



# **Analysis of Performance Measurement and Metrics of Supply Chain Management: A Conceptual Framework**

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## **ABSTRACT**

An important element of competitive strategy to increase the efficiency of organization and profits is the supply chain management (SCM). There are tons of materials on SCM that cover the techniques and approaches for efficiently managing a supply chain. Nowadays, researchers and practitioners have been devoting a lot of attention to organizational evaluations of performance and metrics. The importance of these metrics and measurements in a company's success cannot be overstated because they tend to influence directly on the strategic, tactical, operational planning and control. Setting goals, assessing performance, and deciding on future courses of action are all directly interlinked to the performance assessment and metrics. But still the company has not paid sufficient attention to performance measurement and metrics associated with SCM. To foster a enhanced comprehension plays an important role of Supply Chain Management measurement and metrics in the company's success, we constructed a framework. The framework given here uses the most relevant studies as well as the findings of an empirical examination of a few organizations with the expectation that it might promote more attention in this fundamental domain.

Keywords: Supply chain management, Supply chain performance metrics & framework

## **1. Introduction**

The logistics of managing materials in the manufacturing process have gone through a revolutionary transformation as an effect of SCM. This slant views the supply chain as a unified entity, as opposed to imparting disconnected responsibility for various supply chain segments to functional areas like purchasing, production, distribution and sales. Although there has been dissonance and disagreement among ordinary business owners and operational experts over the definitions of logistics and supply chain management (Mentzer et al., 2001). Regardless of the variance in viewpoint, with respect to the definitions both business practitioners and operations specialists realized that in order to boost their capacity to effectively and quickly respond to customer needs, they are required to look far beyond their own business to their suppliers, suppliers' vendors and consumers.

SCs are setting new and modern management principles into place to boost competitiveness. Only a handful of the current SC paradigms have to be pointed out in this article due to their relevance and better SC effectiveness: agile, lean, green, and resilient (LARG). The movement for sustainability has evolved from an elementary effort to protect the planet into an advanced and sophisticated industry (Naslund & Williamson). Responsibility for the environment has transformed from a trend into a commercial indispensable need in the majority of the organizations. In Table 1, some of the antecedents of the supply chain practices are listed. These practices rendered most effective during the times where the organization faced large interruptions, making the SCs more resilient practices.

SCM's growth and development are being fueled not just by internal motivations, but also by a variety of external causes such as more globalization, lower obstacles to international commerce, increased information availability, and environmental concerns (Lambert et al., 2005). Additionally, modern trends in Supply Chain Management are being encouraged by the introduction of computer-generated production schedules, the growing significance of inventory control, government regulations and activities like the formation of only one European sales, and The General Agreement on Trade and the World Trade Organization principles. To monitor and regulate the flow in operating systems, supply chain integration is required. Flow control of this type is linked to inventory control and activity system scheduling over a wide variety of resource and time limitations. In addition to flow control, an operating system must strive to fulfill broad competitive and strategic goals such as quality, pace, reliability, plasticity, and cost.

**Table 1 - Antecedents of LARG - SCM Practices**

PARADIGM	SUPPLY CHAIN PRACTICES
<b>Lean</b>	Just in time
	Relationship with suppliers
	Cycle / setup time reduction
<b>Agile</b>	Speed in responsiveness
	Modification in batch size
<b>Resilient</b>	Developing visibility
	Lead time reduction
	Demand based management
<b>Green</b>	Reduce variety of materials
	Reduce environmental impacts

The outcomes of the supply chain-enabled operations must be investigated against criteria to guarantee they accomplish the desired outcomes. Parameter values within the regulated order are constant. Parameter values within the unlicensed order remain changeable. The values of parameter can then be modified by certain reactive methods to increase the functionality or update the observed level to the specified value after the intended and actual parameter values can be compared. In one example, a study of the facility architecture might identify the primary cause of extended distribution times, costly transport and movement expenses, and inventory accumulation. Problems can be solved using suitable techniques such as re-engineering facilities, and close monitoring and subsequent upgrades can be made practical via study of the new design.

As a result, it is essential to have control over supply chain operations to improve performance, which may be done, at least in part, through measurement. Better SCM depends on clearly defined and controlled methods.

## 2. Literature review

### 2.1 Recent supply chain practices

The recently introduced phrase, supply chain, places emphasis on connections between marketing, logistics, and production. Opportunities associated with administering the supply network beyond the ethical borders of organizations, such as between businesses and their suppliers, are brought about through this phrase and its use. In order to emphasize the new prospects for channel efficiency improvement, this article discusses the evolution of logistics to determine how it is defined and used today. It has been demonstrated that supply chain management has assisted us migrate from an intra-functional to an inter-functional and even interorganizational view of the channel (Bala, 2014).

### 2.2 Issues in supply chain management

Executives in supply chain management (SCM) have particular difficulties in fusing supply chain-specific corporate objectives with the broader company business plan. The supply chain has risen in importance on the CEO's list of objectives in recent years due to shifting economic realities connected to internationalization. Nevertheless, such reasons aren't necessarily the best ones. CEOs frequently only take the supply chain into account when they need to lower costs or when things go wrong. Process efficiency on an international basis is crucial to efficient corporate operations since the supply chain essentially ships the organization's lifeblood (Lambert & Cooper, 2000). The significance of global incorporation to Multinational Corporations (MNCs) can be seen in the distinct competitive advantage that can result from their ability to take advantage of variations in capital and product markets, to disseminate knowledge and innovation throughout the organizational structure, and to manage the volatility of the fiscal or political circumstances in various countries or regions (Rathee & Deveshwar, 2010). However, the common perception of the business climate in the vast majority of businesses is that there is increasing rivalry and unstable economic conditions.

### 2.3 The need for change

The establishment of new digital markets and data-driven supply chains seeks to fundamentally change how information is shared, processed, and evaluated across many economic sectors in order to create value. This information-driven manufacturing revolution aims to boost output, democratize data exchange, and promote industrial expansion on a previously unheard-of scale. It has to be done to revisit the conventional transactional models and redesign distributed data storage systems to provide for improved data flows among various organizational units. Data is becoming a critical economic resource that, when coupled with new methods for processing and distributing it, might demolish bottlenecks in production, disrupt existing supply-chain patterns, and disrupt existing business models (Epiphaniou et al).

Inter and intra-generational equity within these constraints is then an ethical principle behind sustainability. The majority of interpretations of sustainable development acknowledge that there are constraints on long-term human activities imposed by energy and material being available and also by the capacity of the environment to absorb waste products and emissions (Clift, 2003). As a result, the three components of sustainable development—techno-economic, ecological, and social are identified. The development of indicators that represent these three characteristics and are relevant to industrial sectors, companies, and big groups of products or services are examined in this study. Environmental and economic performance indicators aren't

particularly widely known. Pairing them will show how environmentally friendly a certain product, service, or supply chain is more challenging to interpret are social performance metrics, especially those that represent the social worth of goods and services (Lambert & Enz, 2017).

#### 2.4 Transforming traditional supply chain

One range of items that no Indian buyer would like to buy without a thorough search and several rounds of viewing is jewelry. The buyer is not only faced with endless designs but also with the degrees of purity of gold (Ag) and a precious-metals – a case of *embarras de richesse* (an over-abundance of choice). Under certain circumstances, it appeared quite unlikely that Indian ladies would never contemplate buying jewelry online.

Yet, enterprising jewelers have come up with a solution whereby the power of IT is used to promote online sales and almost entirely transform supply chains. The trend is catching on fast and jewelers big and small in race.

#### 2.5 Potential advances

The CPFR methodology (collaborative planning, forecasting, and replenishment). A website-based system known as CPFR is said to have been developed to coordinate a number of operations amongst trade partners in a supply chain, including production and purchase planning, demand forecasting, and inventory replenishment (Fliedner, 2003). A committee was established by the voluntary Inter-Industry Commerce Standards Association (VICS) in 1998 to identify best practices and provide design standards that would be used for CPFR. Several companies took part in the verification and evaluation of CPFR with these processes and tenants in place. CPFR is now the third most popular approach for improving supply chain collaboration as a result of these initiatives. The goal of CPFR is to distribute certain internal data through a shared web server to deliver greater reliability. Regarding opinions of demand over a long-term basis within the supply chain. Both retailers and manufacturers stand to gain from boosted operational visibility in the supply chain, encompassing potential advantages like increased revenue, inventory savings, and enhanced service to clients (Harsono, n.d.).

A Supply Chain Management (SCM) framework was proposed as a new business model and a strategy to get a competitive edge by proactively managing important customer and supplier relationships. It was founded on the premise that organizations compete as members of a network of corporations rather than as autonomous entities. In fact, it is normal for companies to purchase from many of the same suppliers and sell to many of the same consumers, so the organizations that best manage these relationships win more often. The authors (Kurien et al., 2011) offered a framework of eight cross-functional, cross-firm business procedures that might be utilized as a new way to manage relationships with suppliers and customers in order to successfully manage key relationships across a network of organizations. It was based on research undertaken by a team of university academics in collaboration with a group of executives from non-competing enterprises who had been meeting on a regular basis since 1992 to improve SCM theory and practice. All business functions must be involved in the process implementation.

### 3. Performance measurement and metrics in SCM

#### 3.1 Metrics for planning of order

This approach regulates both how and what quantity of information about customer needs is shared along the entire supply chain.

#### 3.2 Duration of order

Total order processing time, additionally referred to as order delivery cycle time, is the time that passes between once an order has been placed by an end user to when the final products are handed over to the user. Reduced supply chain reaction time is an outcome of decreased order cycle time, which is an essential performance metric and source of business advantage. In order to figure out competitiveness, this correlates directly with the client service.

#### 3.3 Customer order flow

The path that a request moves is a further crucial statistic to consider when evaluating the amount of time spent in different channels. By examining how orders come in from prospects, non-value-adding procedures may be discovered, and measures undertaken to eradicate them.

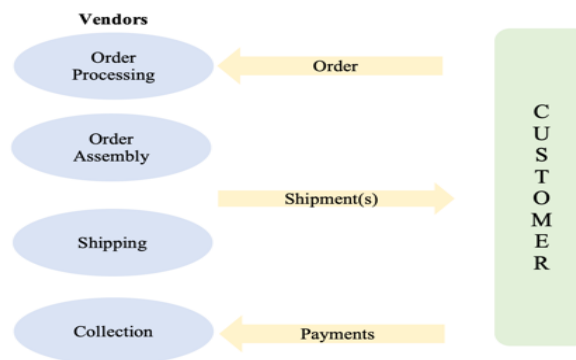


Fig. 1 - Customer order path management

### **3.4 Evaluation of supply link**

Price variation, returns upon receipt, and on-time delivery were traditionally used as the foundation for measuring supplier performance. For a while, identifying suppliers and products was mostly oriented on cost rivalry, with other factors like quality, dependability, etc. receiving less consideration. There has been an important shift of late towards taking a broader view of suppliers. Suppliers are evaluated in the context of the supply chain (effectiveness, speed, and transportation, unity, flexibility, and general client approval all plays an important role).

A few instances of indicators at the level of strategy are the comparison of lead time to standards set by the industry, the quality of products, the success of reducing expenses work, and the comparative advantage of prices offered from different vendors.

The effectiveness of the booking in techniques, revenue generation, assurance of quality methods, and potential flexibility are examples of tactical level measurements.

Measures at the operational level include possessing the ability to make relevant technical representations, stick to established schedules, eliminate complaints, and make deliveries guaranteed to be defect-free.

Supply management and purchasing ought to verify in on their suppliers' ability to meet the future of the business needs at periodic times. Pay close attention to the following: the supplier's general growth strategies; the supplier's future design abilities in important fields; the supplier's role in buying and supply management; the the vendor's possibility of subsequent manufacturing ability; and the supplier's financial capacity for sustaining this development.

A supply chain partnership is a cooperative arrangement in which the purchaser and a supplier recognize a certain level of dependencies and cooperation for a specific venture or purchase deal (Themistocleous et al., 2004)

Such a partnership focuses an intense emphasis on long-term, direct connections, which promotes collaborative planning and problem-solving efforts. Everyone has claimed that creating collaborations is vital for the supply chain functions as well as for efficient and successful buying. Partnership maintenance is equally essential. Simply assessing a buyer's or supplier's performance is inadequate; relationships also need to be appraised.

The factors that build and promote relationships ought to be considered into account whilst measuring them. As an example, the strength of supplier partnerships can be influenced by the degree of support provided in solving common issues. Such standards for evaluating partnerships are going to generate mutually beneficial partnerships that result in supply chains which are stronger and more fully merged.

### **3.5 Measures and metrics at production level**

The following step is to manufacture or assemble the products when the order has been created and the goods are procured (Singh et al., 2014). Owners of production facilities perform this activity, and the degree to which they do so has a big influence on the expense, quality, speed, and flexibility of the products they produce. Manufacturing has to be assessed and continuously improved since it serves an essential part in the supply chain. The following demonstrates fit the bill to determine production level:

#### **3.5.1 Product range and services**

According to Mapes, a plant that produces a wide variety of products is likely to introduce new items gradually than plants that produce a restricted variety of products. Wide-ranging manufacturing operations are likely to score worse in terms of speed, delivery dependability, and value created per employee. This demonstrates unambiguously how the variety of products influences supply chain efficiency.

#### **3.5.2 Capacity utilization**

According to the abovementioned claim, capacity has an substantial effect in determining the intensity of operations throughout a supply chain. Slack believes that among many variables affecting the effectiveness of production, utilization of equipment has an immediate impact on how quickly an organization can cope with customer demands due to its influence on mobility, delivery time, and speed of delivery.

#### **3.5.3 Scheduling technique effectiveness**

The timetable specifies the dates and times by which specific duties have to be completed. Such configuration dictates how running system assets will be sent out, which has an enormous impact on the effectiveness of manufacturing processes and, by extension, supply chain operations. As an example, timetable solutions like Just In Time, Materials Requirement Plan, and Enterprise Resource Planning have a direct influence on batch quantity, transit time, and buying. The supply chain planning ought to be seen in this illumination, since it is highly susceptible to changes with demand and vendor adaptation.

#### **3.5.4 Evaluation of delivery link**

Delivery is the supply chain link that has the greatest impact upon customers. As a result of the fact that it is an essential indicator of customer fulfillment, tracking and improving transportation is always preferred to boost competitiveness in the marketplace by its very nature, delivery occurs in an environment that constantly shifts, making it challenging to analyze and subsequently enhance a distribution system. It should be highlighted that it can be difficult to foresee how changes to one of a distribution structure's key components would have an effect on the framework as a whole (Gunasekaran et al., 2004).

##### **3.5.4.1 Delivery performance evaluation metrics**

According to Stewart, a decline in wait time qualities might lead to an enhancement of delivery performance. On-time delivery is a key aspect of delivery performance. On-time delivery reveals if perfect delivery occurred or not and also serves as a gauge for the caliber of the customer service. Christopher (1992) adopted a similar phrase, "on time order fill," and defined it as a mix of "delivery consistency" and "order fulfillment." The proportion of completed items in transit is a further aspect of delivery; if it is high, it indicates that the number of stock turns are low, and this results in unreasonably greater quantities of capital that remain bottled up. The vehicle's speed, the driver's trustworthiness, the frequency of deliveries, and the terminal sites are only a few of the elements that could influence the rate of delivery. Reduced levels of inventory can result from increased productivity across multiple sectors.

#### **3.5.4.2 Flexibility of delivery systems**

This pertains to flexibility in fulfilling a certain client delivery demand at a predetermined place, using a predetermined mode of delivery, and employing predetermined customized packaging. The type of expansion can affect clients' inclinations to place buying, making it important when engaging and retaining customers.

#### **3.5.4.3 Total distribution cost**

The establishment of efficient and cost-efficient distribution systems is the topic of what is possibly the most valuable logistics research now being conducted. To effectively develop and reevaluate distribution systems, it is crucial to have an extensive understanding of the whole cost of distribution. Thomas and Gryphon (1996) asserted that more active study is required in the field and underlined the significance of addressing transport costs given that they make up over fifty per cent of all logistics costs. Analysis of individual cost components together with their effects on customer service in order to cope with distribution costs encourages trade-offs that result in a more profitable and effective system of delivery.

#### **3.5.4.4 Customer service and satisfaction metrics**

An extremely satisfied and happy consumer is of the utmost significance to an elite firm. Customers in the modern supply chain may be worldwide or locally based, and in both cases, they must be carefully taken care of. The effectiveness of the supply chain approach is not able to be determined without happy customers. Customers' delight must be at the center of metrics related to supply chains if the effectiveness of the supply chain is to be monitored.

#### **3.5.4.5 Flexibility**

Agility can be taken into account to be one of the most significant considerations through which supply chains compete. Being versatile refers to having the flexibility to offer goods and services that meet each customer's specific needs that are 1. A measure of flexibility is the product development cycle time. 2. Machine setup time 3. Economies of scope (e.g., JIT slot size) & 4. number of Inventory rotations.

#### **3.5.4.6 Customer query time**

The amount of time it takes an organization to reply to a consumer's inquiry is an indication of the effectively the business runs. Customers frequently inquire about the status of their purchases, possible problems with availability of supplies, and delivery. It's crucial to give those inquiries an instant and exact response in order to keep clients happy.

#### **3.5.4.7 Post transaction metrics of customer care**

Supply chains keep functioning after the things are finally transported to the customer, demonstrated by the significance of post-transaction operations for client service and the practical input they provide that may be utilized to enhance the efficiency of supply chains.

#### **3.5.4.8 Supply chain and logistics cost**

The total logistics cost, an economical metric, may be leveraged to gauge the success of a supply chain. A supply chain's broad level tactics and activities that subsidize to the movement of goods must be evaluated for their potential financial consequences. Given that logistics span boundaries within functions, effort must be given to evaluate how actions that reduce costs in a particular field could impact expenses linked to other areas. For example, an increase or decrease in capacity has a significant impact on the costs of inventory and the processing of orders.

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## **4. Financial measures of supply chain performance**

Growing the supply chain surplus is the ultimate goal of supply chain. Supply chain profitability which facilitates an improvement in the financial performance of each member of supply chain. In this section, we define important financial measures that are reported by a firm and affected supply chain performance. In later sections we link supply chain drivers and associated metrics to the various financial measures. To illustrate various financial measures, we use the financial results reported in 2017 by Company X and Company Y which will be elucidated in Table 2.

For a shareholder perspective, return on equity (ROE) is the main summary measure of firm's performance,

$$ROE = (\text{Net Income (NI)}) / (\text{Average Shareholder Equity})$$

Where ROE measures the return on investment made by a firm's shareholder return on assets (ROA) measures the return earned on each dollar invested by the firm in assets. ROA captures the return generated by the firms operating and investing activities.

$$ROA = (\text{Earning before Interest}) / (\text{Avg Total Assets (ATA)}) = (\text{Netincome} + [\text{Interest expense} \times (1 - \text{Tax rate})]) / (\text{Avg Total Assets (ATA)})$$

For the financial results reported in Table 2 contains the evaluation of various financial metrics for Company X and Company Y. We have used 2017 numbers for averages, when analyzing the financial metrics. The difference between ROA and ROE is defines as the return on financial leverage (ROFL).

$$Accounts\ Payable\ Turnover = COGS / (Accounts\ Payable)$$

In 2017 Company X's APT of 2.48 was much lower than Company Y APT of 7.35. The small APT indicates X was able to use the money it owed suppliers to finance a considerable fraction of its operations. In 2017 X effectively financed its own operations for about 20.97.

$$ROA = (Earnings\ before\ interest) / (Sales\ Revenue) \times (Sales\ revenue) / (Total\ Assets) = Profit\ margin \times Asset\ turnover$$

Another useful metric is (C2C) which roughly measures the average amount of time from when cash enters the process as cost to when it returns as collected revenue.

$$C2C = -Weeks\ payable\ (1 / APT) + Weeks\ in\ Inventory\ (1 / APT) + Weeks\ receivable\ (1 / APT)$$

It is interesting to observe that the consumer electronics industry has an average C2C cycle of only 9.3 days analysis whereas medical device manufacturers average more than 200 days explained in Table 2

Table 2 - Selected financial metrics across industries 2000 – 2012

Industry	Avg Operating Margin	Avg C2C cycles (days)	Avg Inventory Turns	Avg SG&A Cost/Revenue
Pharma Industry	0.25	190.3	2.0	0.31
Medical Device makers	0.18	211.6	2.2	0.36
Consumer packaged goods	0.15	28.3	5.6	0.31
Food	0.17	37.4	6.2	0.23
Consumer Electronic goods	0.12	9.3	43.8	0.14
Banking	0.10	127.7	3.2	0.35
Chemical	0.09	78.1	5.3	0.09
Automobile	0.04	75.9	9.9	0.13

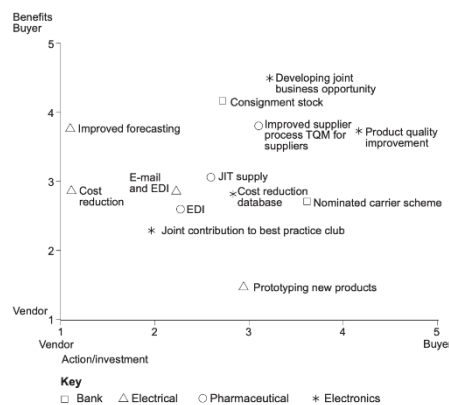


Fig. 2 - A 2D Analysis on new initiatives on supply chain improvements across industries

5. Cost linked with assets and ROI in supply chain

Payables, manufacturing units, wealth, & machinery, as well as warehouses, are a few instances of supply chain assets. With rising inflation and diminishing funds, businesses are under pressure to increase asset productivity—to make their assets work harder (Ushakov & Shatila., 2021).

In this regard, it is crucial to ascertain how each asset's cost in combination with its turnover influences the total flow of cash over time. Another way for dealing with this is to describe it as a typical amount of days taken to convert cash spent in equipment used into cash obtained from a client. Thus, total cash flow time could be considered as a statistic to evaluate the efficiency of a supply chain's assets. Once the entire cash flow period has been established, it is simple to combine this with the profit to reveal the amount of return on investment. The effectiveness of the highest levels is measured in terms of returns on the total capital employed in the company (Hsu et al., 2013). The cost to the supplier for purchasing products from the manufacturer is given as

$$PSMTC = \sum_{n=1}^n ((a, b))^n \sum_{n=1}^n TM^n \sum_{n=1}^n PSM^n(a, b) \times QG(a, b), TM \times (a, b), TM, n^n$$

Effective control of inventory in the supply chain is vital since customer service standards are always rising. The following are the parts of the total cost of inventory in a supply chain: Opportunity costs, comprising warehousing, financing, and storage; Inventory expenses at the level of incoming stock and

works in progress; Service costs, which involve managing inventory and insurance charges; Cost of finished goods, including those in transit; Costs associated with risk are those for fraud, fading, and damage, as well as those for scrap and rework. Cost of having insufficient supplies, which is responsible for regretted earnings and output.

### 6. Cost associated with the processing of information

User-input costs for orders, tracking of orders, order revisions, valuing modifications, and invoicing are all part of this category. Survey results from different industries show that the cost of processing information constitutes a significant portion of operational expenditure. From just facilitating broad, passive oversight through assets like libraries, IT has grown into a highly nuanced controller able to maintain tabs on activities and figure out the most efficient information flow. With the backing of current technology, distribution networks are getting more complex than initially expected. (Azfar et al., 2014).

This flow of information and the cost associated with it can be better understood by this process model given in Fig. 3.

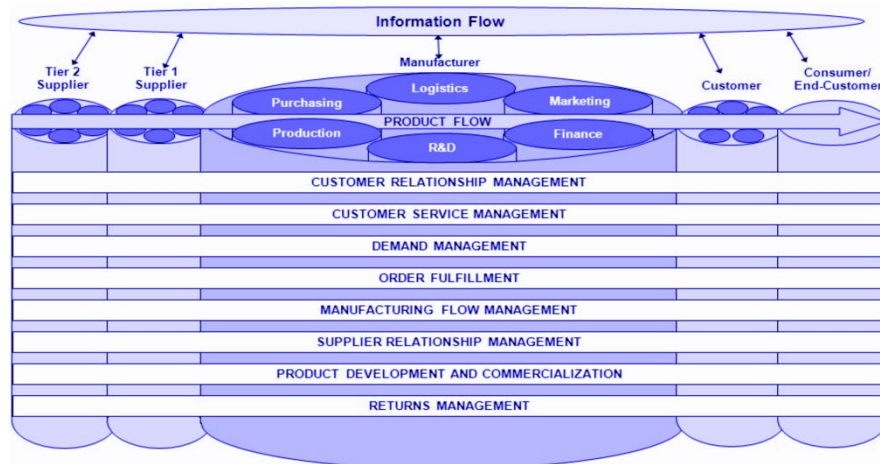


Fig. 3 - Supply chain business process mode Source:(Cooper-Lambert-and-Pagh-SCM-IJLM-1997, n.d.)

## 5. Findings & recommendations

### 5.1 Findings

Supply chain management (SCM) executives face unique challenges, with respect to integrating supply chain specific strategies with the overall corporate business strategy. A taxonomy of supply chain integration difficulties has been addressed by many studies. The challenge of system relationships can be used to categorize SC integration challenges; There are two sorts of interconnections within the SCM system: ones between single subsystems, and those connecting the Supply Chain system and the business strategy. This classification overlooks external obstacles that businesses might confront and instead focuses on technology concerns that arose as a consequence of the interplay between the SCM system and the company's own internal planning. (Estampe et al., 2013).

Plenty of barriers exist in a supply chain's ability to share information with one another. Aligning the goals of an array of partners is the initial and most important issue. Sharing knowledge and collaborating may not always increase a partner's profit, but it doesn't mean they ought not to try. In reality, every couple is cautious of the other(s) take use of shared expertise for personal goals via manipulation.

Along with to this information, we should also observe that most SCM placement models are mainly driven by financial considerations. A greater concentrate on comprehensive forward and reverse incorporation of Supply Chain Management operations is also necessary. (Soni & Kodali, 2013).

The proposed framework must address the following in order to an efficient model:

1. Adapting to constantly changing consumer demands
2. Minimize the delivery and logistics costs and to maximize sales
3. Mitigating and accounting for unforeseen delays somewhere along the chain
4. The expectation of innovation and raising capital for investment in technology
5. Global suppliers can result in a loss of control
6. Inflation at a global scale
7. Collaboration and syncing of data across the supply chain

8. Digital transformation

5.2 Recommendations

The most important component for the organization is structured resource allocation. In addition, employees and management must keep in mind that this notion might assist the organization in solving multiple logistical issues. After coming across so many literature reviews and strategies of supply chain management, we believe that the implementation of Just-In-Time has rendered it as one of the most cost-effective advancements in recent times.

**Just-in-time: a conceptual framework**

Implementation of JIT manufacturing generally requires relatively low investment and typically results in the following magnitude of performance improvement

- 90% - manufacturing lead-time reduction
- 90% - WIP inventory reduction
- 90% - lift-truck reduction
- 75% - machine downtime reduction
- 75% - defect reduction
- 30 to 50% - plant floor space reduction and personnel productivity performance improvement

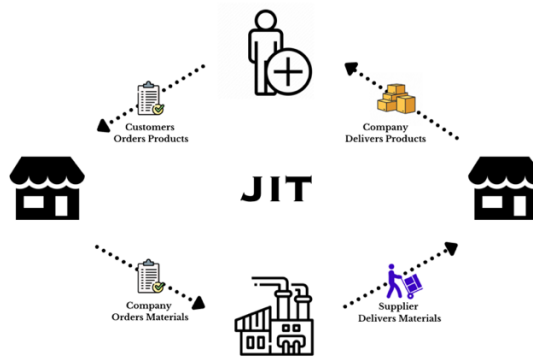


Fig. 4 - How JIT model works?

While it's true that JIT performance and development is an exhausting endeavor, it's also true that, if these obstacles are surmounted, a company may attain an extremely high degree of productivity. The JIT philosophy is merely a component of the supply chain that assists in keeping customers happy. That is to say, there are still problems with other management processes that the JIT framework cannot solve. A well-functioning organization requires an adequate staff structure as well as efficient workflow processes. The only way to boost business results is to work together. In a nutshell the JIT belief is an integral part of a bigger picture. (Aini Othman et al., 2016).

Fig. 3 gives us a conceptual framework of how a JIT system works and what all segments can be interrelated so as to provide maximum supply chain efficiency ensuring reduction in the space required for inventory and thereby the cost associated with it.

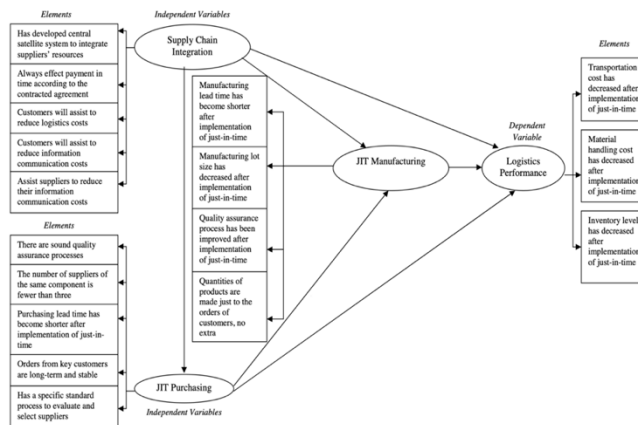


Fig. 5 - Just-In-Time conceptual framework



### *Advantages of Just-In-Time (JIT)*

1. Reduction of setup time in the warehouse - In this instance, the company might focus on different procedures that could need improvement.
2. Employees will work hard to accomplish the company's objectives if supplies are available around the clock, keeping workers efficient and firms focused on turnover.
3. Better time consistency and employee work hours consistency - if there is no demand for an item at the moment, workers do not have to work.
4. This can save the firm money by not having to pay workers for work that wasn't completed, or it could enable them to focus on additional duties around the warehouse that would not necessarily be done on a typical day.

In summary, all these points discussed above shows that JIT spikes up customer satisfaction and capital inflow and also reduces the occupancy of warehouses which helps the organization to get rid of depreciation of inventory (Folinas et al., 2017).

In addition, JIT also has the advantages of better quality of the product, greater efficiency, and lowered cost of production. Some of the major perks associated with the implementation of JIT includes:

1. Inventory reduction
2. Cost savings
3. Improved quality control
4. Faster response time
5. Enhanced supplier relationships
6. Increased productivity
7. Space optimization.

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## **6. Conclusion**

First of all, JIT reduces the cost of inventory through lower stock levels. Unlike conventional supply chain management procedures, which rely on big stocks as a buffer, JIT guarantees that resources and items arrive exactly in time for manufacturing or demand from customers. This eliminates the need for storage space, the expenditures associated with maintaining additional stock, and the risk of expiration or product degradation.

Secondly, JIT additionally enhances operational efficiency. JIT eliminates the need for excess work-in-progress (WIP) inventory by combining manufacturing timelines with demand from consumers. This results in improved methods of production, shorter cycle times, and higher throughput. It additionally allows better capacity optimization and allocation of resources, leading to reduced expenses and greater output.

Thirdly, JIT promotes assurance of quality and minimizing waste. Defects and faults are identified and corrected right away with JIT, preventing the creation of faulty products or improper utilization of materials. JIT creates a system of quality consciousness and motivates employees to take an active role in recognizing and resolving problems by emphasizing on continuous improvement.

Furthermore, JIT promotes strong ties with vendors and consumers. Close collaboration between supply chain partners boosts interaction, exchange of knowledge, and establishing confidence. Suppliers play an important role in ensuring timely shipment of supplies, while buyers benefit from quick order fulfillment. This collaborative approach produces lasting relationships and a more efficient and responsive supply chain. Overall, JIT is an extremely successful SCM practice when compared to traditional methods because of its capacity to cut inventory costs, increase productivity, minimize waste, and improve partnership with supply chain partners.

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