

VISIBILITY OF INTEGRATED TACTICAL LOGISTICS : VITAL

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ABSTRACT

The term visibility in logistics & supply chain management has a prominent and positive appearance in terms of customer service and is very crucial in managing smoothly the logistics networks effectively & efficiently. Various firms across the global, either performing local or global, the visibility aspect of logistics comes with a huge problem which is coordination across channel partners or the visibility aspect, creating delays, losses, damages sometimes to the firms. This paper attempts to present a sophisticated layout of the various aspects in terms of logistics and the concept of visibility at various points in time. As the main objective of the research has been to identify the various aspects which will help in establishing a transparent supply chain network such as IT infrastructure, tracking & tracing system, web based software solutions and integration of manufacturer-supplier ERP systems. This paper also deals with the complexities of tracking systems in domestic and international arena. Tracking and tracing the product through automation of real time information processing.

Keywords : Logistics Tracking, Distribution Partners, Real time information processing.

INTRODUCTION

Before talking about the term visibility and its relevance in logistics and supply chain management, we would like to discuss about what were the problems faced by the companies and how these problems were ruining face of these companies in the market. Supply chain management over the years has become one of the key areas of investments for multinational companies across the globe. It's only because of the role that it plays in the entire scenario of profit making but also their ability and capabilities to sustain. The companies often are baffled with the questions of, how to make products easily available to the customers at the right place at the right time without incurring much of a cost. The answer to this question is building a strong and supportive supply chain management system. Today there have been magnificent advancements in the field of supply chain management which enables the producer to serve their customers in the best possible way in the shortest span of time and making the optimum utilization of their resources. Companies strive to make their supply chain network transparent so that not only they know whereabouts of the product at a particular instance of

time but at the same time it could be known to the corresponding customer that where exactly his/her product is at a particular time.

This not only helps in keeping the track of the products shipped to the customer by the supplier but also builds a sense of confidence in the customer about the reliability of the supplier which ultimately fosters their long term relationship. Here Visibility comes into the picture; visibility in layman's language is making the product visible right from the origin and keeping it visible till the time it reaches its end customers. It means that making the supply chain pipeline completely transparent and accessible right from the origin. Thus the concept of visibility means making the information about the product, its location, condition and movements available and accessible across the supply chain network throughout its supply chain nodes like the vendors, producer, shippers, business partners, dealers and ultimately the end customers at all point of time. Companies today are trying to make their logistics and supply chain management system completely transparent but only few have succeeded in doing so.

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Today visibility is no more a concept that is found in mere theories, "Visibility" has become a reality, and companies have succeeded in making their supply chain network transparent to the maximum extent. The multimodal transportation system advanced tracking technologies, abundance of product information and enormous data received from all the nodes have made it possible. Companies considered to be pioneers in logistics and supply chain management bank upon this technological based tracking system to locate and trace the product not only locally but globally providing a competitive edge to the company over its competitors.

Visibility can also be expressed in terms of inventory movement from one point to the other with all the pertinent information available and accessible to the users who are a part of the supply chain keeping the end customer well informed about

the entire transportation and the delivery scheme, resulting in better customer support. Business organizations generate huge amount of data while completing its one cycle of delivery of a product. This starts from arriving of the order by the customer, reception of the order by the supplier, procurement of the raw materials by the producer, dispatch of the material by the vendor, processing of the order, shipment of the product and reception of the product by the end customer. But are these information's generated put into use, it's a controversial question because it has been found that organization though after generating such enormous data are unable to strengthen their supply chain network that results in several lacunas in the delivery system, which in turn means that the firms fail to utilize their IT infrastructure, their technologies and the resources in the best way they should have been done otherwise.



Figure 1: Step to Supply Chain Improvisation

BACKGROUND

Logistics & Supply Chain Management (LSCM) is a very crucial concept which has been into existence since long and it plays a very vital role in business strategy, whereby there are trading partners within the supply chain committed dedicated members to work in tandem to bring maximum value to the consumers for the least possible total supply chain cost and time.

The process works on an integrated flow concept of physical goods, the information, funds

and knowledge amongst the best players in the industry including suppliers, manufacturers, wholesalers, logistics and financial providers, retailers and the end consumer. It takes place with the support of the 3 Cs of logistics namely Collaboration aspect, Consumer driven supply chain aspect, and the Cost reduction aspect, the non-value added processes in the supply chain are therefore removed and overall working efficiency also gets upgraded and enhanced and works in the best possible manner.

THE SCENARIO

An organization can drown in information and data generated from its supply chain network but the key to sustenance is not extracting or gathering this enormous amount of data but in proper usage of these information received and automated in the entire process and actions based on these data and information's that is received.

In order to establish complete visibility an organization must have supportive IT infrastructure which could enhance the automation process of monitoring and tracking the product in the supply chain pipeline. Visibility in supply chain system not only tracks down the product but also acts as a link between the business partners and the end customer completing the logistics and supply chain loop.

Technology acts as the key facilitator to the visibility concept, proper and adequate web based support is utmost required for establishing visibility in the supply chain network. Web based supports and software solutions like GTM and TMS have become one of the most popular technological solutions for the supply chain managers. The reasons being that these solutions do not require huge investments, they can be easily installed and the true value is derived from their connectivity. The supplies and the shipper both have their ERP system through which they sought out the orders to be processed and delivered which is works on the basis of schedule. The completion of the visibility track is marked by integration of the ERP system of the shipper and the supplier.

Thus to establish a strong supply chain visibility network the supplier must keep into consideration of the following points.

- What is needed?
- When is it needed?
- Where is it needed?
- By whom is it needed?
- What are the nodes attached?
- What resources have to be deployed?
- Cost to be incurred?
- What technological support do we require?
- How can we monitor and track the products in transit?
- How can we establish linkages?

Boosting Supply Chain Visibility

Refining supply chain visibility is of utmost concern these days as companies and corporates are

striving hard to maximize their go-global operations performance. According to a study of few prominent firms, marketing and product management, mostly global trade management solutions provider, offers these types of inputs for using various technologies to increase visibility.

1. Looking at the huge scenario. You need to make sure your visibility software or the parameter is flexible enough to adjust or accommodate with the various fulfillment models and needs in operation throughout the entire organization. Looking on to get and accrue more profits the firm, not just within a single product line or the operational model.

2. Creating a "data or info center." The need to relocate the main info should be removed by assimilating the various aspects of key order, shipment, and inventory information from completely internal inventory planning structures.

3. Choose the partners you are going to trade with wisely. The data quality initiates its process at the source. Confirm new connections by wisely assessing various information requirements and also by leveraging the existing integration partners from an already established network of transportation and logistics service providers and brokers.

4. Postponement in inventory allocation decisions. Most of the leading companies use the new concept of visibility systems to track shipments at the Stock Keeping Unit level. This tracking therefore allows them to handle containers as "floating warehouses" to implement to all the required inventory diversions through a transloaded service facility or to postpone the inventory allocation decisions until just prior to entry.

5. Visibility context, pushing back to origin. The techno savvy companies link their orders to the shipments and in managing in-transit inventory. According to the new customs regulations, viz. 10+2, make importers now more accountable. Many of the required 10 data elements are related to where goods are loaded.

6. Use of scorecards in managing of the trading partners. Visibility comes with a rich storehouse of logistics & supply chain data that can be performed with all the trading partners. So, in order to have a clear and concrete visibility, create a data scorecard to manage the supplier compliance and performance.

7. Use a specific target or instrument that

prompts to facilitate in automation of shipment handoffs. Leading companies use the concept of "instrument that activates" based on supply chain events to plan for their warehouse receipts, the inbound and outbound agenda pickups, and the issue other alerts. This trigger creates and adds remarkable values by compressing the order cycle time and further helps to reduce the demurrage and fixing up of the flaws.

8. Having your own 4Party Logistics System. The shippers can look for implementation and deployment of new value-added services for their existing business units as well as the new firms and "plug-in" into the logistics provider partners - which in effect, helps in becoming their own fourth-party logistics providers known as (4PLs). This model's has couple of advantages that all trading partners gets integrated to the actual single centralized standard and are managed in both ways tactically and strategically. Therefore, the central logistics system has a control of all information assets and delivers the best value-added services to constituents.

WHAT'S THE MATTER ALL ABOUT?

We know that there are people involved in inbound and outbound logistics chain, so, therefore shippers are trying to wrap their arms around the crucial point of visibility and should start by taking a step back in order to look at how this concept actually originated.

"An incident in the year 2000, when there was a scenario of world hunger and providing of world peace to/for everyone was looking for the following, great supply chain technology," "Everyone everywhere was talking about visibility management and saying that this was the time for improved transparency in context to what was going on in the supply chain spectrum."

The concept of event management and transparency were merged together into a single industry term called "visibility" which focused chiefly on the shipment and order statuses. The prime examples of implementing these tracking methods were preferably FedEx and UPS in action. "The shipments and logistics were traced down and were monitored routinely using technology," "with the alerts that were sent out to the stakeholder stating whether the item was in transit, source place or ultimately delivered at all stages."

However now since it's been 14 years, and in the earlier years before such solutions came, it was difficult to find their way into a day of the typical shipper's operations. "There were few vendors who were providing high techno savvy solutions were working on nearby parameters, but there was no such specific marketplace for those typical products". "Mostly after the year 2000 and a series of advancements shippers started coming of technology-hype fatigue and were cautious about emerging technologies leading to the tremendous increase in the visibility aspect".

Lately in the 2000's mid there were evolutions in the new generations of supply chain vendor who were prominent on these aspects, ready to help the shippers attain UPS-like visibility. The focus was primarily on specific, best-speedy-faster solutions, these firms developed tracking solutions that could track shipments, provide all mobility alerts, and help the receiver or the client achieve visibility, both domestically and internationally, giving reach to global and local grounds.

TIMELY, ACCURATE, COMPLETE

The concept of Supply chain has been so prominent that now it's a synonym for timeliness, accuracy and complete information, the data associated and the various insights about shipments and assets involved. Unfortunately, too much data-particularly when it's improper or redundant-can lay just as much burden on the logistics supervisor as not needing the data at all. Throwing light in the fact that some business associates or partners use EDI, while the rest rely on systems like email, faxes, and the job of rejecting through the data to decide what's beneficial and what's not gets that much harder.

One can factually drown in information and data if the visibility context is done properly, says a senior person from a supply chain technology blog and analysis organization. "The actual value that takes place not from collecting all the compulsory metrics, but also slightly from being able to mechanize the whereabouts based on the information that's coming in."

The use of technology is the ultimate facilitator for making all the above happen. As and when required on-demand of people, or Software as a Service (SaaS) solutions, these are particularly good options available in the way that they're web-

based and accessible for all trading partners associated and customers to tap into.

"SaaS solutions have gained much popularity as they are faster to arrange and involves a lesser upfront asset investment, but the unseen value of these answers lies in their connectivity," By default, an arrangement of such type that is on-demand creates a connectivity network, system or pattern, or involves hundreds or thousands of smaller, bigger firms that can flow information over a single platform of hub.

Another important aspect is the integration of a shipper's ERP (Enterprise Resource Planning) system with that of its vendors or suppliers as an equitably basic step on the road to complete the visibility aspect. In such scenario, when a purchase order is issued or made electronically, for instance, automatic position alerts can be made available to show that the purchase order (PO) has been received and any further edits that were made to it can be seen. Shippers can keep tabs on the purchase order and plan accordingly around its estimated shipment delivery date.

At the other side of the band are the software platforms that monitor and facilitate the status of an order starting from the source, over its lifecycle and update the shipment statuses regularly throughout that lifecycle of the order. Let's take as an example a PO has been placed and inputted into the starting platform, now the shippers can track the order from their software systems and also to the outsourced manufacturer's organization's system. The order is thus updated several point of times to reflect its current status, eventually updating & alerting not only the initial shipper-but also its various channel partners be it carriers and/or logistics providers or to the fact that the goods are ready to be picked up.

In practice, however there are several tracking systems available for visibility through GPS, RFID, Barcode etc.; in the past however, all these systems were not fully compatible with the need of the industry. Majority of the accessible tracking and tracing systems operate on proprietary tracking statistics defined by the individual firm's operating systems and are created on information architectural parameter, where the tracking data is integrated to the provider of the tracking facility. Existing tracking systems cannot be able to classify the matters within a container for example, whether the container is open or the contents are lost, damaged or taken etc. In order to hold on to such misalignments

in the purview of the logistics network state-of-the art technologies needs to be developed for workable production process. Tools needed for these should be cost effective and also on the other hand possibility for reuse or recycling in any underlying circumstances. Before proceeding towards the scenario of real-time tracking expertise, it is critical to investigate its various possible cause and effects. Ideal performance methods for the technologies could ensure success in the projects for any industries.

The tracking technologies in logistics networks are applied impartially little in the global technology & expertise industry. Mostly huge volumes of global businesses are implementing this technology with limited available capabilities. The basic procedures for these tracking systems are typically confined for the customer to contact or see or track the tracking information are within the area of outlining the shipments through manual inquiries such as using a site of the firm or calling onto their offices, e-mailing or to engage in emerging systems interfaces or assimilating with the tracking system. There is even no accessible tracking system between generation of invoice and transportation. Customers get the goods that they ordered through either calling or e-mailing the concerned vendors and there do not exist real-time tracking and tracing technologies. This missing affect to the network and the relationship structures between players of manufacturing firms and potential customers too. Therefore industries need a concrete concept, approach, tools and competency to methodically develop their real-time tracking technologies for benefit to all the parties involved in this logistics network.

As we know that, without proper and suitable tracking and tracing system, efficient management of logistic flow would be tough to obtain. With the implementation of this visibility system, it is possible to achieve, detect and reacting any uneven situations in the logistics chain of events and wherever needed important problems or issues can be resolved or at least the loss can be minimized. This type of system is also well-thought-out as a key service requirement for the global transportation businesses firms especially, when they are united with the manufacturing firms adopting just-in-time (JIT) operational strategy. We need to take into consideration other factors like operational scope, coding of the tracked items, goods identification

technology, information planning, or accessing the tracking information etc.

REVIEW OF LITERATURE

L. Allen Bennett, CEO and President Entigral Systems, Greensboro, North Carolina states in his paper that "with a scanned barcode, you can actually have a specific number for a specific product, and with RFID you can have a one to many relationships, there exist a case where efficiency increases. In global supply chain management (GSCM), tracking and tracing of logistics networks is considered to be a very important issue. Establishing a well-equipped logistics network implies that the organizations have utilized their available resources in the best possible manner. Many a times tracing and tracking are used as synonyms. There are no approved definitions that could clearly distinguish between tracking and tracing, but still there are some minor details and nature of use for these words which gives them a distinctive meaning. The word tracking and tracing are used together by many authors and supply chain managers. The term tracking is defined as the collection and management of the information of the product(s) about its present location whereas, tracing system deals with maintaining the life cycle history of all the products and components right from its manufacturing till its distribution and retaining it in the form of log and extracting the relevant information when required.

The tracking and tracing systems have become a part of industrial norms in the practices of logistics and supply chain management of various logistics solution providers (LSP) because it not only serves the means for providing better customer service but also helps in developing competitive advantage for these LSPs. Companies are always in search for better tools and techniques for tracking and tracing the products since quite long.. Not only business organizations but academic community and standardization organizations are also keen to develop new and better standards and identifications so that the product tracking and tracing can be done with ease and with least possible errors. Companies today need much more than standard procedures to track and trace the products. The standard procedures usually adopted is only limited to the identification of the product and its components and do not have any connection with actual tracking and visibility for example Barcodes. Tracking and tracing issue

becomes much more intricate and critical with the scale of business and the distance. The complexity increases when the product has to travel a huge area like in international trade where the products and components cross national boundaries. This results in inclusion of more number of channels and partners within the supply chain network. This can be tackled with gathering, storing, sorting and extracting product related information at all points.

This tracking tracing system plays a crucial role in logistics and supply chain management it not only helps the concerned parties by providing the whereabouts of the product and component but also facilitate better customer service which further helps in expanding the customer base. Well-equipped tracking and tracing system not only enhance the brand image of the company through customer satisfaction but also helps in increasing revenues through its low cost IT infrastructure which can be easily installed. Thus tracking and tracing systems have provided a new face to the concept of visibility and serves both ends of the logistics and supply chain loop by increasing the transparency and reliability in the operations involved in the network.

RESEARCH SCOPE

Reduction of delivery time has always been an area interest for all Logistics solution providers be it at national or international level. Companies look forth to having latest technology to boost their supply chain network to meet the ever changing need of product customization. Real time information processing system is what organizations today require supported by unbeatable technology and process automation. They aim at optimizing the entire logistics and supply chain network so as to satisfy the producer, dealer, vendor, business partners and ultimately their end customers. This research study analysis the challenges faced by logistics and supply chain department of companies today and how these companies tackle these problems by leveraging technology and information system. The study also examines the linkages between different channel partners involved and the process in which they adjust their demand and supply scheme. The study elaborates the importance of visibility and how visibility can lead to sustenance in a dynamic market scenario through use of technology and various tools which ultimately leads to development of a strong and flawless supply chain network in a global market.

The projected work also determines ways to establish a transparent supply chain pipeline for better customer service and enhancing brand image in present business scenario.

The specific objectives of this research are as follows:

- Description of concept of visibility and its relevance in supply chain network.
- Analysis of various determinants of Visibility in logistics.
- Description of the product tracking and tracing system.
- Analysis of tracking and tracing system from supplier point of view.
- Description of different technologies to enhance visibility in logistics network.

FINDINGS

Companies incur huge cost due to inefficient supply chain network which is ultimately a result of lack of transparency called as visibility. Organizations have abundance of information about the product they fail to utilize it in the best possible way due to their incapability to automate the real time information processing. The concept of visibility is given due consideration in present prevailing business scenario as it helps in making the information about the product available right from the point or origin till it is made available to the end customer. Organizations thrive to get advance technologies to support the concept of visibility and establish a well equipped logistics and supply chain network. Companies today invest about 45% of entire funds allocated for supply chain management department for enhancing visibility in their supply chain.

Visibility concept is clubbed with latest technologies used for tracking and tracing products and components such as SaaS, GTM, RFID, mobile technology and so on to magnify the results thus obtained from such integration.

THE NEED FOR VISIBILITY

Optimization of supply chain network is the main aim of any logistics solution provider. This optimization helps a company to derive better results through investing less by leveraging advance technology and latest tools that can be easily deployed and are cost effective. Visibility not only enables a firm to service its clients in a better way but also obtain cost leadership and develop competitive

advantage over rival firms. As the scale of operation increases there is a critical need for having pertinent information about the product and component especially in international trade. Visibility plays a crucial role in making the product information available and easily accessible to all the parties concerned right from the origin and also facilitates in tracking down its smallest of movement in entire supply chain loop, which helps in attaining and enhancing customer satisfaction through value creation.

TECHNOLOGY TRENDS HELPS IN THE VISIBILITY OF LOGISTICS

1. Cloud computing and Software-as-a-Service

The concept of cloud computing as a concept has speedily picked up in the recent years. The topmost logistics firms, and the partners associated in the chain such as manufacturers and distributors have now invested in this technology to reap the benefits. The outline of cloud computing and SaaS are more or less the same. As an alternative of buying and setting up of the software solutions internally, most of the companies can outsource them from an outside provider that hosts the applications on its own internal servers. In addition to offering software as a service or to be a service provider in terms of visibility, other services may also be offered by a cloud network that includes platform, infrastructure, database, or other capabilities.



Figure 2: Benefits of Cloud based models for improving logistics visibility in the Chain

2. Global Positioning System

The Global Positioning System technology gives the details of the source and the destination of any order or shipment. During the transit of the order, it facilitates in providing the exact location of the order or consignment. There are advanced GPS

maps and numerous technologies available through which even a layman can track the movement of the goods positioned and its respective present time location, and be highly proactive to customers by informing about the shipment position and its expected time period of delivery. GPS system supports logistics firms to track the location of their goods. Now as the GPS systems are becoming cheaper and more efficiently advanced, day the day, most of the large and medium sized logistics players have adopted the GPS tracking systems.

3. Radio Frequency Identification

Radio frequency identification is a tool known as automatic identification method that relies on storing and remotely retrieving the information & the data using devices called RFID tags/transponders. It allows several functions such as tracking, monitoring, reporting, and managing the orders, documents, assets and the people involved more efficiently as they move between and across locations anywhere at any point of time.

An RFID tag is assimilated into a product or order for the purpose of identification with the help of radio waves. There are some tags that can be read from several meters away also and is also beyond the line of sight of the person handling it. Such RFID tags can be active or passive both as they require a reading device and also an interface computer to process the desired information.



Figure 3: Importance of RFID in logistics

4. Enterprise Resource Planning

ERP system or technology works on a platform that integrates several data sources and further processes it for an organization into a unified system. A distinctive characteristic of ERP system is use of multiple components of computer software and its hardware to achieve the required integration.

ERP further induces enough sound prominent visibility in the supply chain management so that an efficient work flow can be put into picture. By pulling these aspects together and sharing the desired information from functions or various departments such as procuring, warehousing, and sales helps to control the costs associated. The only issue is that cost that is involved in the installation and upgradation of ERP as it is very costly.

CONCLUSION

This paper tries to give an insight about concept of visibility and its increasing relevance in logistics and supply chain management in present prevailing business scenario. The concept is not only dealt by its literal meaning but also the technical aspect attached to it keeping in view the challenges faced by logistics solution providers. Technology which acts as a catalyst and a key enabler for visibility in supply chain network has been discussed in detail. The scope of visibility concept, its viability and significance in respect of business scenario, its impact on organization's brand image, revenue generation and customer service is described taking into consideration both national and international trade.

The need for gathering, storing and retaining the product related information and automation of real time information processing in fostering the supply chain network has been presented along with the flow of information from the origin to the last point of supply chain system. Concept of tracking and tracing of the product in logistics chain and its relationship with overall visibility concept has been dealt keeping in view the present requirement of establishing standard procedures which are not only related with the identification of the product and component but is also integrated in supplier and manufacturer's ERP systems.

The description of tracking and tracing concept helps to draw significant inference about interdependency of visibility concept and technology. It is found that in order to construct a strong logistics and supply chain network with maximum degree of visibility keeping its all channel partners and the end customer intact, the organization must have well developed and advance IT infrastructure. This IT infrastructure helps reduce the cost and provides value to the supply chain system through connectivity. Various tools and software solutions

provides a boost in tracking and tracing system such as monitoring the product movement right from the time of placement of order, through order processing and dispatch till the product is reached to the customer. Companies like FedEx, Amazon & Walmart who are considered to be giants in logistics and supply chain management have pioneered in integrating their supply chain network with advanced web based low cost software solutions to cater the needs of the customers in a more efficient and cost effective manner.

The main contents of the research include a review of overall development of logistics, the various parameters of the concept of visibility in logistics, which helps us to understand the inbound & outbound activities of various logistics firm's operations, logistics activities, its applications and usage in various fields, aspects & dimensions, whether it is a local scenario, domestic or international scenario, it also talks about the different kinds of IT enabled services that facilitates the identification of the order i.e. the product, which further moves on to the future directions of logistics development. To sum up, logistics and visibility goes hand in hand. A company or a firm that invests its money on certain important order, it would surely be interested in knowing the present actual location of the order, thus this context has utmost relevance.

- (1) Logistics system has crucial importance in our society activities, as the world has shrink into a global village.
- (2) Visibility and logistics management have interdependent relationships that needs to perform its activities through the advancement in IT and other improvisation in resources and meanwhile, a successful logistics system could help an economy to speed up and to reduce in-transit traffic.
- (3) The factors affecting the costs among the related elements in logistics-visibility scenario, the improvement could change the overall performance of a logistics system and in the overall cost-reduction.

The development of visibility in logistics

will be still forceful in the years to come and the logistics concepts will be applicable to more fields.

REFERENCES:

- Business Performance Management, Industry Framework Document, BPM Standards Group.
- "KPI-Driven Supply Chains: How to Master Complexity, Optimize Inventories and Meet Rising Customer Expectations," white paper, CDC Software.
- Chris Caplice, Yossi Sheffi, (1995) "A Review and Evaluation of Logistics Performance Measurement Systems," International Journal of Logistics Management, Vol. 6 Issue 1, pp.61 - 74.
- Helo, P., and Szekely, B., 2005, "Logistics Information Systems: An Analysis of Software Solutions for Supply Chain Co-Ordination," Industrial Management and Data Systems, 105(1), 5-18.
- Helo, P., 2006, "Agile Production Management - An Analysis of Capacity Decisions and Order-Fulfilment Time," International Journal of Agile Management Systems, 1(1), 2-10.
- EAN International, 2001, "Global Trade Item Numbers (GTIN), Application Guideline," EAN International, Online at: <http://www.ean-int.org/>.
- ISO/IEC, 2000, "Automatic Identification - Radio Frequency Identification for Item Management - Working Draft," International Organization for Standardization, ISO/IEC 18000-1-v8.
- BTRE (2001) Logistics in Australia: A Preliminary Analysis. Bureau of Transport and Regional Economics, Canberra, <http://www.btre.gov.au/docs/wp49_contents.htm>.
- Carroll, J. (2004) The magical reserve tracing system-RFID. Taiwan CNET, <<http://taiwan.cnet.com/enterprise> > Chang, Y.H. (1998) Logistical Management. Hwa-Tai Bookstore Ltd., Taiwan.
- Cooper, M.C., Lambert, D.M. and Pagh, J.D.