

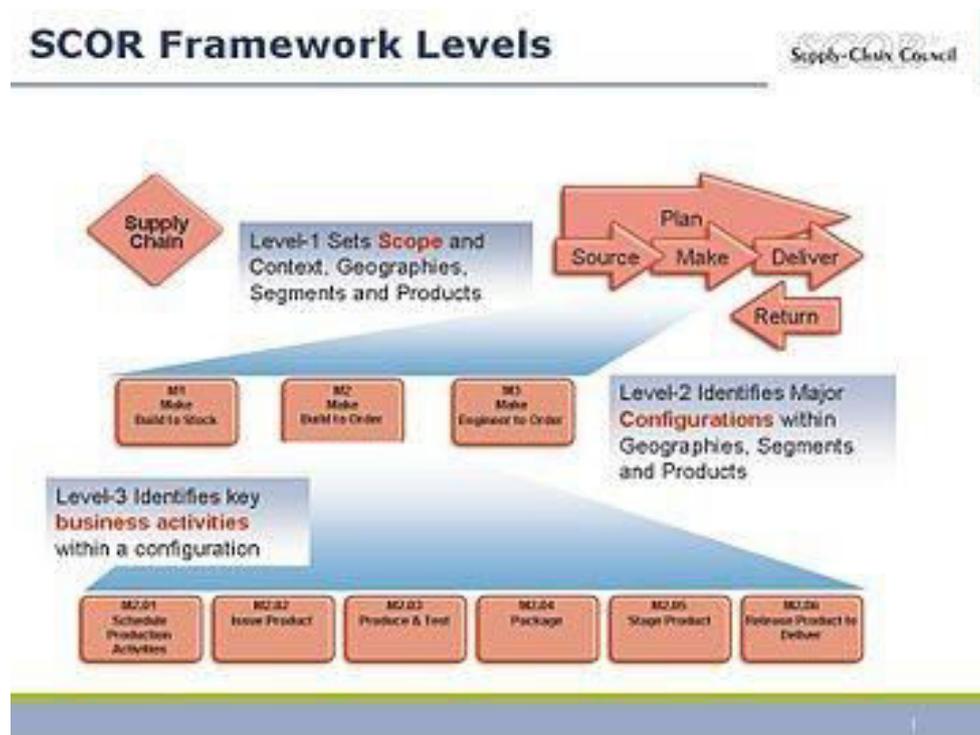
Supply Chain Management Practice in India

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Definition of Supply chain management and its evolution

The entire field of supply chain management has emerged from the contribution of supply chain working professionals such as procurement executives, stores managers, shipping and logistics trackers, inventory controllers, production planning personnel and many more who are either directly or indirectly involved in the manufacturing planning process. There is no common definition of supply chain management across the industry and each industry body, defines it in its own way. Associations alike claim supply chain management as their expertise. And to be fair, APICS, (**American Production and Inventory Control Society**), in its 13th edition, defines supply chain management as “the design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand, and measuring performance globally.”

SCOR Model



This is one of the simplest and tested theoretical framework for supply chain. Supply-chain operations reference (**SCOR**) model is a process reference model developed and endorsed by the **Supply Chain Council** as the cross-industry, standard diagnostic tool for supply chain management. The **SCOR** model describes the business activities associated with satisfying a customer's demand, which include plan, source, make, deliver, return and enable. Use of the model includes analyzing the current state of a company's processes and goals, quantifying operational performance, and comparing company performance to benchmark data. **SCOR** has developed a set of metrics for supply chain performance, and Supply Chain Council members have formed industry groups to collect best practices information that companies can use to elevate their supply chain models.

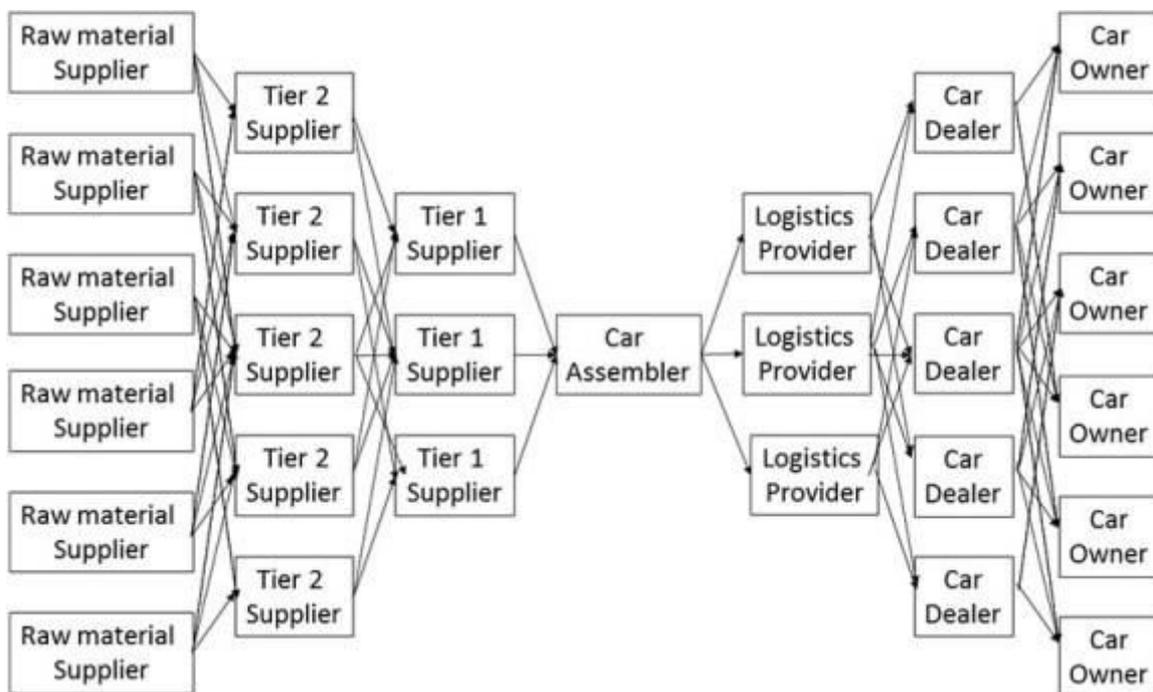
Treatment of logistics function

The *APICS Dictionary* also considers **logistics** which is a part of supply chain, as a physical activity of delivering goods, which is a part of end to end circular supply chain. Logistics in future would cover both forward and return logistics and the latter is likely emerge as a major area with increasing customer expectations and environmental norms. In essence supply chain management links, all activities to bring all stake holders together, in a circular loop. This can be seen from the following illustration



Usually it covers raw material movement from supplier and tracks till it reaches the customer, as a final usable product. This would also include information flow and money flow.

End to end supply chain



For example, in an automotive supply chain almost as a standard across the globe, the end to end supply chain begins from a car owner and the process is linked through the automobile dealerships distributed across the geography. These dealers are serviced through the logistics provider for getting the physical supply of products like cars in showroom condition by the car assembler. The assembler in turn is primarily supported through components and supplies from the sub-assembly vendors like alternator, starter motor, fuel pump suppliers who specialize in a particular component assembly. These suppliers are termed as Tier 1 suppliers. They have backward linkage with Tier 2 suppliers who in turn provide the required parts for making the sub-assemblies. Sometimes it can also extend to Tier 3 and Tier 4 suppliers in few cases before reaching the last stage, i.e raw materials supplier. An intricate web of a number of players dealing with a variety of materials, ranging from steel, aluminum, copper, rubber, plastics, chemicals and consumables together contribute to this value-adding chain. Many of the subassemblies themselves involve an intricate design and in quite few cases patented processes such as in the case of exhaust mufflers in the modern cars also exist. An illustration of this network of supply chain players is given below

Circular concept in supply chains

A typical buyer of a new car in a developing nation like India looks for many technical parameters in the purchase decision, such as styling, ergonomics, ease of servicing and performance on road. They also consider commercial parameters like brand image, purchase funding options and after market value for making a purchase decision. Increasing awareness and pressure from regulatory agencies to protect the environment is pushing the manufacturers to reuse or refurbish the

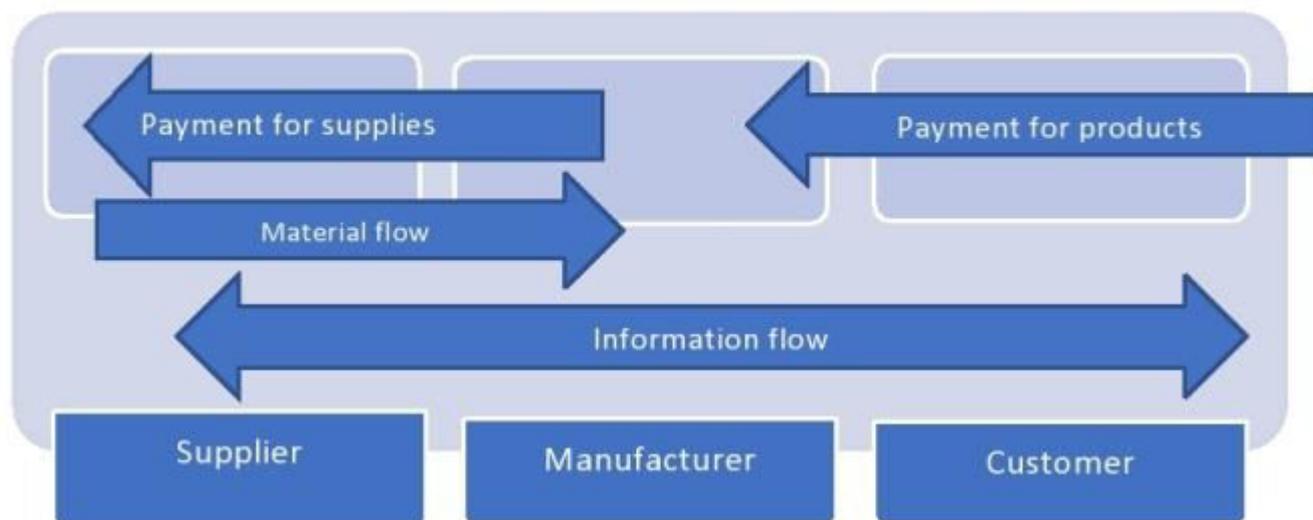
components to lessen the harmful impact on environment. Therefore, it can be said that the emerging supply chains of the future will start with the customer and end with the customer, **i.e circular supply chains**.

Illustrative examples

To illustrate with an example, a Swedish OEM uses one third of recycled re-cycled materials in assembling a new truck by their designs with 90% recyclability. Another OEM uses recycled aluminium which reduces energy consumption by 95%. A French OEM leases battery for electric cars. In India aluminium, is almost recycled fully as it has a well -developed scrap collection and disposal from both domestic and industrial waste. Even plastics are recycled but their waste collection is not as rigorous as aluminium.

Supply chain management essentially has three flows namely

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- the product and services flow which is normally unidirectional except in case of product returns and rejections
- the fund flow, i.e payment for the products and services received from the customer and in turn, payments effected to suppliers
- the information flow, which can be two directional i.e between the customer and manufacturer and supplier and manufacturer

Supply planning process

The first phase in supply chain management starts with supply planning process. In the supply chain operations, there exist three different environments, among the different products and services that are offered to end customers. They correspond to **Made to Stock (MTS)**, **Made to Order (MTO)** and **Continuous (Process)** methods of production. There is also a small variant in the Made to Order Category in cases where high level of design and customization are involved, which is termed as **Engineer to Order (ETO)** environment. Products like soaps, shampoos, consumer durables like Television, washing machines fall under the MTS category. In these categories demand is totally dependent on the manufacturers plans to utilize the available production capacity to the hilt. Even then, there is a complex product mix planning. This is necessitated due to varying consumer demands for various product lines and individual products. These are based on their brand image and seasonal demands due to factors like weather etc.

Normally, for MTS product category, batch production schedules are prepared and the products produced in batches are kept in inventory to meet the demand during the non-production period. In most cases, the products will be highly standardized without any customization and have low value per unit. The physical size also will be small which enables quick movement of inter depot transfers in case of sudden spurt in demand in certain locations. For supply planning, in such chains, there is very little involvement of the front-end customer facing dealer except to provide logistics services and commercial billing and delivery. Economical production in batch quantities and capacity utilization are the driving forces for supply planning in MTS environment.

Unique case of automobile industry

In the case of automobiles, even though, they technically fall under MTS category, the product mix variants can create lot of mismatch between customer demand and production plan, such as in the preference for a specific color, add-ons like power steering etc. In such cases, the data on anticipated demand from customers is continuously collected from dealers based on the footfalls in the car showroom, which is aggregated across the country. In all car companies in India, the demand for product mix is calculated in real time and countrywide ERP implementation across all selling points is considered as a must. Most companies have direct EDI interface with their Tier 1 suppliers and are gradually extending the electronic data interface to Tier 2 suppliers as well. This method of production, for stock purpose is called **“push” method in manufacturing**

Scheduling with Tier 1 suppliers

It may be noted that the supply chain planning process for a Tier 1 supplier does not follow automatically from the car assemblers plan. The reason is that the supplier in Tier 1 needs to cater to the dependent demand from the car manufacturers, which are mostly in the form of firm schedules specifying products, their quantities demanded and required delivery. However, the Tier 1 suppliers also cater to the independent demand that arises from the after-market. While it would be easy to forecast requirements for say the number of steering gears required for a new car under manufacture, as it is dependent on the production schedule of a car manufacturer, the same is not possible for the requirement of after-market for steering gear. The wear and tear in usage causes independent demand and is unpredictable as such. Besides the preference for the users of cars will vary widely with regard to utilizing the car due to individual perceptions and preferences, to replace them instead of repairing etc. In certain geographies, non-availability of skilled personnel to provide service could also affect the demand for spare parts in the after-market.

Preference for Pull manufacturing

This leads to a high level of uncertainty in demand planning for the after-market and coupled with early product obsolescence by the designers, can make the independent demand highly dynamic. In all such cases, the demand is directly linked to the customer pull or customer need. Planning accordingly is based on customer need which is either directly measured like in the case of firm orders or expected demand for example in a textile showroom, during peak festival season. Such methods of production are termed as **“Pull” manufactured** wherein, the manufacturing is initiated whenever there is a **customer pull**.

One of the key complexities in planning for supplies is due to the reducing product life cycles. Earlier, many decades back, typical Indian customers preferred to maintain their cars over 10 years, whereas the emerging customers keep changing the cars, between 3 to 5 years. Even the design of cars has provided for lowering of overall life of a car, since the older products may not be able to meet statutory compliance such as new emission norms like BSVI etc, in future, as they become dated.

Make or buy decisions

The second phase in supply planning is to decide between making the component inhouse or procuring it from outside. This is termed as make-or-buy decision, which indicates the strategic choice between producing an item internally (in-house) or buying it externally (from an outside supplier). The buy side of the decision also is referred to as outsourcing. There can be number of reasons for either making a product or buying it from outside. As a general rule, most companies want to focus their efforts on core activities to sharpen their core competence. Therefore, non-core activities become obvious candidates for outsourcing. However it does not always explain why some of the core components like a crankshaft or axles in the automobile industry are still outsourced. Make-or-buy decisions usually arise when a firm that has developed a product or part wants to move away from that product and assign the supply to a reputed supplier so that they can move higher in the value chain.

Automobile industry practice in India

Make-or-buy analysis is conducted at both the strategic and operational levels. Obviously, the strategic level is the more long-range of the two. Variables considered at the strategic level include analysis of the future, as well as the current environment. Issues like government regulation, competing firms, and market trends all have a strategic impact on the make-or-buy decision. Of course, firms should make items that reinforce or are in-line with their core competencies. These are areas in which the firm is strongest and which give the firm a competitive advantage.

It can be seen that the following core factors generally cause a decision to make a component or product themselves. They are some and not fully exhaustive.

- ✓ When cost is a significant factor in business the less expensive route of making is chosen
- ✓ Use of excess capacity so that part of fixed costs such as overhead can be shared
- ✓ Direct control over production/quality is needed to sustain the quality or brand image
- ✓ Protecting the proprietary design or technology from spreading over
- ✓ Unreliable supply market and questionable level of competence of key suppliers
- ✓ Control of lead time, transportation, and warehousing costs
- ✓ Greater assurance of continual supply and leveraging of stable work force

Issues in core technology in automobile industry

Lead time issues: Development of technology in automobile components in India, is beset with getting a joint agreement from different stakeholders like public authorities and Governments as it uses the roads which are public owned. It also requires approval from the apex regulatory agencies like ARAI Pune for getting in principle approval for newer technologies as the apex approving body, acceptable to all stakeholders. The automobile OEMS who carry the last word of approval, need to create space in the crowded market place in their product mix. They also need to match various subcontracted aggregates to perform in unison to deliver the final vehicle performance. In most cases it is the time that is more critical than the cost, as can be seen in the slow shift that has taken place in India towards higher performance vehicles as compared to bare basic products like the recently phased out Maruti 800 cc car by the manufacturer, as an example, which had ruled as the single largest product over last 30 years.

Development cost implications: In every case of product development, a component supplier in India, unlike his Japanese counterparts may not have the requisite funding base for new technology. Therefore, in many cases even when the stakeholders are well aware of the limitations of the existing product, for example in the carburetor driven gasoline engines system, a full-scale shift to fuel injection pumping, a technologically superior method may not take place, quickly. The larger issue of servicing the geographically thinly spread after-markets for supply of spare parts and training of the service personnel in the unorganized sector with new technology can really become a nightmare in logistics. This is one of the reasons that currently, the battery technology in vehicle operations is taking roots slowly even with a high level of interest by major manufacturers and Federal Government, to protect environment.

Supplier organization issues: Most suppliers in India have started their business operations from a small-time business startup or with limited public participation in the initial stages of business. Except few of the second or third generation established Tier 1 suppliers in the field like TVS business group in the southern India and Anand business group in northern India, many suppliers are located near their single major customer like Gurgaon in Delhi, where the first plant of the single largest manufacturer of cars in India- Maruti Udyog Ltd began their operations in year 1983. The next level of Tier 2 suppliers has difficulties in running their organization with professionals, as their ability to attract skilled talent in India is limited. The younger generation managers also tend to shift towards career in non-auto fields like information and communication technologies which offer quicker growth and shorter lead times to acquire new skill-sets needed for that sector. In a typical automobile Tier 2 supplier organization, a freshly inducted executive becomes really productive only after a number of years as he/she requires ability to operate under scaled down conditions like managing limited supply base, geographically spread markets, stifling local regulations such as labor market hiring inflexibility etc., which are unique to Indian market.

Outsourcing decisions

The decision to outsource is strongly preferred when

- The part is not essential to the firm's strategy and lack of expertise to make it in-house
- Suppliers' research and specialized know-how exceeds that of the buyer and at lower cost
- Limited production facilities or insufficient capacity inhouse
- Difficulties in procurement and inventory considerations
- Supplier company has strong brands

Outsourcing due to unrelated technology

Many times, technology itself becomes an issue. Even in the same category of a product, take the case of tires, their application varies widely from a simple bicycle to most advanced aircraft landing gear tires. While they may have few common material ingredients, the technology is quite different and it varies across different products. For example, in the case of cars which operate under high road speeds continuously, with limited load, the cornering characteristics of tire are most critical and hence radial tires as compared to cross-ply tires in principle, may get a preference by the automobile manufacturers in procurement. Whereas in the case of bicycle tires the market for which is fully distributed across the Indian retail space, price is the single most determining factor. Therefore, in the case of cycle tires manufacturers, necessarily they have to outsource to get the entire product supplied by a least cost vendor and the other factors like quality, delivery and service in the supply chain take secondary importance. In the case of SUV vehicle tires, the quality assumes

the highest significance as the products are under keen public eye and most of SUV vehicles are used as status symbol brands in India and the best brand available is procured

In the case of car tires, the major delay in India in introducing radial tires in a big way was due to the resistance from the after-market which had significant volumes and had high preference for the older technology. The reason is that the older technology of cross-ply tires enables reconditioning of used tires with retreading to extend their economic life. Due to strong patronage for this feature by a number of users, for retreaded tires in preference to higher cost new tires, the after-market shift to radial had been slow. This preference is not applicable to both bicycle and aircraft tires in principle itself, as retreading in both cases have no takers.

In- between category in outsourcing decisions

The most difficult part in the make or buy decision by Indian automobile assemblers, is the in-between category. While the crank shaft for example, a highly technology driven and capital-intensive component is fully outsourced, the gear manufacturing an equally critical component is mostly manufactured in-house, as the criticality of performance of later is immediately visible in the market and that acts as the single-most important factor. The in-between category say camshaft which is not as critical technically as a crank shaft (as it does not take direct explosion of the combustion process in engine) it may make sense to outsource, but the commonality of process with crank shaft may result in manufacturer to make it in house as well.

Few products like auto-electricals for example require a high degree of technical specialization which is possible only by those who are competent in it. That is why companies like Bosch, Lucas TVS are used as vendors for electrical components who have the technology, global spread and volumes to supply.

Now we come to another in-between category in low value addition. In the case of automotive chains, it is a critical performance product with low technology. For two wheelers it is most critical for performance and without exception only the technically sound vendors like TI Diamond Chain and LG Rolon Chains are the known suppliers, preferred by the two-wheeler manufacturers. However, a number of processes, within the automobile chain manufacturing are labor intensive in the various stages of chain manufacturing. While it may be desirable to outsource the entire product line, to a third-party manufacturer, they would not be able to match the quality standards of large organizations like Murugappa Group or LG group in India. Therefore, they leverage their existing competence in developing external supply network by permitting contract manufacturing in select areas like chain link assembly etc, within their manufacturing facilities using limited contract labor, which are labor intensive processes.

In the case of cycle frames, which is a super critical factor for bicycle performance, TI cycles of Murugappa group in their second manufacturing green field plant at NOIDA in UP near Delhi, have positioned their single supplier for cycle frame assembly in NOIDA, adjoining their manufacturing facility. In fact, the out gate of the supplier is positioned just in front of in-gate of TI cycles assembly line in the manufacturing plant. This not only makes material movement easier, but reduces inspection needs. It offers high flexibility in manufacturing to make instant changes in product mix planning in daily manufacturing schedules. Therefore, in automobile component and assembling industry in India, contract manufacturing has turned out to be an in between category of both Making (for some processes) and buying from outside (shifting part of work outside).

Value Analysis and Value engineering application

Most automobile OEMs jointly work with suppliers to ensure a year on year cost reduction agreement in procured components. This is possible only when value analysis is carried out continuously to explore minor changes in design parameters or in the manufacturing process. Since material cost accounts for more than 60% of the cost of component, reduction in material use or alternate material selection at a lower unit price or a change in design parameter either in the design itself or by changing processes this can be enabled. Sometimes the performance of two components can be combined by redesigning and replacing them with a single component, saving significant costs.

Strategic sourcing as a supply development strategy

Increasingly strategic sourcing is utilized as the best choice for the critical supplies of automotive components. Most manufacturers, operate with “ Just In Time (JIT)”strategy for supply replenishments in their assembly lines. This is necessitated by the high speed of manufacturing wherein an assembly line almost produces one car every two minutes. In such a critical speed of operation, it makes sense to make institutionalized arrangements in purchasing with commitments made and executed on a long-term basis. Many critical components, that require high capital investment may not undergo significant design changes and a continuous improvement by an existing supplier can meet the requirements over a period of time. But that requires commitment from both buyer and seller and strategic source as a strategy helps in this process. Many times, strategic sources are also single sources creating mutual dependence and consequent trust-building.

Conclusion

To sum up automobile industry in India had to evolve its own processes in supply planning due to customer practices and supplier issues. This becomes more relevant even when new technologies like electric vehicles get introduced as a number of components like battery for example may require an understanding of user preference in advance in supply planning for manufacturing of these vehicles. This coupled with the issue of likely statutory regulations for used battery disposal will need to be addressed even at the concept planning stage in supply development.

About the authors



Mr. V. Ramachandran, is a professional management consultant focused on providing services to MSME sector of India. He is in the honorary advisory counsel of the MSME ministry in the Govt of India, for supporting the ministry of industry of Tamil Nadu Govt. He is certified as a Master trainer by the Logistics Sector Skill Council of National Skill Development Corporation, to develop trainers across India meeting NSQF quality framework. He is certified for international consultancy by WTO and for training in NLP (Neuro Linguistic Programming) by Dr. Richard Bandler, USA the founder of NLP. He is qualified with B.Tech from I.I.T. Madras and MBA from I.I.M. Calcutta. He was a field marketing professional for - Toyota, Ashok Leyland, BHEL and L&T, with 40 plus years of experience in Engineering, Automobile, Service and training, teaching and consultancy. He was formerly member Board of Studies in Sri Ramachandra Medical college in Hospital Management. He conducts a number executive skill development programmes across India. He currently coordinates Executive Development Programmes at IIMM Chennai Branch and member Board of Studies in AMET Maritime and Logistics University.



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7 Reasons Why the Supply Chain Matters to Business Success

Whether you are the CEO of an expanding corporation or the owner of a fledgling enterprise, its fortunes are subject to an undeniable truth. The success of your business links inextricably to the performance of your supply chain. If you want business success (and who doesn't?), you have to make your supply chain successful too. Of course, it is helpful to have some statistics on hand to validate the statement above. First though, since the topic is "business success", let's be clear on what that looks like.

<https://www.logisticsbureau.com/7-reasons-why-the-supply-chain-matters-to-business-success/>

Blockchain Technology is Set to Transform the Supply Chain

Supply chain has become complicated. Some would say cumbersome. It takes days to make a payment between a manufacturer and a supplier, or a customer and a vendor. Contractual agreements require the services of lawyers and bankers, each of which adds extra cost and delay. Products and parts are often hard to trace back to suppliers, making defects challenging to eliminate. Friction in the supply chain is a big problem. There are too many go-betweens. There is too much back and forth. The rise in uncertainty stops supply chains from working well. Suppliers, providers, and clients must interact via central third-party entities instead of directly with each other. Ostensibly simple transactions turn into lengthy multi-step procedures.

Blockchain could be the answer to many of these issues. This recent technology is what drives Bitcoin and other so-called cryptocurrencies. However, it goes much further than an unhackable way of holding and exchanging money. Blockchain can manage any form of exchange, agreement, or tracking process. In a supply chain, it can apply to anything from self-executing supply contracts to automated cold chain management.

<https://www.logisticsbureau.com/how-blockchain-can-transform-the-supply-chain/>