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# **Implement RFID in Railroad Industry from Collaborative Transportation Management (CTM) View**

**By**

**Name: IEELONG CHEN**  
**Organization: North Dakota State University**  
**E-mail: [ieelong.chen@ndsu.edu](mailto:ieelong.chen@ndsu.edu)**  
**Phone: 701-3472151**

**Name: Brian Kalk**  
**Organization: North Dakota State University**  
**E-mail: [brian.kalk@ndsu.edu](mailto:brian.kalk@ndsu.edu)**  
**Phone: 701-3472151**

## **1. Abstract**

Radio Frequency of Identification (RFID) has changed the transportation operation. Many logistics providers have been forcedly implemented to provide their customers' tracking information in terms of increasing their service levels. As members of the supply chain, many trade partners coincidentally have brought out RFID within their internal process under conditions that standards stabilize and component costs fall. From the railroad carriers perspectives, RFID should be adapted to increase their working efficiency and working along with their customers of the supply chain.

Railroad carriers should not only provide a lower freight rate but also need to offer better service for tailoring customers' needs. It would be win-win situation. Under this demanding situation, we used an unconventional concept of Collaborative Transportation Management (CTM) that is the sub concept from the concept of Collaborative Planning, Forecasting, and Replenishment (CPFR) to find the benefit of implementing FRID in the railroad industry.

The result could be used for refining business processes and building up the strength by increasing the degree of visibility and decreasing the expenditure for inventory, logistics, and transportation. It would be the dramatic improvement in railroad transportation and encourage all players of the supply chain (SC) to take advantage from RFID.

## **2. Exclusive Summary**

Many trading partners in the SC believe the RFID would be a life saver in that RFID could bring out a long-term value for them. From the downstream of SC, RFID have been practiced in retail stores and the technology has generated a great amount of interest. To implement RFID, there is no way of practicing it widely at beginning and getting all members of the SC involved. Still, many transportation providers or shippers are reluctant to embark RFID until they fully understand what benefits and challenges they might have.

RFID is not a one-size-fits all technology. Its benefits and challenges would depend on the business scenario. The change could be from the internal reengineering business process and outside transportation providers' competitions. From the railroad history, "there has been a host innovation in railcar development as result of economic conditions, deregulation, advent of larger trailers, growing using containers, and greater levels of terminal mechanization, combined with a more innovative attitude by railroad toward intermodal operation" (Solomon, 2007). Each time the railroad industry uses new technology, the railroad has more prosperity.

The railroad industry has to implement RFID not only for themselves but also for the other trading members in the SC based on the collaborative concept. By adapting RFID, railroad carriers can reduce their clerical activities by eliminating manual tasks. RFID can be used to collect business information and automatically distribute the valuable information to the players in SC.

The information can let the information system be updated in real time. It could optimize the outcome of the whole SC and have the SC players make a better business plan. Our primary issue here is using a macro view of Collaborative Transportation Management (CTM) to encourage the railroad industry to adopt RFID throughout.

For the railroad carriers, they have trouble tracking and managing their rolling properties. They could not know their railcars and locomotives locations if the rolling properties are out of their yards or terminals. For the safety of the commodity on piggyback transportation, it would be an issue as well. If the product is a hazard or security sensitive, we do need to know their location in real time.

For the railroad shippers, they need to know where their goods are, so they can have the improved information access via insight into execution-level activities for their inventory management. They can turn RFID data into an actionable business advantage. The low railroading shipping fee would not only be a major concern for moving their products. RFID has become mission critical and needs to be managed as a strategic mandate. But it is not a silver bullet (Fontanella 2003). Each player should be prepared to make process changes to accommodate the technology. It requires good business integration and customer focus. It is inseparable from the business and requires complete alignment with the other trading partners in SC.

### **3. ROI**

#### **3.1 RFID:**

Radio frequency identification (RFID) is one type of wireless technology and it opened a new door to a new era in Supply Chain. Unlike barcode technology, it is non-line-of-sight technology. A RFID reader can use antenna to interrogate a RFID tag attached on an item and get item information back about its dimension, contents, movement, security and so on and get item's location back in real time (Tsuji, 2004). The item size is not limited. It could be a container, pallet, case, or invisible size. RFID has the capability of collection information that could cross different levels of operation, organization, and countries. And its edge server can utilize, retrieve, and distribute information to different SC players in order to make a value-added business process.

No one can be exempt from a bullwhip effect once you are a player in SC. Players become more vulnerable in particular if the scale of the supply chain over many different organizations. The degree of demanding amplification would increase; it can cascade down the entire supply chain. The bullwhip effect could increase from the bottom of SC, customers and distributors, to the top of SC, manufacture and material providers.

However, all players in SC would have a big change eliminating the bullwhip effect in real time after implementing RFID. Organizations can utilize the information gathered by RFID by integrating their existing information system to make more accurate forecasts in inventory and sales.

Moreover, it is a good way to track a container's location even though they are in mobile status. The firms' boundaries would not exist, and the real-time information would generate new opportunities over the whole supply chain and be beneficial to all members of the supply chain by decreasing the degree of bullwhip, smoothing the lead time, and lowering their management cost in inventory. In accordance with the same business protocol, RFID could be an impulse to forming the emergence of all supply chain members together (Angeles 2005).

The biggest retailer store, Wal-mart, has used RFID as a technological aid to integrate their existed Point of Sale (POS) system. It helps Wal-mart to correct and real time information applying their inventory and price discount.

RFID is the logistics backbone in Wal-mart and it became a major reason to keep Wal-mart competitive. It provides Wal-mart the last logistics information and processes the information by integrating their information system without human re-type process. The labor cost has been decreased and the profit margin has increased consequently. Thus, Wal-Mart can price the "Always Low Prices" to attract the customers.

Railroad logistics providers should take measures to apply RFID in their business. Even though adopting new technology might be painful, it could create new opportunities in return for current business and future transportation markets. Don't let old-school mindsets impede the railroad industries revolution. Based on railroad innovation history, 89-foot flatcars, articulated spine cars, and double-stack well cars have made big contributions to the railroad revolution (Solomon, 2007). We need other action to open a window of SCM; RFID can open a new era to pave the way for improving logistic efficiency.

The cost of implementing RFID is various (Karkkainen, 2003). It could depend on what kind of RFID hardware and software you are going to use for your business process and what service level you are going to provide to meet your customer demand. It could be time-consuming as well. The ROI of RFID is not clear, and it might take more than 2 years to get payback (Blanchard, 2005). The following tale is about the benefits after adopting RFID in SC. It can also generally be modified and applied in the railroad industry as well in the future.

Benefits characters	Cost improvement	Note
Labor	<ul style="list-style-type: none"> <li>Cut 50-80 % in total distribution</li> </ul>	Retailers

	<ul style="list-style-type: none"> <li>cost</li> <li>Decrease 36% in order picking, and 90% in verification cost</li> <li>Identify product bottlenecks for quality control purpose</li> </ul>	beneficial most
Visibility	<ul style="list-style-type: none"> <li>Could lessen the pitfall for all stakeholders. US\$ 28 billion lost.</li> </ul>	Lower inventory level
Asset Tracking	<ul style="list-style-type: none"> <li>Save time and money to identify the their asset for calibration and inspection (Cooke,2000)</li> <li>Track an asset's movement, use, and placement. Tracking people, items, and equipment in real-time.</li> </ul>	Airport use it to replace barcode
Security	<ul style="list-style-type: none"> <li>E-seal for anti-shrinkage by providing an electronic signature</li> <li>Tags could be re-useable</li> </ul>	Favor for high value product

### 3.2 CTM:

Collaborative Planing, Forecasting, and Replensiment (CPFR) is a concept that is an evolution and refinement resulted from Efficient Consumer Response (ECR). The ECR main idea only concentrated on the business management based on vertical collaboration from the participation of manufactures, retailers, and customers in order to meet customer needs and satisfaction efficiently. The goal of ECR provides a comprehensive solution from linking independent partner ideas or individual solutions by offering a platform to retailers, manufactures, and customer. And the platform allowed all members of the supply chain to exchange consumers' data and tactics for a successful entry to create a value-adding process. Later, the ECR was refined and developed as CPFR.

CPFR focuses on enhancing supply chain integration and improving the relationship among all parties of the supply chain by planning, supporting, assisting, and sharing business strategy and information jointly. The major difference between ECR and CPCFR is that CPFR has more concrete-and-contracted on long-term relationships among the members of the supply chain (Seifert, 2003). The systematic and strategic coordination would cross different businesses within the supply chain for the purpose of improving long-term performance (Mentzer, 2001). The degree of replying to the exchanged information is increased. We can consider the members involving the supply chain to be a team. Two independent companies via a collaborative relationship would create more profitable revenue in whole by proceeding and utilizing technological innovations (Tuominen , 2006). Each trade partner would keep their competence as

-serving a business function of the supply chain (Maloni1997). CPFR also determined what kind of information should be shared and how soon it should be shared.

Each organization can keep their core competence and work out their business plan to maximize their profit by taking a part of the joint business plan. The business plan can be optimized and a sales projection is to be created as well. Sales forecast could be more precisely created and make lead time shorter. The whole business process would be modified for increasing operational efficiency (Towill, 1996). The degree of inventory is getting lower through joint visibility and the speed of replenishment of products throughout the supply chain is getting quicker. The reaction time to customers has been decreased because the shared information continues updating inventory and upcoming requirements. Expenditures for merchandising, inventory, logistics, and transportation across all trading partners are decreasing. Trading members could be satisfied in improved business-to-business relationships, revenue enhancements, and cost reduction after they do the final step of CPFR: replenishment (Seifert, 2003).

The Collaborative Transportation Management (CTM) could be viewed as sub-concept of CPFR. The concept is about product movement. It is a new way to solve traffic volumes. CTM is “discipline such as cognitive science and organizational behavior that rule the root.” (Cottrill, 2002)

Walmart piloted CTM in 2000 with Procter & Gamble and J.B Hunat. The result successfully demonstrated the advantages of CTM in reduction of steps processing goods for their promotions. The Wal-mart partners decreased 16 percent in unloading time and dropped 3 percent in empty miles because they got early forecasted shipping order information. “CTM should be viewed as vendor-and platform-independent, such that any trading partner entering into a collaborative relationship will not be hindered by technical limitations.” (Dutton, 2003)

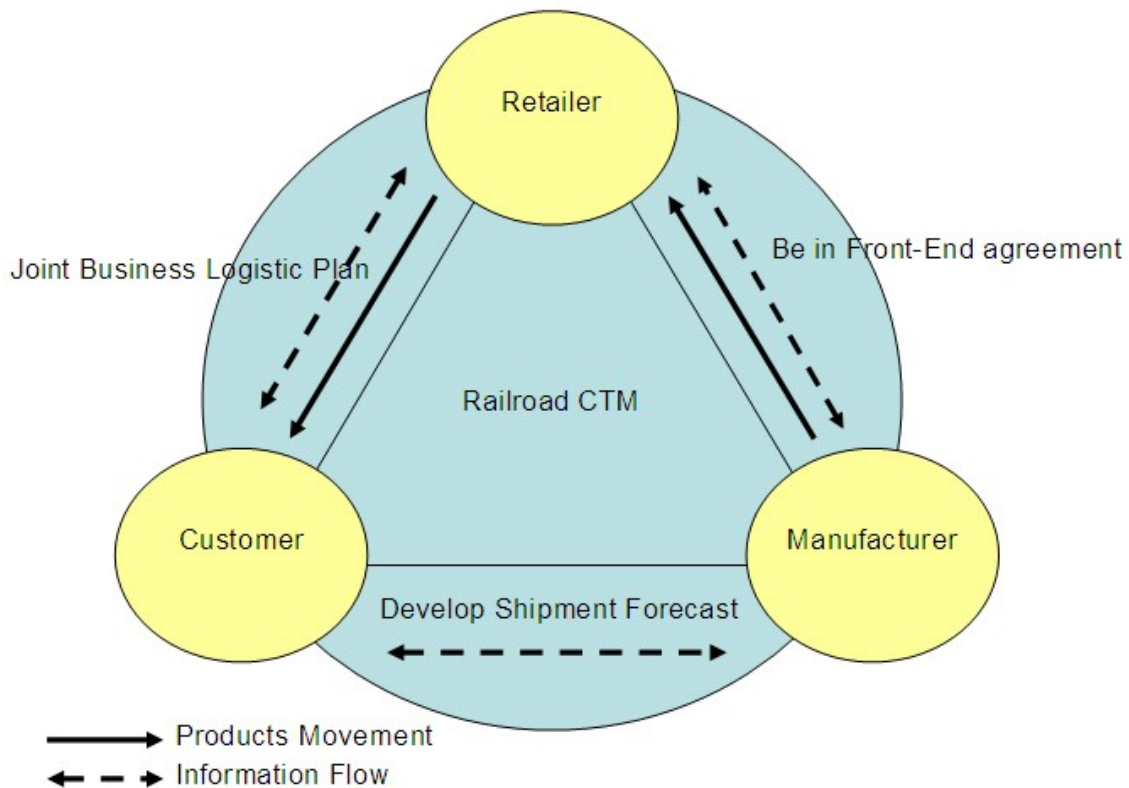
CTM involves carriers in the front-end business agreement and plan; in addition, the information of order forecast could be translated into a ship forecast. For the whole SC, applying CTM could increase the on-time performance and improve the service level (Karolefski, 2002). The each member of SC can execute the physical movement at costs as low as possible.

The competency in transportation has been changed from coordination to collaboration. CTM enhances replenishment continuously and efficiently over a time horizon. It does not only mean that moving goods to difference places is that simple. “In the traditional buyer/seller/carrier relationship, the carrier is the last step in the supply chain” and is usually not asked to participate until the product is ready to be shipped ( Pogorelec, 2000). Players in SC only calculated order requirements from the view of lead-time rather than the view of the whole scope of the joint business plan. Conventional trading partners used replenishment strategies in a traditional way by pull, push or hybrid without having the big picture of CTM. Under the co-managed inventory or vendor-management inventory, the CTM can focus on developing appropriated information exchange links across the supply chain. The output of CTM could improve business

information availability and it could upstream and downstream the whole SCM. The focus on the whole transportation of the supply chain is not only about moving goods, but also is related to an individual company's business strategy; "logistics capabilities are significantly linked to strategy." The exception transportation would be well managed and solved since the action could be triggered by the other trading partners (Lynch, 2000).

The railroad carriers could improve their customer service level through improved shipment status visibility by the CTM. By taking advantages of the trading information collected by RFID, railroading providers could have more opportunities to explore their current market and offer more competitive price to their customers. Using RFID is in demand now.

The railroad shippers can be kept in the information cycle and have the opportunity to make adjustments to shipments as readily as possible. They would have more choices in their worry-lead time to delivery their products under transportation cost consideration. Compared to truck delivery cost and air shipping cost, railroad transportation would be better choice. It is one third of truck cost and one tenth of air cost.





## **4. Business Scenario**

All trading partners would engage in a trusted relationship and the information flow collected from RFID can be used for better decision-making. RFID could make the railroad operation more streamlined, and the information can be immediately transmitted to the middleware and forwarded to back office such as ERP (Twist, 2005). The network of the SC may need to be re-architected and modified. The railroad providers can use active tags with smart labels to initiate their rolling property management, so they can know their railcars' location and monitor the entire railcar fleet. They can enhance the service they can provide their customers, and they can also do hazard material tracking from different trading partners and suppliers.

Moreover, the railroad providers can join the business logistic plan from the beginning to the end. For example, the railroad carrier would get noticed early and have a right railcar pick it up before the chemical containers shipped out from the supplier. Meanwhile, they would send out desirable and critical information to the other members of SC when the container is on the way to the destination. The information could be about what material is in the container and when the container would arrive. By reducing the loading and unloading time delivering the containers, the replenishment time would be decreased for all members (Esper, 2003). The rail switching time would be automatically calculated. The container can cross the rail yard quicker. The railcar yard can increase their run-through rate more efficiently. In addition, the receiver can update their information database for their ERP. From the manufacturer's view, they can reduce their lead time producing their product. From the railroad carrier's view, they can deploy their assets more efficiently and offer the shipper a lower rate.

In addition, railroad providers can increase the degree of the usage frequency on the railcars. They can spot their railcars easily and reduce the switch time as well; they can enhance their core competitiveness and offer better service for their customers. The dwelling time for transshipment would be dramatically decreased. From the CTM view, once members of SC make a sale forecast, the information would be immediately forwarded to the railroad provider. The railroad carrier would get involved for the transportation job and make arrangements and control their labor demands in advance. The railroad container consolidation will come true; railroad providers can keep their railcars full and moving. Shippers can ship their product in one full rail load to a destination. They do not need to ship their product by two partial railcars. The railroad shippers and carriers are in a win-win situation. Both of them could reduce management cost and labor demand in return (Dutton, 2008).

## **5. Conclusion**

This paper provided an extensive concept about implementing RFID in the railroad industry from a CTM view. RFID will give all trading partners using railroad service opportunities to weigh the cost and benefits. By optimizing their current supply chain, carriers and suppliers can do better on their transportation network. Carriers can use

RFID to balance their capacity to meet their customer transportation forecast. Shippers can go by real time collaboration and with the transportation partners' help meet dynamic demand. The result can be in greater efficiency and lower cost for all participants of the SC.

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