis is utilized in present research for examining link among dependent variable (SC performance) and 5independent variables (operational efficiency, inventory management, logistical performance, SC flexibility, as well as SC integration). SC performance is analyzed by two dependent variables: cost

reduction and customer satisfaction. Source biasness is checked using Harmans's Single Factor Score and score obtained is less than 50%

For this investigation, the regression model that follows is utilized:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where $\beta_0$ = Constant; $\varepsilon$ = Error term; $X_1$ = Operational Efficiency; $X_2$ = Inventory Management; $X_3$ = Logistics Performance; $X_4$ = SC Flexibility; $X_5$ = SC Integration; $\beta_1$ to $\beta_5$ = Regression coefficients.

## 5. Results and Discussion

Correlation and regression analysis was done to find out the results of the investigation:

### 5.1 Correlation Analysis

Employing Pearson's product moment correlation, the link between variables is examined. With a p-value=0.000 as well as a correlation coefficient=0.929, outcomes show a strong association between SC performance and operational efficiency (H1). With a p- value=0.003 as well as correlation coefficient=0.889, investigation also demonstrated a favorable association between inventory management and SC performance (H2). With a p-value of 0.000 as well as a

correlation coefficient of 0.803, it was also noted that logistics performance and SC performance (H3) are positively correlated. The study also found that, with a correlation coefficient of 0.931 and a p-value of 0.000, there is a positive association between SC performance and SC flexibility (H4). The study concluded that, with a correlation coefficient of 0.892 as well as a p-value of 0.000, there has been positive association between SC integration as well as SC performance (H5) (Table 1).

Table 1. **Correlation of the Study Variables**

| | | Supply Chain Performance | Operational Efficiency | Inventory Management | Logistics Performance | Supply Chain Flexibility | Supply Chain Integration |
|---|---|---|---|---|---|---|---|
| Supply Chain Performance | Pearson Correlation | 1 | | | | | |
| | Sig.(2-tailed) | | | | | | |
| Operational Efficiency | Pearson Correlation | 0.929** | 1 | | | | |
| | Sig.(2-tailed) | 0 | | | | | |
| Inventory Management | Pearson Correlation | 0.889** | 0.913** | 1 | | | |
| | Sig.(2-tailed) | 0.003 | 0 | | | | |
| Logistics Performance | Pearson Correlation | 0.803** | 0.730** | 0.927** | 1 | | |
| | Sig.(2-tailed) | 0 | 0 | 0 | | | |
| Supply Chain Flexibility | Pearson Correlation | 0.931** | 0.832** | 0.911** | 0.855** | 1 | |
| | Sig.(2-tailed) | 0 | 0 | 0 | 0.001 | | |
| Supply Chain Integration | Pearson Correlation | 0.892** | 0.831** | 0.910** | 0.854** | 0.902** | 1 |
| | Sig.(2-tailed) | 0 | 0 | 0 | 0.001 | 0 | |

Note: ** indicates significance.

### 5.2 Regression Analysis

Using SPSS 23, a multiple regression analysis is performed to ascertain the link

among SC performance as well as five independent factors.

Dependent variable would be impacted by changes in independent variable to extent that coefficient of determination would account for the percentage of variation. The study's five independent variables indicated why adjusted R2 (Table 2) represents 80.1% of SC performance in the context of start-ups.

The following equation is based on Table 3, which was produced by the SPSS tool:

$$Y= \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

is

$$Y=0.027X_1 + 0.054X_2 + 0.003X_3 + 0.349X_4 + 0.022X_5 + 17.667$$

Table 2. Model Summary

| Model | R | $R^2$ | Adjusted $R^2$ | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.901 | 0.812 | 0.801 | 0.36078 |

Note:' Predictors: (Constant), Operational Efficiency, Inventory Management, Logistics Performance, Supply Chain Flexibility, Supply Chain Integration.

Table 3. Regression Coefficients

| Model | | Unstandardized Coefficients | | Standardized Coefficients | *t* | Sig |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 17.667 | 9.741 | | 1.816 | 0.032 |
| | Operational Efficiency | 0.027 | 0.026 | 0.054 | 1.059 | 0.031 |
| | Inventory Management | 0.054 | 0.033 | 0.123 | 1.782 | 0.020 |
| | Logistics Performance | 0.003 | 0.221 | 0.009 | 0.024 | 0.012 |
| | Supply Chain Flexibility | 0.349 | 0.026 | 0.790 | 1.165 | 0.002 |
| | Supply Chain Integration | 0.022 | 0.043 | 0.021 | 0.543 | 0.043 |

Note: Dependent Variable: Here cost reduction and customer satisfaction are taken as dependent variable to analyze supply chain performance.

If every independent variable drops to zero, Y might have a value of 17.667. According to the findings, for every unit gain in operational efficiency, the SC performance would rise by 0.027. Given that the p-value=0.031, this shows that operational efficiency as well as SC performance are significantly correlated.

Additionally, the findings show that for every unit increase in inventory management, SC performance will rise by 0.054. The p-value of 0.020 indicates that inventory management as well as SC performance are significantly correlated.

Additionally, the data show that for every unit increase in logistical performance, the SC performance will rise by 0.003. Given that p-value=0.012, this indicates that there has been substantial correlation among logistical performance and SC performance.

A unit increase in SC flexibility is found to result in a 0.349 improvement in SC performance. The p-value=0.002 specifies that there is a strong correlation among SC performance as well as flexibility.

Lastly, the results also showed that for every unit increase in SC integration, the SC performance will rise by 0.022. The p-value=0.043 indicates that there has been strong correlation among SC integration as well as SC performance. This demonstrates that SC flexibility has the greatest impact on SC performance, with inventory management, operational effectiveness, SC integration, and logistical performance following closely behind.

## 6. Conclusion

In the context of start-ups, this study demonstrates a strong positive correlation between SC performance and its metrics, including operational efficiency, inventory management, logistical performance, SC adaptability, and SC integration. The study also demonstrates how start-ups effectively leverage the e-commerce process to enhance their SC performance. The scope of this study is restricted to how e-commerce activities affect start-ups' SCM performance. For future research, this study can be applied more broadly, notably in the context of merging systems with different SC partners.

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