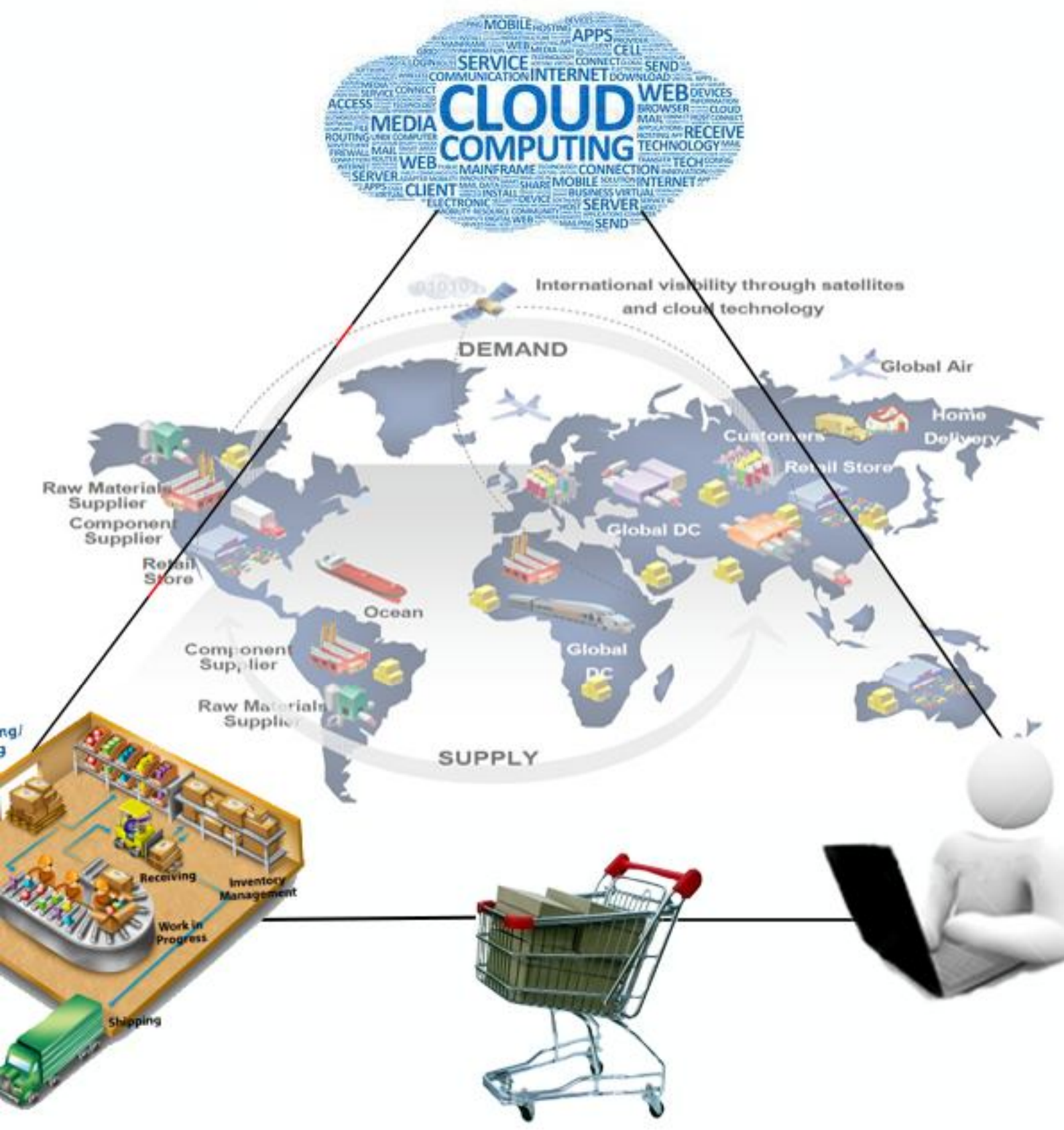




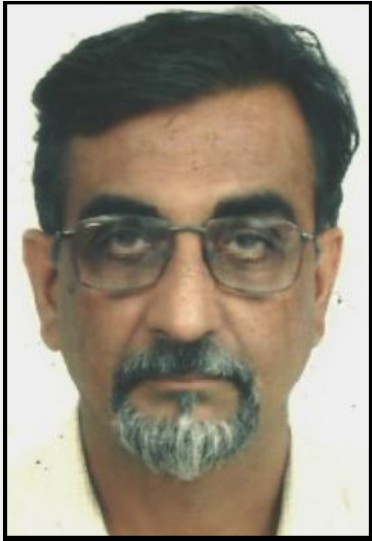
# OPUS

## A Supply Chain Magazine by NITIE, Mumbai



# Convener's Message

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**Prof. Harsh V. Bhasin**  
**Convener, OPUS**  
**NITIE, Mumbai**

For years, human mind has been boggled by the constraints of operations in lieu of logistics and in the Indian forefront, NITIE has been the vanguard. Propagating the tradition passionately and descriptively, NITIE collaborates with the thoughts of the leaders in the industry, faculty across the globe and with the students from various esteemed institutes to bring out the best of the invaluable knowledge on the back bone of the industry, The Supply Chain Management.

Chain-to-Excellence (C2X) has been the major stakeholder in conducting some of the most challenging supply chain competitions, organizing enlightening sessions from industry leaders and with its novel initiative – The OPUS. OPUS aims to bring forth the most challenging business situations and practices in the field of Supply Chain Management, and initiate intriguing thoughts in the students to make excellence a habit for all its readers.

OPUS (Vol 1 – Issue I), has laid the foundation to build up and strengthen credentials of a fabulous source of knowledge, and timely herald of news and happenings in the world of supply chain management. OPUS (Vol 1 – Issue II), intends not to be just a magazine but to be a reference and a case guide to students in the arena of supply chain management. It is here to act as a bridge for industry problems and the very coveted ideas sought by the evolving Industry in the rat race to lead.

I believe that Team C2X will continue its chain of unfolding the most innovative ideas to enlighten one and all in the fields of SCM and keep glorifying the institute in this unending quest for excellence. I congratulate the efforts behind this wonderful creation and wish all the readers that their chains to excellence start right here!

# From the Editors' Desk

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Extensive globalization & subsidiarization, shorter operating cycles, pressurised top-lines and tougher competition have become the order of the day for businesses in the past year.

The move to allow FDI in retail is expected to give a major fillip to the economy by easing supply side pressures and easing inflation. As global retailers get down to set up sophisticated back-end and supply chain systems, we take a look into the new developments expected in the field of Supply Chain Management.

In addition to these prevalent trends, another significant trend seems to be emerging in the field of supply chain management – A Supply Chain powered by Information.

As supply chains become increasingly complex and global, in order to respond to the changing needs of the customer, avant-garde companies are abandoning rule of thumb in favour of adopting advanced IT tools and technologies in the supply chain.

With the advent of cloud and increasing acceptance of technologies like RFID, it's time we take a moment to review the exciting opportunities these technologies present to in increasing visibility in supply chains. Visibility provides the impetus for increased collaboration between different stakeholders and ultimately results in a supply chain that is agile and aligned to the changing market demand.

Increasingly, 'Information' is being viewed as pivotal in making supply chain decisions because it provides the global scope needed to make optimal decisions. To this end, we try to explore the upcoming field of Supply Chain Analytics. By employing Analytics, organizations can bust knowledge silos, and integrate information across the supply chain, thereby gaining a 360° view into supply chain issues and opportunities. They would then be able to design supply chains that are truly agile, adoptable and aligned.

In our endeavour to be the harbinger of the latest trends in the Supply Chain domain, we, C2X(Supply Chain Interest Group of NITIE), present to you the Second issue of Opus, the supply chain magazine.

We express our sincere gratitude to Professor Bhasin, for his guidance in bringing out this magazine.

## Team — Chain To Excellence

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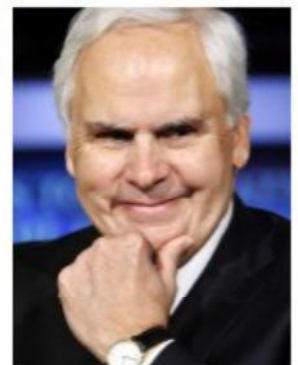
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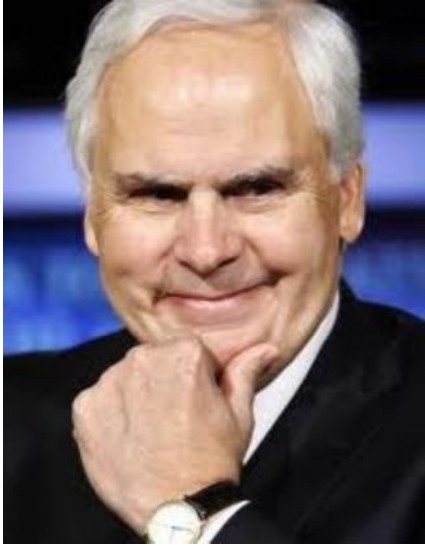
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# Personality of the issue — Fredrick W. Smith



*"You absolutely, positively have to innovate-if only to survive."-Fred Smith*

Who would have thought that a concept in an economics paper declared unfeasible by a Yale professor would turn out to be the world's first overnight delivery company changing the transportation industry forever. The paper was presented by a college kid named Fred Smith who later became the founder of Federal Express Group, the no. 1 overnight shipper in the world, delivering more than 3 million packages to nearly 210 countries each working day. Despite numerous competitors, FedEx is still the leading player with a 44% share of the air express market. Its fleet of 645 aircrafts and 71,000 trucks carry an average of 5.5 million shipments each day.

Fred Smith belonged to a family of transportation. His grandfather was a steam boat captain, and his father built from scratch a regional bus line that became the Southern backbone of the Greyhound Bus system. Fred's stint as a charter pilot during his teenage years gave him the insight that led him to revolutionize the delivery business. He noticed that he was also frequently ferrying spare parts for computer companies such as IBM that didn't want to wait for the passenger airlines to get critical components to customers. This single observation brought Smith back to the overnight delivery concept he had hit upon in college. Determined to make it work, he came up with a plan for creating an integrated air and ground delivery system in which packages from all over the country would be flown to a central point, or "hub," sorted, and then flown out again along specific routes, or "spokes" to their destinations. Under this "hub and spokes" system, the flying would be done at night, when airplanes were comparatively empty. The airports used would be in sizable cities, and trucks

would carry the packages to their final destinations, whether in those cities or smaller communities. With \$4 million inherited from his father and \$80 million from venture capitalists, he set up Federal Express Corp in 1971. Its promise: guaranteed overnight delivery of critical goods between any two points in the 11-city network that Smith created.

The concept though being ahead of time was hardly an overnight success. Ready to launch the service from Memphis on March 12, 1973, Smith secured just seven packages for the first night's run. He sent his salesmen back into the field, more than doubled his network to 25 cities, and re-launched the service a month later -- this time handling a grand total of 186 packages. Apart from the miniscule initial volume, another big obstacle that FedEx faced was the postal monopoly that lasted till 1970s. Moreover, onerous airline regulations at first restricted it to flying tiny Falcon jets. Because of rapidly inflating fuel prices, costs surpassed revenue, and by mid-1974, FedEx was losing more than \$1 million a month and was even denied a viable business loan. Smith's desperation led him impulsively to take the company's last \$5,000 to a Las Vegas Blackjack table where he won \$27,000 and the money was wired back to FedEx's account.

Smith's persistence paid off. By the late 1970s, America came to rely on the ability of FedEx to deliver goods overnight -- be it spare parts, urgent business documents, or 11th-hour birthday gifts. Merrill Lynch & Co. executives even discovered that employees were using FedEx to deliver documents between floors of its Manhattan headquarters building because it was faster and more reliable than the interoffice mail. By the time FedEx went public in 1980, its revenue had zoomed to \$415.4 million and profits soared to \$38.7 million. From then on, it was smooth sailing for FedEx. These days, FedEx is an anchor of the just-in-time deliveries revolution -- its planes and trucks serving as mobile warehouses -- that has helped companies around the globe cut costs and boost their productivity. The logistics service now contributes the lion's share -- 92% -- of FedEx' \$26 billion in annual revenues.

Fred Smith was told that it couldn't be done. But Smith followed his gut feeling, and single-handedly changed the way the world does business.

# RFID in Supply chain: Improving turnaround time of Fleet by vehicle tracking



V.B. Khanapuri  
Associate Professor  
NITIE

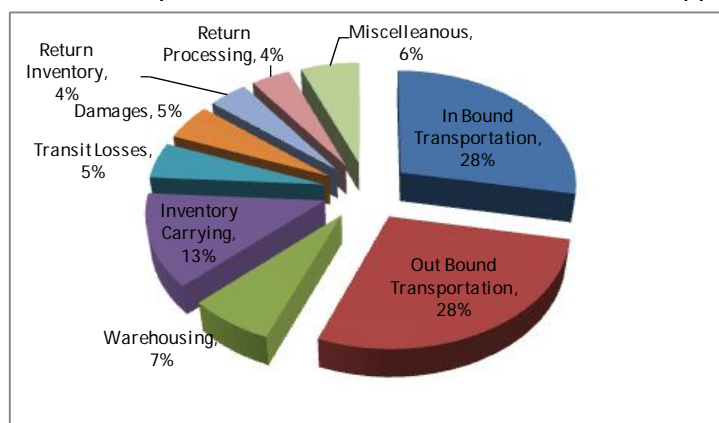


Anuj Bhansali  
2<sup>nd</sup> Year student  
NITIE

## Introduction

Executives of supply chain today need to focus on five dimensions: cost containment, operational visibility, risk management, ways to enhance customer intimacy and opportunities of revenue growth due to Globalization. However, the rising supply chain costs have been impacting the bottom line of all. This is especially true in the Indian context where the logistics costs are in the range of 10-14% of total cost. Within the logistics cost, transportation cost is a major contributor and most organizations have been trying to address this concern.

In the below chart we can see that transportation alone costs more than 50% of total supply chain cost. Supply chain cost can only be decreased when focus is on all the supply



chain growth drivers simultaneously. These growth drivers have been identified as Facility, Inventory, Transportation, Information, Sourcing and Pricing. If we talk about transportation cost, turnaround time of trucks may have a significant cost in various routes- especially for shorter routes because of more non value adding activities. Organizations try to reduce their loading/unloading and transit time to reduce their turnaround time. This can be achieved by optimizing warehousing processes and minimizing waiting time for the trucks. Idle time in the manifestation process can be drastically reduced by the use of radio frequency identification (RFID) technology – an e-tagging technology that can be used to provide electronic identity to any object. RFID is now being widely used within the organization and well as between the organizations to optimize their fleet utilization.

## RFID in Supply Chain

RFID technology is being used in a range of applications, including access control to buildings, document tracking,

livestock tracking and identification, vehicle security, pay-at the pump gasoline sales, product authentication, retail outlets, sports timing, ticketing, wireless payment etc. Also, RFID technology is being used in shipping and distribution industry where it enables suppliers to accurately determine the location of a pallet, to track its journey through the supply chain. In retail industry – this technology has significant advantage to offer over bar coding as it enables the information about the movement of the product through the supply chain till it leaves the point of sales.

Similarly, in Manufacturing industry RFID is being used for product tracking where the parts can be individually tagged and tracked throughout the manufacturing process while on the production line. Also the parts received from the production plant can be tracked throughout the assembly process which has helped the manufacturers with their carefully scheduled Just-in-Time (JIT) assembly lines.

RFID is also being used by Indian government in various projects:

- The Ex. Minister of Road Transport and Highways, Government of India, Mr. T.R. Baalu launched a pilot project for radio frequency identification (RFID)-based vehicle tracking project on the Delhi-Jaipur highway. Under the project, 68 buses of Rajasthan State Road Transport Corporation (RSRTC) plying on the highway have been fitted with RFID tags and readers have been placed to track the vehicle movement along the highway, whereby their movement is being tracked, monitored and managed
- The Centre for Railway Information Systems (CRIS) of Indian Railways plans to use Radio Frequency Identification (RFID) technology to improve the wagon management system of the Railways. CRIS proposes to have a RFID tag or chip embedded in all the wagons and provide sheds with hand-held devices that would read these chips and thus register the data

As we see the prevalent use of RFID in various industries (Agriculture, Cattle and food production, Health care industry, Pharmaceutical Industry, Government, Gaming and Security industry etc), one industry that offers huge benefits from RFID is the transportation industry. And, in transport industry, fleet management is very challenging especially for the organisations which have large fleet and need to be effectively utilised. Fleet Tracking can be done with the help of GPS, GSM Devices or RFID. Each technology has its own

advantages and disadvantages which are briefly discussed below along with brief overview of the RFID technology. A case has been presented with regards to applicability, benefits and the challenges that an organization can derive by implementing RFID.

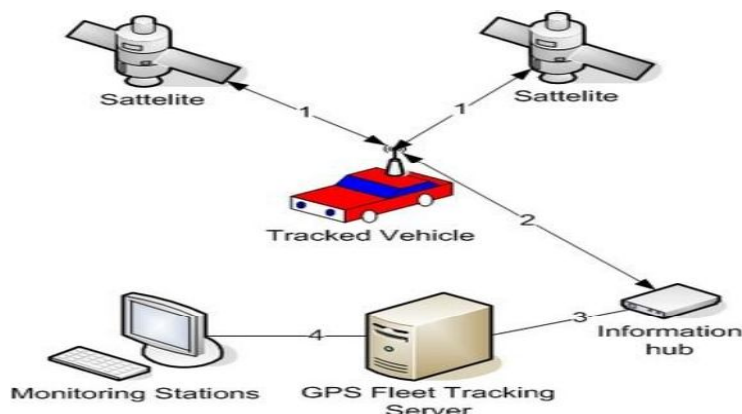
### Vehicle Tracking – Different options

Several types of vehicle tracking devices exist. Typically they are classified as "passive" and "active". "Passive" devices store GPS location, speed, heading and sometimes a trigger event such as key on/off, door open/closed. Passive systems include auto download type that transfer data via wireless download. "Active" devices also collect the same information but usually transmit the data in real-time via cellular or satellite networks to a computer or data center for evaluation.

Historically vehicle tracking has been accomplished by installing a box into the vehicle, either self-powered with a battery or wired into the vehicle's power system. For detailed vehicle locating and tracking this is still the predominantly used method.

### Comparative analysis

#### GPS based Fleet Tracking

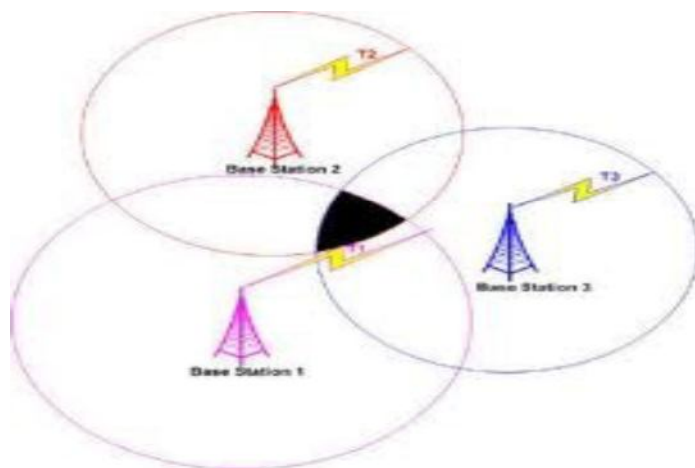


It is the most common method to track vehicles. It consists of a GPS receiver mounted on the truck and a GSM based connection to transmit data through the net to a web portal to be accessed on any internet connected system. The setup requires a line of sight for the satellite and hence works only with an antennae mounted on top of the truck. This system delivers the most accurate location based service along with vehicle speed and acceleration. This system is also the most expensive and can cost anywhere between 12000 to 15000 INR for each truck.

#### GSM based Tracking

This is a method which gives intermittent locations of the truck based on cell triangulation of mobile towers. The mobile uses signal from 3 towers to accurately give a position of the mobile. However this technique is available

only with the cell phone operators. A simpler version of this application is used by application developers to give a location by switching of the tower signal in the mobile. As we pass through tower range the mobile switches through towers giving a unique tower id which can be used to determine the position of the phone. However this requires the mobile to have an application installed and is possible only on phones with an operating system that is capable of installing such applications. Thus it limits our option as it would involve upgrading of the mobile handset on the driver end.



#### RFID based Fleet Tracking

The system relies on interval data and since the path is fixed it works on average travel time and average speed to compute vehicle position and location. For our application we need the time stamp of exit and entry at various points to analyze the data to prompt the system for approximate arrival time. The reader reads the information of passing truck at various points along the route and maps it accordingly on the route to calculate the approximate position.

Depending on the requirements of the organization and the constraints imposed on the system, it is proposed to examine and understand this technology of RFID and explore its application in the context of an organization. Brief details of the RFID technology along with its deployment in the context of an organization is presented below

### RFID Technology

Radio Frequency Identification (RFID) devices consist of tags and readers that assist in the tracking of goods and vehicles. Tags are the devices that give identity to the vehicle and work like a wireless name plate. They transmit their identities to readers which are placed at strategic locations like entry/exit of a premise, highway, weighing bridge, parking lots and others. Readers pick these signals up and transmit them to the centralized data servers from where the information can be viewed or utilized anywhere. The



read-range of the reader varies up to 40 feet depending upon the technology in place.

An RFID Tag is a transponder which receives a radio signal and in response to it, sends out a radio signal. Tag contains an antenna, and a small chip that stores a small amount of data. To communicate, Tags respond to queries by generating signals that must not create interference with the readers, as arriving signals can be very weak and must be differentiated.

RFID readers are radio frequency transmitters and receivers controlled by a microprocessor or digital signal processor which communicate with the tags. Readers using an attached antenna capture data from tags and then pass the data to a computer for processing. In passive Systems, the reader transmits an energy field that “wakes up” the tag and provides the power for the tag to operate. In active systems, a battery in the tag is used to boost the effective operating range of the tag.

Data collected from tags is then passed through cable or wireless to host central for interpretation, storage, and action.

## The Business problem: A pilot project on RFID in Fleet Management

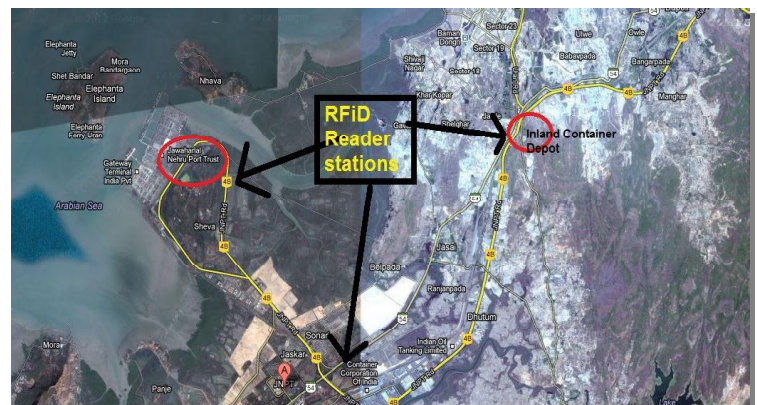
### Brief overview

Manufacturing and Service organizations are under constant pressure to enhance their performance due to competitive pressures as well as improve their bottom line performance. With the growth in the economic activity, there has been a steady rise in the imports leading to increased traffic in the ports. These opportunities have been seized by different business houses by setting up business in the different links of value chain such as transportation of container traffic from the ports, Container Freight Stations (CFS), Inland container depots, Customs clearing agency etc. However, there has been increase in the pressure on each link of the value chain to enhance its performance. Due to involvement of manual processes, the company finds it difficult to determine the exact cycle-time for a vehicle carrying goods from the factory to a particular destination and carrying raw material as a return load back to the factory.

The context presented is of one of the Container Freight Station (CFS) located about 50 km from the JNPT port on the western coast and is very close to Mumbai. With the increased level of activity in terms of imports and exports there has been a spurt of growth in terms of many organizations setting up their business and vying for a share of business. These companies operate for different shipping lines. When a vessel carrying containers arrives at the port, depending on the arrangement with the different CFS;

containers have to be evacuated within 72 hours after the port authorities give the clearance. Thus, to be competitive, most CFS operates a fleet of their own. The company under consideration has 150 trucks at present to undertake delivery of containers from the port and transfer these containers to its yard at CFS. After 72 hours, the penalties involved for every hour are huge. The client in order to move the containers from the port at the earliest employs higher number of trucks than optimum as neither the current location of trucks is known nor the schedule planning can be done in advance to achieve the maximum fleet utilization.

The trucks take approximately 5 hours to reach from JNPT to CFS and 3 hours in the return journey when they are not loaded. With the rotation of drivers and shift timings a single truck can make up to a maximum of 3 round trips per day. Due to non-availability of information with regards to the trucks’ location in the present scenario, many trucks are left unaccountable. Currently the organization has no specific approach to understand the status of truck and ascertain the time taken by trucks and the reasons associated with any delay. Also, no knowledge regarding the status of the consignment is available, which leads to deviations in vehicle requirement planning.

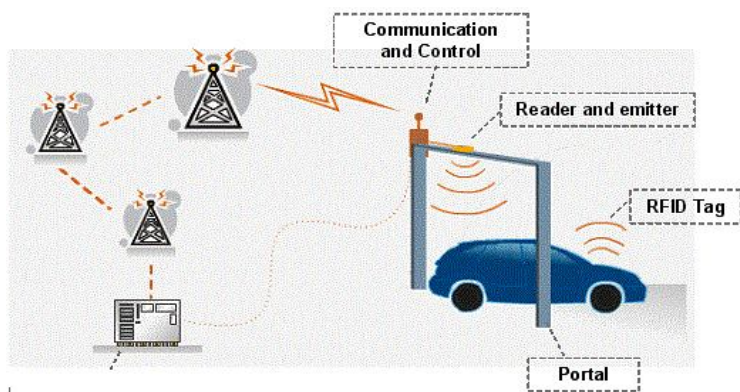


Thus, the organization needs to enhance its fleet utilization which is probably one of the best cost-containment strategy because it ultimately reduces the size of the overall fleet. A smaller fleet generates lower costs as it requires fewer maintenance technicians and less money for parts, vehicle replacements, and fuel.

However, the challenge for the organization is to ensure the availability of vehicles at the required place and time. This is especially true for the container freight station which has very limited time at its disposal (72 hrs) for evacuation of the containers from the vessel. To achieve this objective CFS keeps track of the vehicle turnaround time.

### Proposed RFID System - Vehicle Tracking

Based on the analysis of the volumes of containers received at the CFS and the number of vehicles deployed during each



evacuation cycle, it was observed that the number of vehicles deployed were 30% more than the optimum. The different reasons include unaccountability of the truck put in operation and intractability of trucks to take decisions to deploy additional trucks. This sometimes led to deployment of hired vehicles which could have been avoided. To take care of these, it was proposed to have vehicle tracking by using RFID.

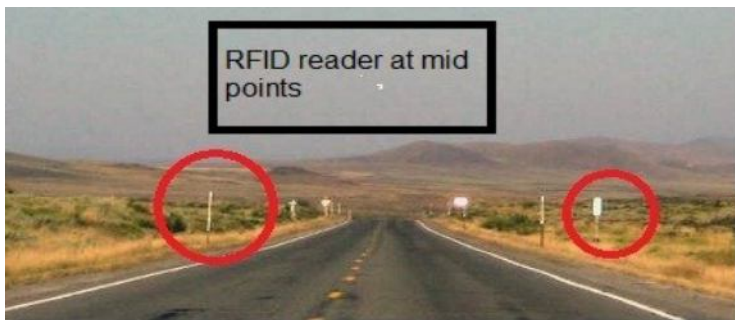
All the trucks will be equipped with an RFID tag that will carry the truck information, such as the Vehicle number, driver's information and other attributes of the shipment. These RFID tags would then be read across the RFID stations at various points across the route. The concept is to have RFID readers (once installed, needs very little support and maintenance) at strategic locations. Whenever a truck passes through the gateway or the RFID reader it would be registered and the data will be sent to a central server marking the timestamp of the truck passing through that point. This data can be used to ascertain the direction of the truck as well as facilitate continual tracking of truck's whereabouts.

This system is intermittent in data and does not give continuous updates about the truck but is most cost effective for planning the logistics of the trucks. Moreover, the application only needs the time stamp of exit and entry at various points to notify the system about the approximate arrival time. The reader reads the information of a truck passing through various points along the route and maps it accordingly on the route to calculate the approximate position.

### Optimal allocation of checkpoints

The allocation of checkpoints should be planned carefully in order to minimize costs. Based on the understanding of the operation it has been proposed to have the reader at the major intersections on main roads and at the entry / exit points of the route i.e. RFID gates can be installed at both the ends of the 50 Km track i.e. the shipping port and the warehouse. Additionally, an RFID gate can be installed midway i.e. 25Km from the port.

The data after being read through a RFID interrogator or reader will be passed on through a GPRS/GSM connected modem. The data shall then be processed through an application on the web and can be accessed anywhere using internet connectivity. This way, one can know the status of trucks in terms of number of vehicles in transit, number of vehicles having entered the port and yet to come out and number of vehicles that have crossed the intermediate



### Installation of RFID readers at strategic locations

check points. This will ensure better control of logistics and planning of the placement of the trucks at the port. This can also be linked to the vehicles maintenance schedule so that availability can be increased.

### Results and findings

After performing cost benefit analysis with GPS and GSM technologies it was found that one time fixed charges are high in the RFID based system but it pays off in the long run as the trucks increase. This would also involve an additional cost of installing the RFID readers along the road, which will have a one-time installation cost depending on the location. Also, the RFID system is not dependent on weather conditions or affected by indoor usage whereas the GPS based system needs to be in contact with the satellites for data gathering.

After implementing the proposed solution to the business problem:

- We would be able to reduce the effective number of trucks to 70 with the proposed scheduling.
- Cost savings of 30% in the truck operations
- If any truck takes longer than the usual time an alert can be sent to the patrolling car to take notice of the truck and do a follow-up for the same.
- Thus, increasing the effective utilization rate of the fleet.

**The key is to go beyond the first level of elementary phase or "slap and ship" implementations to systems that intelligently use the information supplied by RFID tags.**

With proper tracking, this will not only increase the fleet utilization but also identify the bottleneck processes and the

organization can start working on how to reduce the lag-time, such as the idle time spent by the truck in the port. The processes can then be modified to minimize these time lags. The identification of such processes can happen only if the right data is present. A quick turnaround time would allow the CFS to use less number of trucks and thus meet the expectations better and also lower the costs.

### Challenges

Although RFID has enormous potential for reducing the total costs of the supply chain, there are also a number of reasons at the fundamental and technical levels for its delayed acceptance:

**Fundamental:** Significant challenges exist in finding the return on investment (ROI) and justifying the spending on RFID.

**Technical:** Among the technical problems are imperfect read rates, unproven systems, and conflicting problems with assembling low-cost tags. To reduce tag cost is to reduce the size of the chip, which however makes assembly more expensive.

Another problem is that RFID creates huge volumes of data that are difficult to manage. The solution lies in implementing a proper data-management system that can analyze huge amounts of data quickly.

Despite the above challenges, the future of RFID technology holds exciting opportunities for almost every business. When the price of tags becomes economical enough, it is expected that RFID will take off in other venues.

### Conclusion

RFID technology is firmly establishing itself as the way forward for successful and sustainable supply chain operations. The promise of RFID technology is to help companies succeed in moving goods around efficiently, to cut costs and deliver a wealth of information that helps companies more efficiently predict and respond to customer demands.

RFID is the most recent prolific technology that provides supply chain collaboration and visibility. Order visibility is the touchstone of concurrency. The opportunity to concurrently have many people acting on problems has tremendous benefits not only for the planned order, but also for the unplanned order. An RFID systems solution will increase corporate ROI while at the same time improving supply chain communication. Handled properly, RFID technology can result in an evolutionary change incorporating legacy systems with the real-time supply chain management of tomorrow. The challenge for IT experts today is to determine how to integrate RFID with existing supply chain management (SCM), customer relationship management (CRM), and enterprise resource planning (ERP)

According to Joe Owen, RFID program manager, Rockwell Automation, "RFID is less an issue of technology and more an issue of information flows and business process change"

applications with the entire system.

Today, many companies have embraced RFID and are beginning to generate real business benefits from the technology. Many regard RFID as a technology in its infancy having untapped potential.

### Citation and References

*Mohsen Attaran, (2007) "RFID: an enabler of supply chain operations", Supply Chain Management: An International Journal, Vol. 12 Iss: 4, pp.249 - 257*

*Radio Frequency Identification: Applications and Implications for Consumers: A Workshop Report from the Staff of the Federal Trade Commission, March 2005*

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Prof. Vivekanand B Khanapuri has done his fellowship at NITIE, Mumbai and holds over 13 years of teaching, research and consulting experience in Project Management, Strategic Procurement, Business Process Re-engineering, Industrial Engineering and Maintenance Management.

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# Impact of Cloud Computing on Supply Chain Management



Sanyukta Sen  
GLIM, Chennai



Ankur Joshi  
GLIM, Chennai

SHRUTI SEN

*“For any enterprise today, just having an effective Intra-Organizational collaboration platform is not sufficient; they need to have an Inter-Organizational collaboration platform. They must be constantly connected to their strategic business partners via a communication platform that eliminates all technical barriers and provides a convenient interface for exchange of information.”*

‘Reduction of bottom line’, ‘collaboration across company borders’, and ‘Make-versus-Buy decisions’ are some of the strategies which top the list when a company seeks to increase its profits. Many supply chain pundits have come up with innovative ways of implementing these strategies, and in one way or the other the focus has always been on being efficient at what we do, concentrate on our core competencies, and pass on the ball when we know someone else can handle it better than us. The best run companies in the coming years will not compete company to company, but will compete on value chain to value chain, they will plan and act not as a single company, but as an integrated network of strategic businesses. And this can be done on the strength of their information systems. Well, if we look deeper Cloud computing, the latest advent which has caught sudden buzz in the outsourcing community, circles around doing the above mentioned things.

computing providers can address this need very well. With the advent of grid and cloud computing the general trend these days is to focus more on the application and its use for the business rather than worry about scalability, reliability and security which are considered an integral part of the cloud offerings.

## Cloud Computing based SCM

National Institute of Standards and Technology (NIST), gives the most succinct and complete definition of cloud computing – ‘Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction’. Experimentation by the cloud providers has created four distinct layers of services:

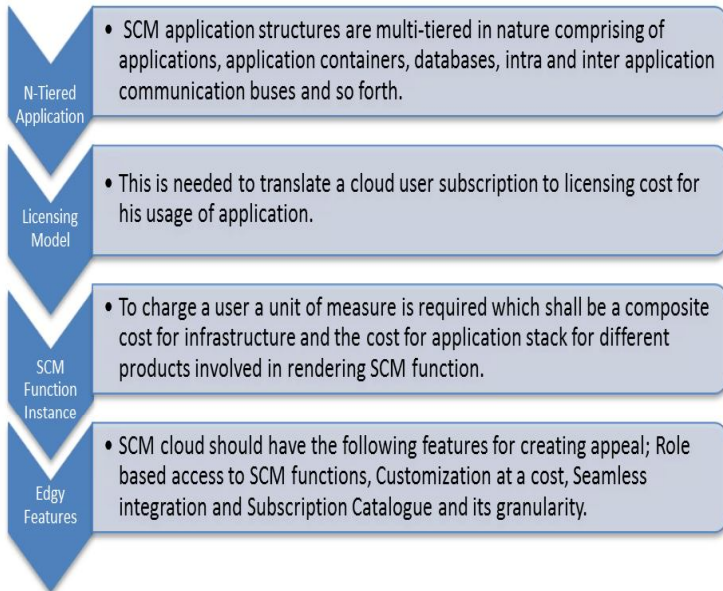
Cloud Services			
<b>Infrastructure as a Service (IaaS)</b> Provides raw utilities such as compute power and electronic storage resources, as services over the network.	<b>Platform as a Service (PaaS)</b> Includes tools and environments to build and operate cloud applications and services	<b>Software as a Service (SaaS)</b> Enables on-demand use of software over the internet and private networks	<b>Business as a Service (BaaS)</b> Includes application functionality coupled with physical and human resources required to perform a broader set of business activities

Layers of cloud computing services

For any enterprise today, just having an effective Intra-Organizational collaboration platform is not sufficient; they need to have an Inter-Organizational collaboration platform. They must be constantly connected to their strategic business partners via a communication platform that eliminates all technical barriers and provides a convenient interface for exchange of information. Cloud

Cloud Supply chain is the virtual replica of the physical supply chain, where each supply chain link is represented by exactly one object in the cloud based system. When there is a change in a single object, its status changes and there is an update to each and every link about that change. As per Mr. John Brand, Research Director at Hydrasight, an IT research and analysis

firm, Cloud computing provides two aspects of benefits to manufacturing and logistics organizations. First, it eliminates the internal costs associated with running one's own IT infrastructure. Second, it increases visibility across organizational boundaries, particularly in case of a third party involvement. Following are certain characteristics of SCM Cloud:-



### Characteristics of Cloud based Supply Chain Management

*Software as a service (SaaS)* offerings are used in the major SCM processes: plan, source, make and deliver. Adoption varies depending on the SCM process, complexity and level of process sophistication and size of the enterprise. Recently only 8% of 257 supply chain decision makers, during a survey, indicated that they selected SaaS/cloud as a deployment model during the last three years. This number is expected to reach 17% during the next three years. SaaS benefits the enterprises in the following way to improve their supply chain:

#### Cost

- It provides a low cost way to achieve SCM functionality.
- Works around IT resource and budget constraints.
- Supports highly distributed operational processes at a low cost
- It includes lower upfront costs.

#### Speed

- It achieves faster time to deployment.
- It helps in recognizing or demonstrating ROI faster.
- It avoids delays associated with long IT project queues.
- Quicker time to market for simple to moderate requirements.
- It speeds up new feature releases.

#### Business value

- Enables SCM in small and midsize businesses.

- Helps in building competencies prior to investing.
- It tests the vendor application in a proof of concept.
- Helps in innovations at a lower cost, without engaging in long-term commitment.
- Improves agility to respond to user requirements on an ongoing basis.
- Often improves usability.






Platform as a Service (PaaS) helps users extend and customize a cloud-based business application, as a service, or ecosystem partners to build solutions that extend the functional footprint of a vendor's. PaaS has the potential to reduce the cost of development and integration. PaaS business value has high capabilities in enabling new ways of performing horizontal or vertical processes. Infrastructure as a Service (IaaS), the provision of outsourced, industrialized, asset-based IT infrastructure managed services, is attractive as it enables a vendor or user organization to better align computer load and costs, avoiding the issue of over-investing in data centre capacity. The business value of IaaS is low, as it only slightly improves processes that will be difficult to translate into increased revenue or cost savings.

### Cloud based SCM Implementation

While browsing through YouTube videos we got a very interesting insight on the supply chain cloud by *Greg Johnsen, CMO at GT Nexus*. He states that implementing ERP systems and other highly sophisticated IT infrastructure is becoming increasingly complex, expensive and risky. Cloud can rescue the enterprises from all these by providing superior IT economics, lower risk and faster time to value. Cloud is not only an IT infrastructure substitute but proves to be a highly efficient economic model for a company. Cloud based supply chain roughly follows *FaceBook's Single Page Information Model*. The difference being the shared information, i.e. on FaceBook its user profiles, whereas, in a supply chain its thousands of business objects that change constantly. GT Nexus, a cloud supply chain provider, focuses on three major zones namely *Financial Supply Chain* (purchase order to final payment), *Logistics* (from raw material to product to final delivery) & *Value Chain Analytics*. In a typical SCM Cloud assignment this company worked with a major Fortune 500 manufacturer to launch a *Supply Chain Control Tower Cloud* which monitors the flow of parts and components into every plant, outbound finished goods to the market and service logistics. In the first six months this company saved over \$70M by taking 3 days inventory off.

In the Supply Chain Council, October 2012, *IBM Corporation* has presented the benefits of Cloud over Traditional IT infrastructure which are depicted in the figure.

IBM has been one of the biggest contributors to the world

Business Metrics	Traditional IT	Cloud Capabilities
IT Service Delivery 	Additional Capacity obtained by transactions to purchase additional server, storage, networking or software	Incremental IT capacity is obtained real-time via the Cloud; usage based pricing
Business Agility Time-to-Value for Business Changes 	Months	Weeks
Customer Loyalty 	3 – 5 second response times	< 1 second response time = + 7 customer loyalty points
Spend more on IT business innovation and less on maintenance 	>70% on maintenance costs and growing	Lower by 20% to 40% (hardware, energy, software, database and mainframe) costs while absorbing growth
Increase asset utilization 	Average of 15 – 25% server utilization	Utilize >65% server capabilities

each unit and the ability to fulfill them, the leadership of each unit, or a combination of any of the aforementioned factors. These uncertainties coupled with the organization’s current information processing capabilities are the major determining factors of adoption of SCM cloud. In general, firms which have higher levels of environmental and inter-organizational uncertainty are more likely to adopt cloud computing, whereas firms which have higher levels of task uncertainty are likely to stick to their in house IT infrastructure. Cloud based supply chain management is not a one stop solution to all SCM problems. If we look deeper and take the above mentioned factors into consideration we can easily comprehend that cloud based solutions are acceptable and are successful in companies where it dissolves quickly into the organizational structure and provides a push to the overall competitive strategy of the company.

### Comparison of Traditional IT and Cloud Computing

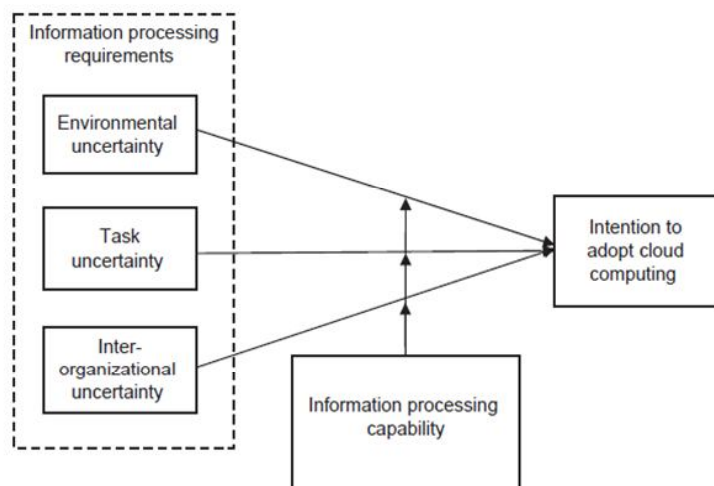
cloud, and it seems that their reign is going to continue in the SCM Cloud as well. A global pharmaceutical industry leader had the following requirements:-

- Highly flexible, adaptive strategy to respond to rapid changes
- Need to easily evaluate and respond to complex customer requirements
- Improve shipment visibility

Traditional IT infrastructure solution wouldn’t have been an ideal solution for such requirements. IBM provided a Cloud solution which provided them quick ramp up and value creation time, increased visibility to status of external trading partners via integrated IT systems for all supply chain partners and a cloud application that shows map of shipment origins and destinations for traceability; yields faster deliveries.

### Organizational Acceptance of Cloud Computing

A revolutionary idea is null if it does not fits the organizational scenario and it does not meet the organization’s strategic goal. In a research on similar lines the authors *Casey G. Cegielski, L. Allison Jones-Farmer, Yun Wu, and Benjamin T. Hazen* have beautifully studied the uncertainties which affect the intension of an organization to adopt SCM cloud technologies. First, *Environmental Uncertainty*, arising from security concerns, economic instability, and vendor support, and costs. Second, *Task Uncertainty*, arising from the nature and complexity of the tasks involved in a supply chain process. Third, *Inter-Organizational Uncertainty*, which derived from the nature of the relationship between units, the responsibilities of



### Conclusion

The move toward cloud-based supply chain management is currently not as rapid as for other enterprise functions, but many of the enterprises like, financial services, retail, high technology, groceries and pharmaceuticals are adopting this model, as cloud-based supply chain can improve their competitive advantages. Looking at the growing demand for such model of supply chain cloud supply chain management providers have made it easy for the suppliers to join their networks, so that they can provide a large and diverse network to their clients.

### Did You Know

According to the Council of Supply Chain Management Professionals (CSCMP), it is estimated that it costs approximately \$0.37 to deliver a box of cereal to the U.S. consumer’s breakfast table.

# Foreign Direct Investment in Retail

A lot of deliberation has taken place over the positives and negatives of FDI in retail. The purpose of this story is to heed the reader of the consequences of FDI with respect to its effects on supply chain, industrial production and on the economy as a whole by quantifying the effects on consumers, producers and associated parties like government.

Relevant global examples have been included and analysed to better understand what FDI holds for Indian retail industry. Also Indian retail comes with peculiar challenges which the foreign players have to be prepared to conquer this space.

First let us have a look at some figures to gauge the position of Retail sector in India as this will help us better understand the importance of the recent reforms brought about by the Indian Government.

The Indian retail industry accounted for 9.4% employment and 22% of the country's GDP in the Financial year 2011. This makes retail in India a Rs. 25,300 Billion industry employing about 40mn people. The sector is also witnessing impressive growth with overall sector growing by 14.2% during 2010. Total Retail Sector in as of 2011 stood at Rs. 25,300 Billion with Food and grocery accounting for more than two-thirds of the overall retail in India with a share of approximately 70% of the total market size. However, the Organized Retail Penetration (ORP) in this vertical is the lowest at 2.4 %. This vertical is dominated by *kirana* stores (mom and pop stores), cart vendors and wet markets in the unorganized space. But organized retail is expected to grow faster than total retail at 24 % by 2016-17 as compared to 15% growth of total retail during the same period.

foreign retailers would begin to spread their operations in India, and as this happens domestic players would develop their supply chain, create new strategies and improve operations to counteract the competition from foreign players, and would inevitably encourage investment and employment in supply chain and back-end sectors

- Processing
- Manufacturing
- Distribution
- Design Improvement
- Quality Control
- Packaging
- Storage
- Warehousing
- Agriculture market produce infrastructure and logistics

FDI in Multi Brand Retail policy and other reforms announced in September 2012 is another key milestone reform that will help in faster growth of the sector and the economy. Consequently, organized retail penetration is likely to increase to 10% in 2016-17 from 7 % in 2010-11.

Before we analyse what expectations India holds with FDI, here are the **salient features of the policy:**

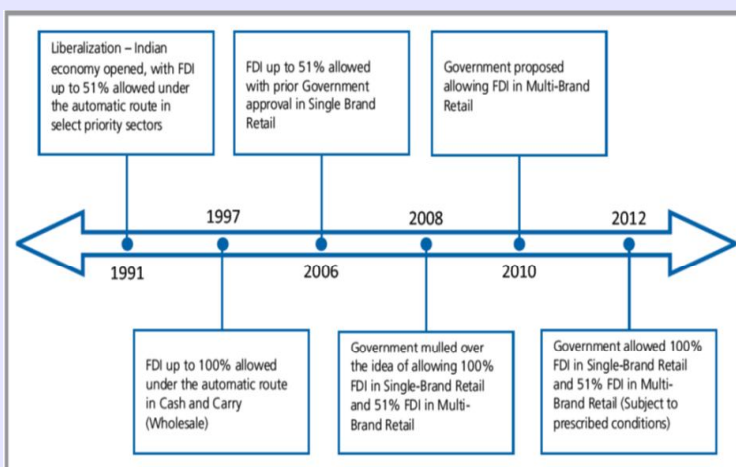
On September 14, 2012 Indian Government passed the bill which allows FDI up to 51% permitted under Government approval route in Multi Brand retail. This means Fresh agricultural produce including fruits, vegetables, flowers, grains and meat products although unbranded may be traded. A Minimum investment of USD 100 million needs to be infused by Foreign Investor. Of this At least 50% of the Foreign Investment has to be invested in back-end infrastructure within 3 years of induction of FDI towards:

Apart from this a Minimum 30% of manufactured/processed products should be sourced from Small Scale Industries. Although the decision to permit setting up of retail outlets has been left to the state governments these outlets can be only set up in cities with population of more than 1 million as per 2011 census (including an area of 10 sq. km around the municipal/urban limits). For States/UTs not meeting the above criteria, outlets may be setup in cities as decided by the respective State Governments. The policy also states that Retail trading in any form, by means of e-commerce, would not be permissible for companies with FDI engaged in the activity of multi-brand retailing.

Now we know how big this and salient features of the policy, let's move to the expected **impact of FDI in retail** in India:

## On Consumer:

Although many advantages have been announced for the consumer like better shopping experience, more variety, improved quality, increased availability, one stop shopping,

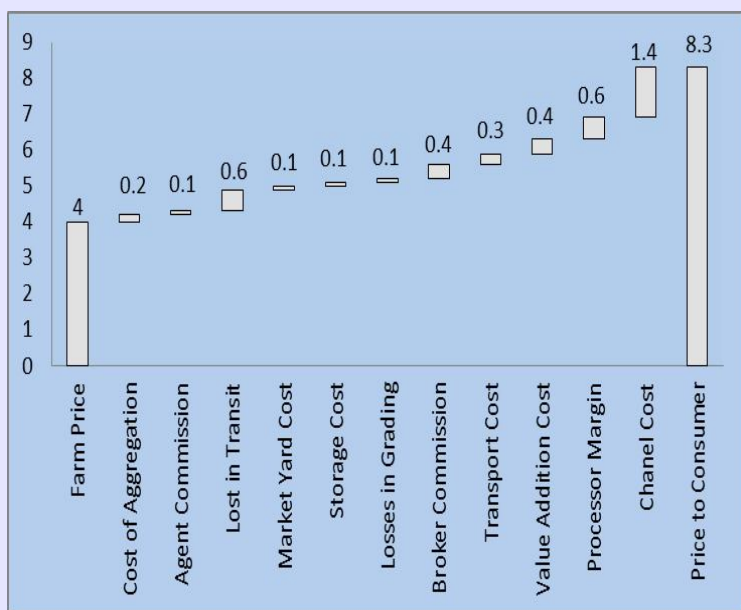


Timeline of FDI in retail in India

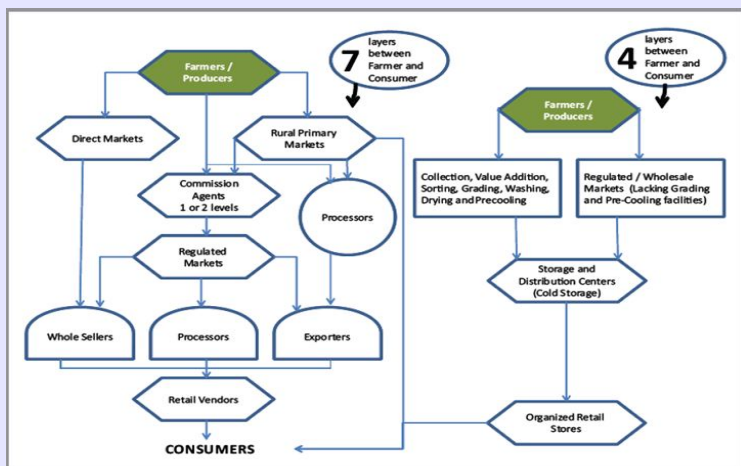
fresh stocks and reduced prices, none is more important for a consumer in context of today's high inflation conditions as reduction of prices but having said that the consumer today is not ready to sacrifice quality for cheap. The consumer today demands Quality product at low prices and this is exactly the issue which FDI in retail is expected to resolve. The major reasons for the high price the consumer has to pay are because of large number of intermediaries and wastage across the supply chain.

**On Farmers:**

First let us look at the escalation of prices across the existing supply chain



Here we can observe that in a traditional supply chain, the producer i.e. the farmer gets only about 40% of the final amount the consumer pays. This is as low as 10-15% in certain categories like horticulture while in a modern retail supply chain this is expected to rise to about 55%. This is due to intermediaries and wastage in the supply chain due to poor infrastructure like warehousing and cold storage facilities, which is discussed in detail. Also the MNCs like McDonalds have helped farmers grow better quality



Traditional Vs. Organised retail chain:

Source: Economic Times

produce by imparting knowledge of agricultural techniques and providing access to quality seeds and fertilizers.

**On Backend Infrastructure:**

As the policy demands that of the minimum investment of \$100 MN at least 50% has to be invested towards back-end infrastructure within 3 years which include activities like storage, packaging, processing, manufacturing, logistics etc. significant improvement can be expected in shortage of such facilities.

Though India is the second largest producer of fruits and vegetables (about 200 million MT), it has a very limited integrated cold-chain infrastructure, with only 5,386 stand-alone cold storages, having a total capacity of 23.6 million MT.

Post-harvest losses of farm produce, especially of fruits, vegetables and other perishables, have been estimated to be over INR 1 trillion per annum, 57% of which is due to avoidable wastage and the rest due to avoidable costs of storage and commissions. As per industry estimates, 35-40% of fruits and vegetables and nearly 10% of food grains in India are wasted. Though FDI is permitted in cold-chain to the extent of 100%, through the automatic route, in the absence of FDI in front-end retail, investment flows into this sector have been insignificant.

Although contrary views argue that since Modern retail stores are limited to only cities with a population of more than 1 mn and cater to only 10% of the population such benefits would be insignificant as per the actual need but it is expected that as the foreign retailers would begin to spread their operations in India, and as this happens domestic players would develop their supply chain, create new strategies and improve operations to counteract the competition from foreign players, and would inevitably encourage investment and employment in supply chain and back-end sectors.

**On SMEs:**

A study was conducted by the Confederation of Indian Industries covering a wide range of small and big SMEs from different sectors to gauge the mood of the SMEs regarding the government proposal to allow FDI in Multi Brand Retail Trade with the 30% sourcing norm.

The major findings of the survey were:

66.7% of respondents see it as an opportunity for their sector while around 21 % of respondents perceive it as a threat but majority of the respondents (98.6 percentage) are of the opinion that the opening of the FDI in retail will result in substantial growth of sales of their products.



Also, Majority of respondents are of the view that the decision of opening of the FDI in retail would impact positively in the form of new orders/contracts generated. Around 31.2 percent of respondents expect the new orders and contract to grow substantially with more than excellent rate of 20 percent growth.

They also expect that coming in of foreign retailers will help in achieving qualitative improvements and branding of the products and would lead to improvements in the supply chain efficiencies in their sector which in turn will integrate small and medium size enterprises into the modern trade process, resulting in substantial amount of knowledge and skills transfer in the sector.

#### On Jobs:

A new skill category called retail jobs would be created. This would also increase wage rate. According to Indian Staffing Federation (ISF), an apex body of the flexi staffing industry in India, FDI in retail can create around 4 million direct jobs and almost 5 to 6 million indirect jobs including contractual employment within a span of 10 years.

There has been lot of hue and cry from certain political parties and many associations on the benefits of FDI in retail. To better understand this let us look at the **examples of few countries where FDI in retail was permitted** and what was its overall impact.

An average Indian family spends about 45% of its income on food expenditure which is pretty high when compared to

other developing countries such as Brazil and Mexico where this figure stands at 19 and 22% respectively.

Although we have observed varied response to FDI in different countries the implication in Indian scenario would depend on how the Global retailers are able to face the **unique challenges India has on offer** like:

#### Real Estate:

It will take another 5 years before the modern retail in India can take off. Current supply of retail space to foreign players falls short than what is needed. Even the spread of malls is lopsided, with 5 states having 60% of the malls. Also the construction cost is similar in large and small cities but rentals differ significantly. Developers are shying away from making such investment as it's a long term play.

#### Politics:

There is the never ending political sabre-rattling around FDI. The possibility that different states will impose different caveats or that there will be new conditions that make the already challenging path to profitability even more challenging.

#### Heterogeneity in India:

Every hundred-odd kilometres, there are different oils, different pulses, different brands and different water conditions, to name just a few. This makes scaling the business harder.

BRAZIL	MEXICO	CHINA
<ul style="list-style-type: none"> <li>•During the mid to late-1990s, foreign direct investment entered Brazil's formal food retail segment for market-seeking purposes.</li> <li>•Labour productivity improved by 14% in 6 years from 1995</li> <li>•Productivity increase of 75% can be majorly associated with FDI</li> <li>•Employment decreased by 0.7% per year gradually from 1995 to 2001.</li> <li>•Prices increased at a lesser pace than prices in overall economy, though the role of FDI is not clear.</li> <li>•Tax revenues increased \$100-200mn from 1995 to 2001.</li> <li>•FDI introduced capital that was otherwise not unavailable and introduced some best practice technology and processes.</li> </ul>	<ul style="list-style-type: none"> <li>•During 1990s many international companies entered Mexico's Food retail market but have failed to gain significant market share.</li> <li>•Sector productivity declined</li> <li>•Employment grew at 6% in Modern while 4% in traditional retail during 1996-2001</li> <li>•Increased productivity across food processing industry and spill over effects on supplier base and distribution channel.</li> <li>•Food prices grew more slowly than overall economy prices particularly after 1999. CPI grew at 18percent while food prices grew at 15.9</li> </ul>	<ul style="list-style-type: none"> <li>•First permitted in 1992 with foreign ownership restricted to 49%, progressively lifted with no restrictions now.</li> <li>•Over 600 hypermarkets opened between 1996 and 2001</li> <li>•The number of small outlets (equivalent to 'kiranans') increased from 1.9 million to over 2.5 million</li> <li>•Employment in the retail and wholesale sectors increased from 28 million people to 54 million people from 1992 to 2001</li> </ul>

**Lack of requisite talent:**

Retailing is a science and needs requisite talent and skills, which India lacks currently still being in a nascent stage.

**Bureaucracy:**

India is ranked one of the most difficult countries to start a business because of multi license regime and prevalent corruption. Something which foreign companies are not used to and recently Walmart had to sack few of its people related to corruption charges.

**Lack of basic infrastructure:**

India lacks the basic infrastructure like roads, power which leads to adopting smaller carriages and alternate sources of transportation. This leads to an increase in operating costs thereby eroding into the operating margin.

**Strong Unorganized Sector:**

The unorganized sector will expand further due to its proximity, goodwill, credit sales, bargaining, loose items, convenient timings and home delivery.

The rapid growth of the organized retail segment is checked by the **numerous clearances that are required** to set up a retail outlet.

Despite these, the overall mood in the market seems to look favourably upon the FDI in retail sector. Here's what **experts say** about this:



FDI means inclusion of money. And with money coming in, it will translate into infrastructure development. If about 50 percentage of the investment is utilized in infrastructure, it will automatically mean an improved supply-chain. Infusion of money will set the backbone for retail.

Because a strong retail sector runs on the backbone of supply-chain. — Col Vijay Nair, General Manager, SCM at HyperCITY Retail (India)



As multi-brand retail is far more capital intensive, it offers tremendous opportunities to 3PL companies in terms of back-end operations and transport management for large multi-brand retailers. We envisage a spurt in demand for cold chain warehousing and transportation, which are amongst the major reasons for implementing FDI. With large investments in transport and multi-client warehouses (MCS) in key cities in India, we are gearing up to support multi brand retailers for supply chain operations in the country. — Vikas Anand, COO, DHL Supply Chain India



FDI in retail will bring in global retailers with their sophisticated back-end and supply-chain systems. These global giants will make higher demands from the LSPs (Logistic Service Providers) and also drive increased efficiencies and faster information flows with enhanced use of technology. — Sanjiv Kathuria, Director – Sales and Marketing, TNT India



FDI in retail will bring about a spiralling growth in the industry and will significantly contribute towards the development of the Indian economy. The most significant will be the creation of back-end infrastructure from a very low base across farm level pack-houses for horticulture and agriculture products, establishment of cold chains at all levels from mandis to retailers, large scale warehousing and refrigerated transportation. — Vineet Agarwal, Joint MD, Transport Corporation of India



I think it's a welcome step. I think it took people to understand and realise that it is a win-win proposal for all stake-holders. FDI will help in increasing consumption, manufacturing, enhance the services and the job sectors. In short, we will see the emergence of a modern India. — Kishore Biyani, CEO, Future Group

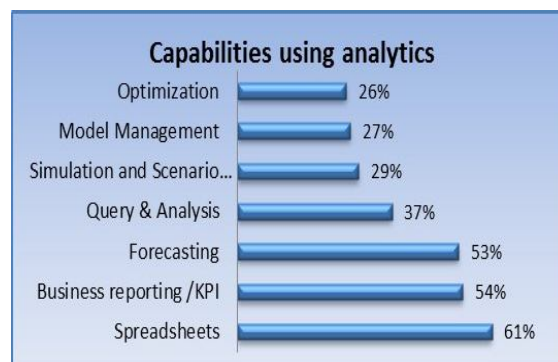
# Analytics in Supply Chain— FMCG India perspective



Arun Kumar S  
IIM Indore

*“With power of technology and advanced analytics the companies can change around their traditional supply chain to intelligent supply chain or sensory supply chain which has better responsiveness, control and flexibility.”*

Analytics is the science of examining raw data with the purpose of drawing conclusions about that information. Analytics is used in many industries to allow companies and organization to make better business decisions and in the sciences to verify or disprove existing models or theories. The decision can be *descriptive*, which involves extracting information from data and make decisions such as “Which store to concentrate in a locality” or it can be *predictive*, involving predicting future trends or consumer/customer behavior for instance “How many customers will leave my program in next month?”.

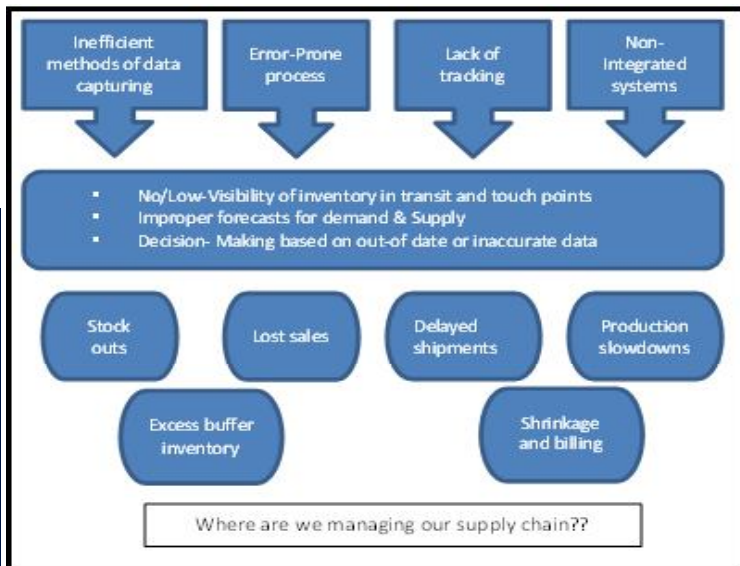


Use of analytics for business decision is on the raise; however we are far from utilizing full potential of analytics in business. According to a Bloomberg report 97% of companies surveyed across geographies with revenue more than \$ 100 million use analytics for decision making, up from 90% in 2009. But the odd part is only 25% of these companies feel there is value in using analytics for decision making. Reasons for non-realization of value from analytics can be attributed to lack of analytical talent, implementation of using analytics at an organizational level, moving up from traditional spreadsheet analytics to advanced analytics which organizes data across departments and enable to make strategical as well as tactical decisions.

As markets become more global and competition intensifies, firms are beginning to realize that competition is not exclusively a firm versus firm domain but a supply chain against supply chain phenomenon. Many firms take a stand that supply chain cost are one of the firm figures available in their cost sheet and whatever the information they require are already available and few agree that they have scope for improvement but are skeptical about ROI in analytics. Managing supply chain is one of the complex business processes and to identify insights we need to have an overall view of the entire chain and in depth analysis for root cause analysis. Importance of analytics in supply chain can be well grounded by its complexity and the prominent role it plays in cost structure of the company. Many of the improvements re-tune their supply chain due to “done-it this-way-for-year attitude”. As Albert Einstein puts it “we can’t solve problems using the same kind of thinking we used when we created them”. Wal-Mart, Groupon, Tesco are few companies using analytics in their supply chain to considerable extent.

## Current Supply chain practices and analytics methods:

Usage of analytics can be dated back to world war-II, when US army used analytics to derive various logistical models. Similarly many of the organizations use various analytical tools predominantly excel based to analyze their role and to make things simpler. The issue lies in islands of data, fragmented analysis of supply chain, deluge of reports that flows within organization, availability & sanctity of data, lack of analytical talent and tools. The figure on the next page represents impact of lack of data and proper tools in supply chain management. Without such information and technology individual



organizations functions virtually as multiple organizations which is exactly opposite to what supply chain management intends to do. With evolution of advanced analytics and technology such as EDI, Barcode, RFID and IT capability companies can look forward to integrate available information and take real time decision like extending offers, impact of specific sales promotion, understanding behavioral pattern of specific consumers using point of sales data, predictive analysis incorporating macroeconomic factors and environmental factors. Further they can improve value chain efficiency by taking supply chain from intra organization to inter organization.

### Indian FMCG & CPG Industry and the challenges faced:

Indian FMCG industry, a \$ 13.1 billion industry provides great growth opportunities but to extract maximum value the company has to crack India's inherent challenge in supply chain including increasing rural consumption, highly fragmented logistics providers, lack of data down the supply chain for analysis, sourcing uncertainties and uncertainty of data for network modeling. Supply chain is the heart line of FMCG companies, where availability of right products at

right location in right time plays a critical role. This article explains how the supply chain is improved/can be improved in FMCG by use of analytics aided by technology. Emphasis is given to technology rather than stages in supply chain.

### Sourcing & Production:

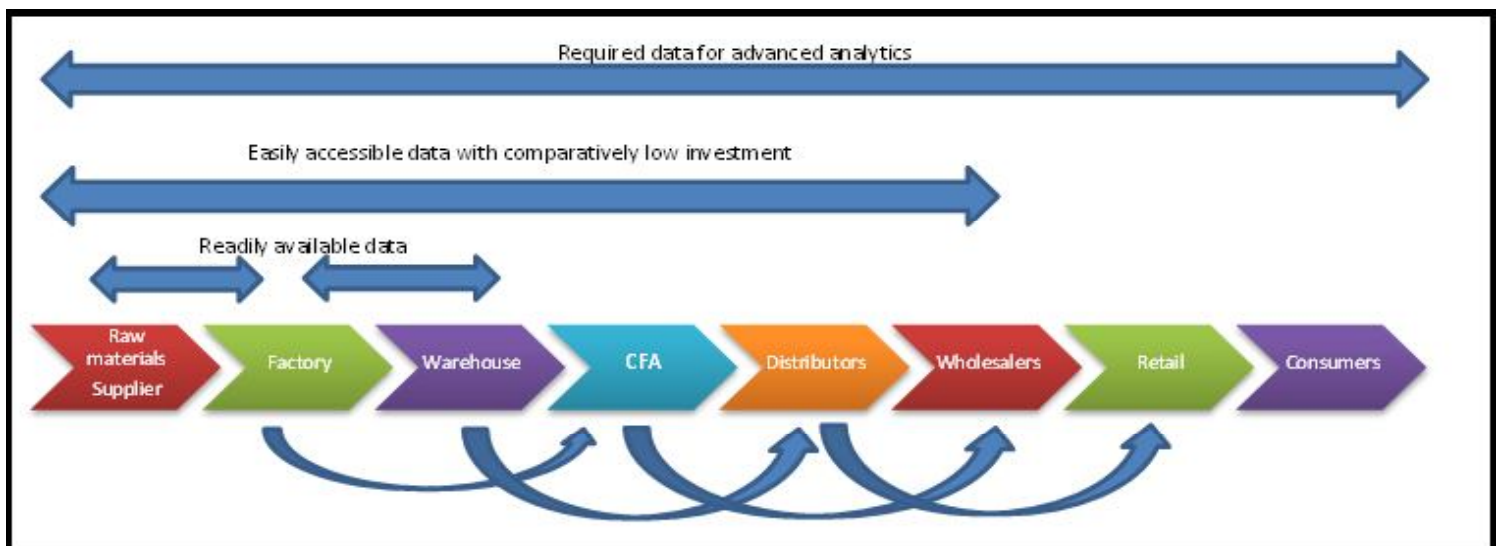
Impact on price due to increasing competition makes companies to look for price competitiveness and reliability with its suppliers. With geographically spread sourcing the companies can look for optimum sourcing considering lead time, cost and service level agreement of individual suppliers. They can use the data for contract review. Dash boards evaluating basic KPIs are used in many companies but real time analysis of data, deep diving and root causes are yet to catch up. Oracle business intelligence, Gen pact supply chain analytics are some to name a few. With ability to access real time data, companies can avoid under/over production for specific products. Individual machine reports and ROI for specific machines pre and post purchase can be calculated, thereby making informed decision.



### Logistics:

Performance, cost calculation and other compliance can be monitored using analytics. This will be handy in benchmarking performance of various providers. With information from tracking of shipments dynamic routing of shipments can be implemented which will reduce inventory to great extent. Even location of warehouses and distribution rights can be optimized to ensure low cost and better service.

All the above analysis can be executed if and only if we have sufficient data for analytics. In India where majority of the supply chain partners are unorganized hence extracting information across supply chain is a formidable task. In case



of organized retail we can extract information till point of sales data but in case of unorganized retail POS data is not feasible. By extracting values just before retail outlets, great benefits can be reaped.

### Organized retail at consumer end:

In case of organized retail, collaborating with retailers can help us in accessing customer level data. With increase in loyalty programs by retailers we have access to consumer level data which can be used to derive behavioral insights which are used in new product development, new or extension of promotional offers etc. Barcode is the technology currently prevalent in this industry for POS data. EDI 852 is the standard for sending point of sales data and inventory activity. With most of the organized retailers moving towards vendor managed inventory accessing POS data has become much easier in current scenario.

### Unorganized retail at retailer end:

Retailers in unorganized retail are reluctant in investing barcode scanners due to cost, volume and level of knowledge. But the companies can ensure that they collect data till retail outlets through distributor's/agent's salesperson. With handheld devices it is now easy to track orders from individual retailers. TVS electronics' 'sanskriti' is one such innovation which enables companies to collect retailer level replenishment data at SKU level. With this the companies can plan for production cycles at appropriate level reducing stock outs and accumulation of inventories in unwanted locations. These would increase inventory cycles of companies and better satisfaction levels to their customers by ensuring availability of right products as per their preference.

### Technologies and innovations implemented in the value chain:

In organized retail outlets source their supply either from the CFA/ distributors where RFIDs are used to track real time data. Company can respond reactively which is much faster than proactive response with current analysis. RFID tags are non-contact sensors which reduce tracked from a distance unlike barcodes. They can be tracked on a continuous basis right from the items leaving factory to point of bulk breaking. This coupled with GPS enable telematics gives access to real time data across the value chain till it reaches distributor's repository. Pantaloons implemented RFID tracking with 1000 RFID tags in one of its warehouses. In case of FMCG where there is frequent movement of pallets and dollies, tracking them becomes easier with RFID tags. With increased usage RFID tags are getting cheaper, currently a passive RFID tag costs



around 15 INR and a receiver costs less than 2000 INR. The cost goes down considerably with increase in volume. With implementation of EPC across products a single receiver can be used to record real time movement of products. This will ensure reduction in delayed shipments, shrinkage and maintaining optimum level of stocks in warehouses and distributors. Adoption of RFID tags in India is low due to cost involved and penetration of barcodes. But the benefit due to barcode and RFID tags are entirely different. Other EDI standards which are used in real time tracking are EDI 867 for warehouse withdrawals, 816 for store lists and 830 to access forecast information across supply chain. This data can be used to understand forecasts at individual touch point and to optimize production plan. Many organizations integrate this data to their enterprise package such as SAP to use them in decision making in their decision making processes. Apart from this specific advanced analytics tool helps us in monitoring product performance region wise and stock outs at specific location at SKU level. In Indian scenario where distributors stocks products of multiple companies, multiple companies, stealing and loss of data is an issue. But RFID has provision for secure tracking by encrypting the transmission signals.

GPS based telematics ensures that there are no unwarranted delays or theft in quantity of products during transit. Blue dart, Mahindra, Gati, are some of the logistics providers who support telematics based tracking systems.



With uncertainty in climate, road conditions and reduced buffer sizes it is extremely important for the companies to track shipments in real time. Several companies are coming up with devices

which can be fixed in trucks to track shipments. FMCG companies can invest on infrastructures such as RFID in distributor's warehouses to have access to real time data.

With power of technology and advanced analytics the companies can change around their traditional supply chain to *intelligent supply chain* or *sensory supply chain* which has better responsiveness, control and flexibility. It is understandable that impact of analytics entirely depends on sanctity of data used. Current analytical tools have provision to correct errors in data and derive inferences. With advancement in analytics the decision making can be made automatic thereby making the system to make real time decisions without human intervention.

# Issues Faced in Last Mile Delivery in Indian Context



Kunal Ray  
IIFT



Mohit Jethwa  
IIFT

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*“Even today, road transport plays a dominant role in India’s transportation sector with a share of 4.6% in India’s GDP in 2007-08 as per the data released by the Central Statistical Organization. Moreover, the share of road transport in freight traffic has gone up from 13.8% in 1950-51 to over 65% in 2006-07. At the same time, between 1951 and 2004, the vehicle population grew at a CAGR of 10% compared to CAGR of 4.3% in the total road length.. “*

In the context of supply chain management, last mile delivery means the transport of goods from an intermediate point or transport hub to the final destination. Traditionally, problems pertaining to the last mile have been recognized as bottle – necks with respect to telecommunications, but lately, they have found widespread acceptance in the areas of not only SCM as mentioned above, but also passenger transport.

The rising costs of all goods in general have caused companies to go back and introspect on their operations to maintain their profit margins. Last mile delivery is unique in its position as it is the final leg of the logistics and also acts as a touch point between the customers and the company. An optimization in this phase of delivery can really help the company improve its bottom-line.



Restricting to the movement of only freight at present, it is understandable why prompt last mile delivery assumes so much importance. As per an estimate by the Council of Supply Chain Management Professionals, in US, as much as 28% of all transportation costs are incurred in the last mile, whereas a similar study by A. T. Kearney in China pegs it at 53%. A study on the movement of freight in small and medium sized urban areas (SMUAs) in the US indicates that the annual delay per traveller is 17 hours, wasted fuel per traveller is 26 gallons, average cost of congestion per traveller is \$318 and congestion costs to the trucking industry is \$73 per truck per hour, which reduces the competitiveness of all affected sectors. Discounting the cost factor for a moment, there are other some very pertinent issues related to last mile delivery

including the time sensitive nature of many deliverables and their safety especially when deliveries are required to be made to far flung areas. However, the most important factor with respect to last mile delivery remains infrastructure or rather the lack of it.

## Contemporary Issues Faced in Last Mile Delivery

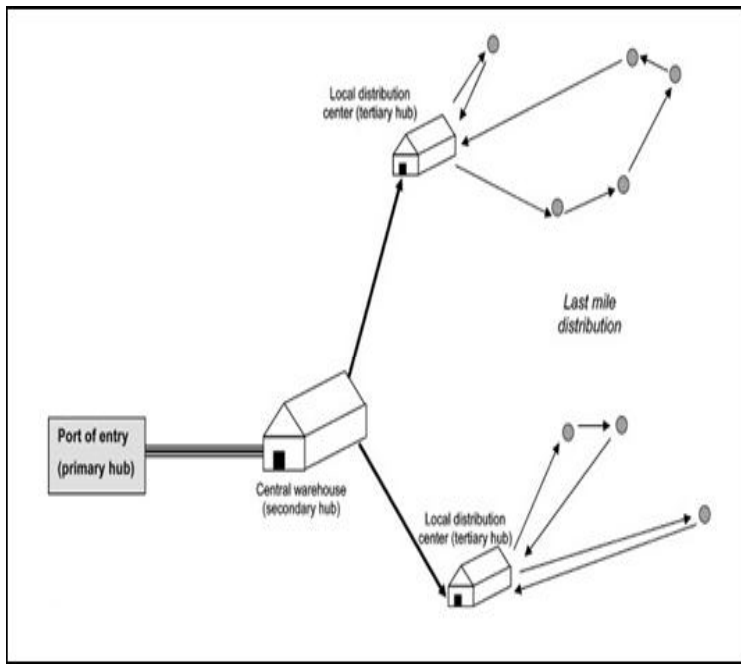
It's important to note that last mile cannot take advantage of the same modal flexibility as other links in the supply chain. Companies cannot opt to deliver products to customers' doorsteps via train or ship, even though those modes are usually more fuel – efficient and economical than trucks. The liberalization of our economy has brought home the urgency of recognizing that an efficient transportation system is necessary for increasing productivity and enabling the country to compete effectively in the world market. Therefore, given the importance of last mile delivery, it becomes all the more relevant to study the issues facing last mile delivery in the Indian context and attempt at offering some solutions.

⇒ **Infrastructure** – In the Indian context, passenger and freight movement has increased astronomically over the years. The inter modal share of road transport in carrying freight which was around 14% in 1950-51 had increased to around 61% in 2004-05. Moreover, according to the Planning Commission; the road freight traffic is estimated to reach the value of 1,231 Billion Ton Km (BTKM) by 2011-12.

Even today, road transport plays a dominant role in India’s transportation sector with a share of 4.6% in India’s GDP in 2007-08 as per the data released by the Central Statistical Organization. Moreover, the share of road transport in freight traffic has gone up from 13.8% in

1950-51 to over 65% in 2006-07. At the same time, between 1951 and 2004, the vehicle population grew at a CAGR of 10% compared to CAGR of 4.3% in the total road length.

All this gives a fair idea of the facts that firstly, in India, majority of the freight movement takes place through roads and secondly, it puts a huge pressure on the existing network. This is the primary reason which leads to bottlenecks in freight movement especially where the infrastructure is most neglected, causing last mile delivery issues.



Tier 1 cities are already overcrowded and the tier II and tier III cities coming up are also getting populated at a tremendous speed. According to a research conducted by McKinsey Global Institute, by 2030, there will be 68 cities in India, each with population greater than one million, up from 42 cities in 2008. This is nearly 60 per cent growth over two decades. However, the infrastructural facilities are not growing at same pace. This gap is the cause of major traffic related hitches in these cities. Congestion is a prime hurdle in last mile delivery mechanism.

Another factor affected by the lacuna of growth differences is non-optimal spread of last mile delivery distribution centers within the city limits. Last-mile efficiency is all about being closer to consumers, and more facilities mean greater proximity. The result is usually greater delivery speed and cost savings. However, companies find it difficult to locate proper facilities in most areas of a city. This results in an increase in cycle time as well as delivery cost. Today, most of the distribution centers are located in the industrial areas around a city rather than in residential places.

⇒ **Owned Vs Outsourced** – Probably, one of the biggest dilemmas facing companies involved in direct selling to the customers is whether they should opt for self – owned delivery/distribution networks or rely on Third Party Logistics (3PLs). One of the best examples which can be used to illustrate this is from the e – commerce and e – retailing industry which is growing at a rapid pace in India and which relies excessively on last mile delivery.

A major cost incurred by the e – retailing companies is during the last mile delivery. Another important reason why the e – commerce sites should take last mile delivery seriously is that if they mess up a delivery, chances are that they might alienate that customer and the people they would have recommended the website to, would also be lost. This results in lost brand equity. As an example, consider Flipkart, which is by far the largest online retailing organization in India. Started in 2007, Flipkart has become one the largest and most visited e-commerce portal in India today. In a short span of 5 years they have achieved tremendous success by bringing in new initiatives with optimization of their delivery system being one of them.

	Own	Outsourced
Reach	Low	High. Highest Reach when using a VPP.
Delivery Time	<24hrs	2days-Week
Brand Visibility	High, since the courier up to customer is branded	Low
Cost	Variable	Fixed Cost that becomes significantly lower with economies of scale
Reliability	High, since supply chain is controlled	Low

Initially, Flipkart started their deliveries with a 3PL mechanism but soon moved to their own network of distribution, Flipkart Self Delivery (FSD). This has brought down their logistics cost and also helped in avoiding the glitches due to non-timely delivery. Today Flipkart operates with a combination of owned and outsourced logistics. Revenues have grown from Rs. 4lakh to 500cr within 5 years and nearly 60 to 70 per cent of deliveries take place through their own network.

⇒ **Economical & Technological** – Another point of worry is the high capital investment for setting up an efficient last mile system. Finance is required to buy transport vehicles, build warehouses and distribution centers and set up an IT infrastructure. As all these are interlinked, neglecting any one of them might hamper the profit margins.

A point of concern which comes up especially in the case of perishable goods is the absence of sufficient number of cold storages across the country. This results in a greater distance between the hubs and final delivery points for these items, which given the poor infrastructure, in turn leads to higher costs incurred due to wastage. Furthermore, this creates resistance in transport of produce freely across the nation, thereby generating localized inflation in case of some selected goods.

Nonchalance to information technology is typical barrier faced while going for a last mile delivery system in India. The growing importance of IT mandates proper investment in IT infrastructure which in turn will help the company to serve their clients more efficiently. In addition to this they can track transport vehicle on the move Vehicle tracking system. This will help them to improvise the route of any truck which might lead to cost saving for the firm. Hence, setting up a competent IT system in place as per the company's business need is very essential in the long run.

⇒ **Legal & Social** – The uneven tax structure across various states also hinder the efficiency of last mile delivery system. The introduction of a uniform Goods and Services Tax may change this scenario. Additionally, last mile delivery deals with transport of goods to some far flung areas also raises safety considerations. This has also led some of the industry players to rely more on local expertise rather than developing their own network.

⇒ **Last Mile Delivery in Disaster Management** – Adding another dimension to the discussion is the importance of last mile deliveries in times of natural disasters. A natural disaster brings forth every conceivable problem related to last mile delivery. Humanitarian supply chain management is more difficult than its commercial counterpart because it requires a greater amount of logistics in a shorter amount of time. Moreover, infrastructure often gets destroyed, hindering communications and transportation. The demand for relief supplies is huge and immediate and at the same time, the threat of death and disease adds a sense of urgency. The main operational issues cropping up related to last mile distribution are relief supply allocation, vehicle delivery scheduling and vehicle routing. The task is made more difficult due to strict financial limitations.

## Conclusion – LAST MILE ECONOMY

As the age old saying goes, "Necessity is the mother of invention"; similarly, efforts to solve the last mile delivery problems have led to some entirely new sectors of the economy coming up and new off – shoots in some others. The last mile delivery is estimated to be around \$ 8 billion industry in India. This has brought in several new start-ups who provide these services exclusively focusing on this burgeoning space. Though in its nascent stage, the sector may see some traction in coming years.

Chottu.in, a last mile logistics firm that specializes in delivering the product at the customer's doorstep was started by Adhar Agrawal. It provides the logistics support to many e – retail organizations. They are not involved in shipping the consignment from the warehouse. Once the goods are shipped to a particular city, they deliver it to the customers. Chottu.in works only for e-commerce clients like Myntra, an online shopping portal, as well as Groupon India.

Another important development has been the increasing sales of sub – one ton commercial vehicles as a means to improve last mile delivery, where these smaller vehicles are utilized. A common example is the introduction of Tata's ACE which has perfectly filled this space.

All said and done, it is more than evident that the problems that India faces related to the last leg of distribution networks are too significant in magnitude to get solved so soon. The Government is doing its part by boosting rural connectivity with the help of Pradhan Mantri Gram Sadak Yojana, a 100% CSS. However, there has been considerable slippage and this shortfall is being addresses by clubbing it with the Bharat Nirman Programme initiated in 2005-06 and trying to achieve the targets in a time – bound manner. At the same time, Public Private Partnerships have also been explored in several cases through Build – Operate – Transfer (BOT) and Build – Own – Operate – Transfer (BOOT) mechanisms. With these initiatives, it is being hoped that India will be able to overcome the challenges which come along with last mile deliveries.

### Did You Know

Amazon has metrics showing that a 0.1 second delay in page rendering can translate into a drop of 1% in customer activity." What can that 1% drop in customer activity do to revenues? Assuming a 10% conversion rate (assuming most customers at Amazon are repeat and not just exploring the site), it translates into 48 million dollars!



# Servitization – An Emerging area in Manufacturing



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*“Traditionally, manufacturers assumed services as purely an add-on to their products. After the evolution of servitization, services are now becoming a major differentiating factor in a totally integrated product-service offering. The boundary will be reached, when products will be treated purely as an add-on to the services.”*

Few decades ago, the world seemed quite simple. Manufacturing companies produced goods for us; like televisions, planes and cars. Services were provided by the companies; like hotels, hospitals and banks. But then, services companies became more and more successful with time. They took a bigger and bigger size in our economy. Cut-throat competition, increasing production costs and customers empowerment are few major challenges for manufacturers now. In this kind of a macro environment, the basic business model of lots of manufacturers is just not sustainable in a longer term. Inclusion of *services* is an option for their survival. Even manufacturers can build revenues through services, and the process is called Servitization. People hold misconceptions like Servitization is all about letting go the manufacturing activities and thus, product itself is no longer of importance. Let's dispel this widespread myth and understand what Servitization is really all about?

## What is Servitization?

Servitization is about adding more and more services to the products, rather eliminating the product itself. It is widely recognized as the process of creating value by adding services to products, which implies using product itself as a platform for delivering services.

## Evolution of the Concept of Servitization

Servitization is like the marriage of products and services. The term 'Servitization' was coined by Vandermerwe and Rada (1988). They defined Servitization as "The increased offering of fuller market packages or bundles of customer focused combinations of goods, services, support, self-service and knowledge in order to add value to core product offerings". They considered intangibility of services as their major differentiating feature from products.

Engine manufacturer Rolls-Royce (R-R) is frequently lauded as good example of Servitization in aerospace sector. R-R had registered trademarks and contracts, which enables collecting fixed engine maintenance costs, over an extended period of time. Slowly but surely, a belief developed among the traditional manufacturers that a move towards Servitization is a means to create additional value adding capabilities. Manufacturers started to look these integrated product-service offerings as distinctive, long-lived, and easier to defend from competition and thus, Servitization evolved.

## Product-Service System (PSS)

Product-Service system (PSS) is a Scandinavian concept, closely coupled to the concept of sustainability and focuses on reduction of environmental impact. PSS has been defined as a combined bundle of tangible products and intangible services designed to fulfill specific customer needs. Although concepts of Servitization and PSS have developed separately and emerged from differing perspectives, they are converging towards a common conclusion that manufacturing companies should be focusing on selling integrated solutions or PSS (Tukker and Tischner, 2006).

## Servitization Strategies for Manufacturers

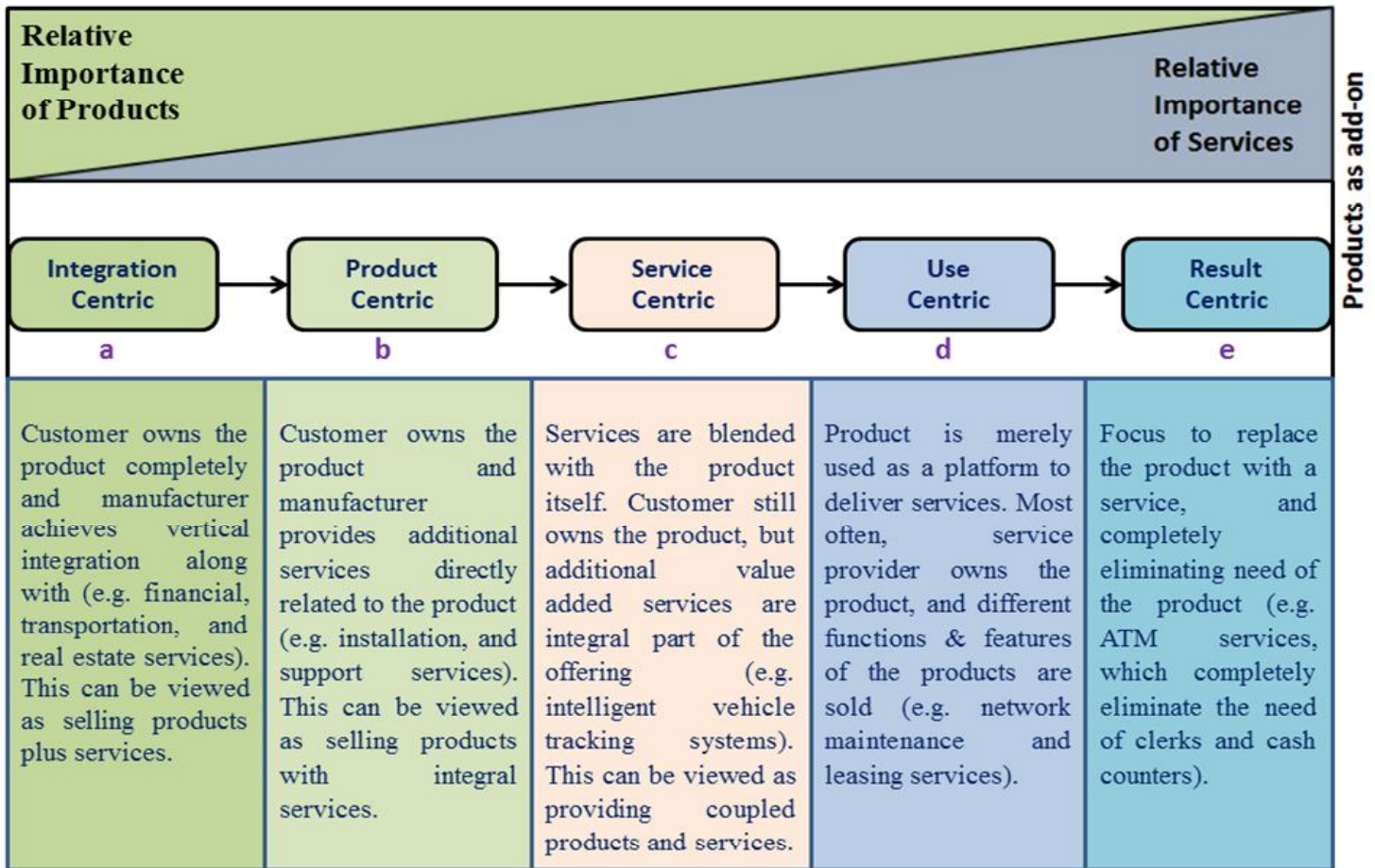
Traditionally, manufacturers assumed services as purely an add-on to their products. After the evolution of Servitization, services are now becoming a major differentiating factor in a totally integrated product-service offering. The boundary will be reached, when products will be treated purely as an add-on to the services.

Five different Servitization strategies have been suggested by Neely (2008). A key

feature of these strategies is strong customer centrality. **The strategic product-service continuum** is shown in figure below. A manufacturer first has to analyze firm's current and desired positions along this **SPS Continuum** and then have to decide upon desired Servitization level.

package.

**Introvert Bulk Producers** represent stereotypical manufacturers that concentrate on selling products without much interest in providing services.

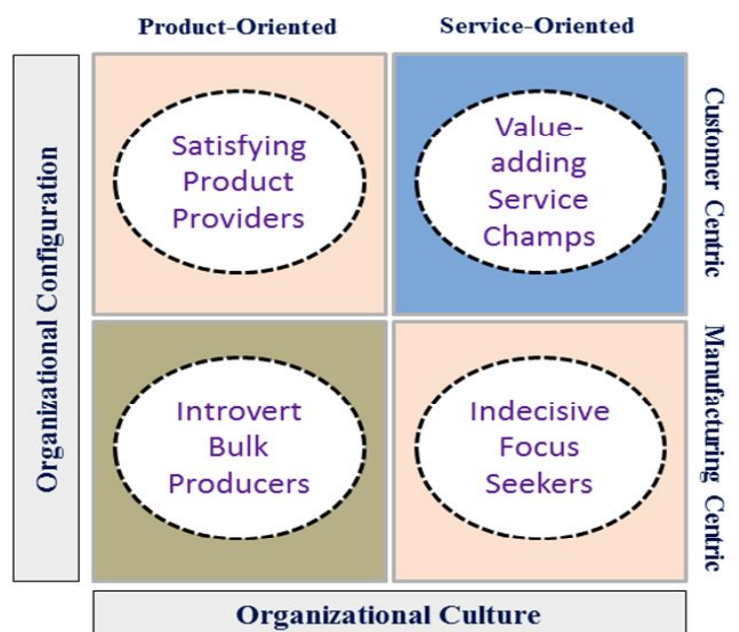


**The strategic product-service continuum**

Organizational culture of a manufacturing company is said to be product-oriented, when organization focuses on efficiency, economies of scale, and beliefs that variety and flexibility are costly. It is classified as service-oriented, when focus is on continuous nurturing and communicating service awareness as product-service-package. Organizational configuration is said to be manufacturing-centric when operations focuses on production and selling and defined as customer-centric when focus is on developing customer relationships and integrated solutions. The model is shown in figure along side

**Satisfying Product Providers** serves customers mainly through selling products. A true understanding of customers' requirement is still lacking and potential of adding more services exists.

**Value-adding Service Champs** are seen as most able in Servitizing their operations. They have to focus on their abilities to maximize the revenues from appropriate



**Servitization Capability Model**

**Indecisive Focus Seekers** may face internal conflicts due to service-promoting culture and manufacturing-centric capabilities

### Industry examples

It has been seen that giants, those supplying high-value capital equipment such as Rolls-Royce, ABB, Thales, and Alstom are leaders in adopting servitization. These giants have shifted from product-manufacturers to integrated service-providers along their value-chain. Few other examples are Ericsson, Nokia and WS Atkins.

### Challenges in Servitization

Transition of focus from products to services is a major challenge for manufacturers, as this will require extensive inter-functional co-ordination and alignment with overall

corporate strategy. Few other relevant challenges are –

- Defining a product-service strategy
- Aligning corporate strategy with business model
- Shifting mindset of various functional areas
- Designing product-service offerings

### Conclusion

Servitization is the means to sustain and maximize revenues for today's manufacturers. They can thus realize their full potential by adopting relevant servitization strategy. It requires innovation of organizational capabilities and shift of mindset from selling products to providing customized product-service packages. Servitization helps manufacturers to come closer to their customers and understanding them better, which in turn nurtures overall business prospects. It's a call for all the manufacturers, who wish to maximize value of their firm and value delivered to their customers as well.

### Did You Know

- The first automobile to be mass produced in the United States was the 1901, Curved Dash Oldsmobile, built by the American car manufacturer Ransome Eli Olds (1864-1950). Olds invented the basic concept of the assembly line and started the Detroit area automobile industry.
- The mastermind behind MRP (material requirements planning) was IBM's Gene Thomas who later founded the company, Emeritus.

# Maple Case Study Contest

One of the biggest tech giants in the world, Apple is hoping to increase its market share manifold in the Mac book, iPod and other accessories segment. Apple has achieved a growth of 15.6 % in this quarter compared to 3.9 % in the preceding quarter and is looking to sustain this growth rate.

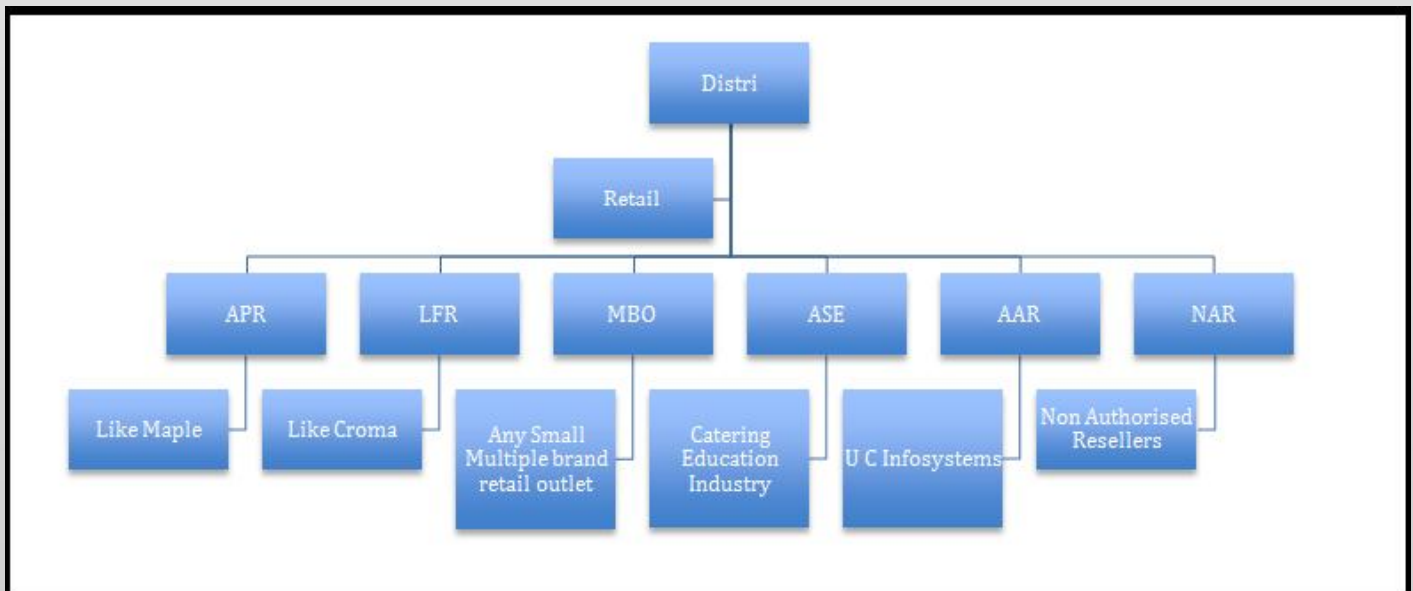
According to a write up in the Wall Street Journal, “Apple is about to expand its Indian sales in a big way and is already working out details for the same with its distribution partners in the country”. For Indian consumers, of course, this spells a greater freedom of choice. As per its ambitious plans, Apple has tied up with Neoteric, Redington & Ingram and others channel partners for the Indian Markets.

Maple is one of the retail business units which have recently contracted with Apple for the Authorized premium Retailership (APR).

## About Maple

Maple, established in year 2005 is a core Retail Business unit which also operates in Broadcasting and corporate businesses. It is an established premium reseller of Apple products in India. With a team of more than 100 dedicated employees, it is serving pan India. As per its current expansion strategy, Maple is focused on opening more no. of outlets. It currently has three premium stores across India. It is planning to open more premium outlets. However, with the growing e-commerce industry in India, Maple sees a new opportunity to reach out to more no. of prospective consumers via the online platform.

## Current distribution strategy for Apple in India



## Maple strategy for online Market

Though Maple has a plan to launch an online platform, it wants to weigh its alternatives before framing its future Roadmap. Maple has noticed that the Apple products are primarily sold online in major Global Markets and this trend is due to follow in India.

According to IAMAI, the sectoral umbrella body, current e-commerce market in India is around \$ 10 billion and at a more robust growth scenario, it can grow between \$ 125 billion and \$ 260 billion by 2024-25. Current online retail market players like E-bay, Infibeam and Amazon are the major players in the e-commerce market segment.

“Even though there are only under-10 million internet users who actually buy online in India, there are about 150 million internet users or around 75 million households that are 'ready' for e-commerce” as claimed by the IAMAI.

Having realized the current potential, pertinent question appearing before Maple is whether to completely own its exclusive online platform or to have strategic tie-ups with the leading E-commerce websites to provide this platform.

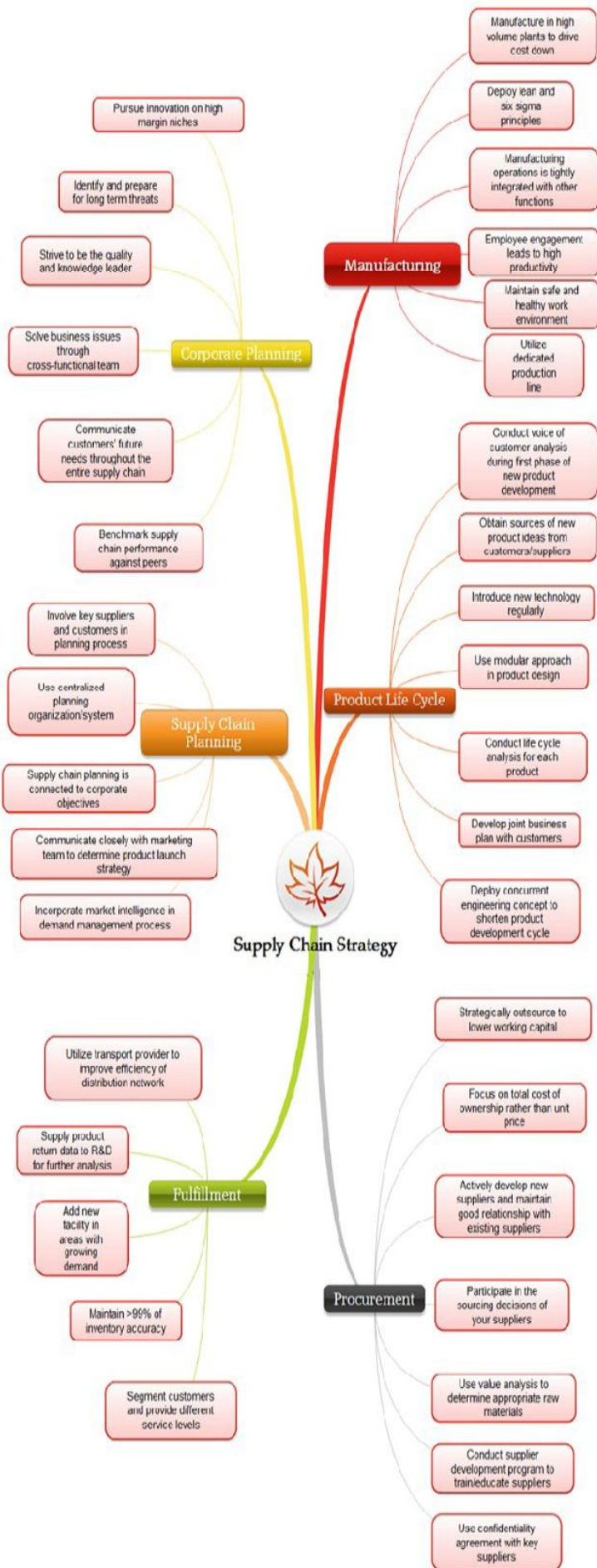
Owning its online retail platform would mean more customer intimacy and higher brand loyalty. Attracting sufficiently large user traffic and restructuring a new business process will be few of the major challenges. Going through other Retail e-commerce sites would mean that Maple has to compromise on customer intimacy and brand loyalty.

### **Deliverables**

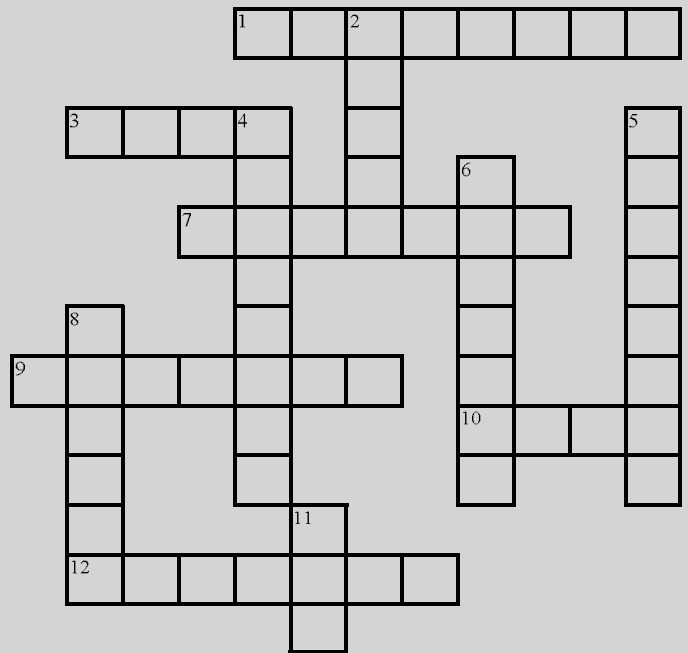
- Consumer preference and E-Market potential for Apple Products in India
  - ⇒ Include the market/customer research done in pdf/xls format
- Maple "Go to Market" strategies to compete with other E-commerce sites (Differentiation and promotional strategies)
- Potential challenges in Supply chain transition from Brick & mortar stores to e-commerce
- Partnership and strategic Tie-ups for increasing penetration and efficiency

### **Rules and Regulations**

- A team of 2-3 members from the same institute can submit the solution in form of PPT slides
- Send your entries to [nitie.c2x@gmail.com](mailto:nitie.c2x@gmail.com) in the form of <Team Name\_college.>.ppt/pptx
- Deadline for submission is 23:59 hours, 12<sup>th</sup> March 2013.
- For Registration and other details visit: <https://www.facebook.com/nitie.c2x>
- Contact Sumit Choudhary (9167683660) or Piyush Shah (9819891676) in case of any queries.



## Cross Word



- \_\_\_\_\_ forecasting refers to computer monitoring of tracking signals and self adjustments if the signal passes a preset limit
- A call light that signals problem
- A forecast that is consistently higher or lower than actual values of a time series
- Fees manufacturers pay to get their goods on the shelf in a retail store
- Japanese term that describes suppliers who become part of a company coalition
- Bill of material organized by major sub- assemblies or by product options
- Rule used to minimize the processing time for sequencing a group of jobs through 2 work centers
- Switzerland based consumer food giant which paid 29 different prices for vanilla to the same vendor
- \_\_\_\_\_ Means tracing upward in the BOM from the component to parent item
- \_\_\_\_\_ identifies all costs connected with poor quality and shows how these costs increase as the product moves away from being exactly from what the customer wants
- Systems for automatic placement & withdrawal of parts into designated place in a warehouse
- All inventory between a stage & the final customer

1. ADAPTIVE 2. ANDOON 3. BIAS 4. SLOTTING 5. KEIRITSU 6. MODULAR 7. JOHNSON 8. NESTLE 9. PEGGING 10. ASRS 11. QLF 12. ECHELON  
Crossword Solution

# WITH ATTRACTIVE INTEREST RATES, MANAPPURAM GOLD LOAN BECOMES MORE ATTRACTIVE...



*'Ab life banaaye  
aasaan...'*

*'Life banvi  
soppa...'*

*'Jeebon kore  
tole shohaj'*

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## *Who We Are...*

C2X, Chain to Excellence, the supply chain forum is an endeavor by students of NITIE to catalyze the supply chain interests and to bring awareness about up-to date industry best practices and latest supply chain innovations. In this current age, where the competition is no longer between the organizations but between their supply chains, C2X is an initiative where NITIEans do their bit to bring out the best of the industry to one and all.

The forum aims at being an interface between industry and academics. The raison d'être of C2X is to supplement the teachings at our institute. Our activities focus on enlightening the students on Supply Chain by conducting various group activities, guest lectures, case studies and knowledge sessions etc.

We believe that supply chain being a very dynamic field, there is a lot to explore and lot more scope for us to improve. We hope you enjoy the magazine as much we enjoyed creating it. Please do write to us in case of any concern.



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