

Data sharing between supply chain actors

Advantages and disadvantages

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CASE STUDY

SUPPLY CHAIN
MANAGEMENT



AUTHOR BIOGRAPHY

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Introduction

There is high demand for continuous and on-time delivery of car-body components to the manufacturing lines of car-assembly factories, due to the short buffer time between arrival of products to the car factory and usage of them in their manufacturing lines. It leads to high-speed lean production, by reducing the total inventory cost of the products. If the car-body components arrive late to the assembly factory, the company can risk late delivery of the finished car to the final consumer, causing negative financial consequences. This can be a serious risk for the reputation of a car-manufacturing company in the very competitive automotive market.

In the case of railway transportation in automotive supply chains, when a train departs from a car-body components factory to a car assembly factory, the different partners in such a logistics network should collaborate. Such supply chain partners include the senders and receivers of the products, transportation companies, third-party logistics providers, government authorities and other types of stakeholders of the supply chains depending on the type of products and the logistics networks. Each of these partners or organizations is interested in monitoring the condition and location of different levels of transported objects on the train, as their moving assets. These objects include the rail wagons, containers inside the wagons, racks and pallets inside the containers, and the products inside the racks and pallets.

Track and trace (T&T) is a function that enables companies to know the location of the objects, their movement history and even their condition. When T&T applies to the movement of objects between multiple supply-chain partners, eg railway transportation of car-body components in this case, it requires the collaboration of supply chain partners in the form of sharing hardware, software and data. This case study investigates the body components supply chain of Volvo cars in Sweden and illustrates how collaborative T&T might take place between the stakeholders of an automotive supply chain.

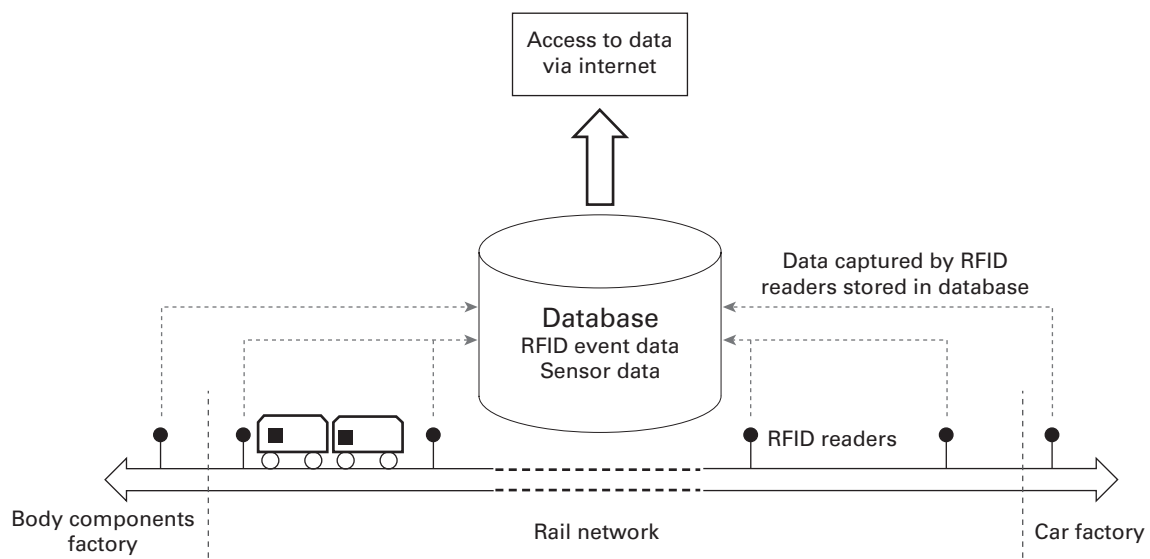
Volvo's collaborative T&T system

The Volvo Car Corporation has started using a collaborative radio frequency identification (RFID)-enabled T&T system in order to monitor the location of their cargo, shipped from their body components manufacturing factory in Olofström in southern Sweden to its car assembly factories located near Gothenburg, a city in the west of Sweden.

This T&T system is built on the foundations of an RFID data-capturing and sharing system designed to control the usage and wear-and-tear of the rail tracks in the Swedish railway network. It was created and is managed by the Swedish Transport Administration which is the government authority that owns the country's railway infrastructure. The Swedish Transport Administration has installed RFID readers alongside the railway tracks to enable T&T of rail wagons owned by transport operators. To enable the system to work, the rail wagons are equipped with a uniquely coded RFID tag. The system stores the RFID event data captured by the readers from the RFID tags of wagons of railway transportation companies. Whenever a wagon passes by the RFID reader captures data including the time, the date, its location and its direction. Every RFID reading station on the railway network has sensors that check the temperature of the axles and wheels of the wagons to check that they are running under safe conditions. By combining the RFID data of each wagon and the data from the sensors, the technical condition of each wagon can be monitored individually.

The data captured is stored in a central database owned by the Swedish Transport Administration and it can be shared or made accessible through the internet. This data is integrated with the data collected by the RFID readers inside the production facilities of the body components factory in Olofström and the car assembly factory in Gothenburg, thus enabling T&T of rail wagons through the whole Volvo Cars body components supply chain. In other words, by doing this, the required data for enabling the function of the T&T system is fed into the system by readers of different organizations, at different locations through the supply chain. Figure 1 illustrates the information architecture of the Volvo Cars collaborative T&T system. As you can see, the data captured by the RFID readers of different organizations in the supply chain are stored in a central database owned by the Swedish Transport Administration. This data can be shared via the internet with any user, for example the Volvo Cars body components and the Volvo Cars assembly factories and the logistics company, GreenFreight.

Figure 1 The information architecture of the Volvo Cars body components supply chain



Such methods of T&T are expected to replace the current tools and methods of using email, fax, and barcode readers. An example of the data that is shared on the internet for T&T of shipments of wagons for the users in this supply chain is illustrated in Table 1.

Table 1 RFID information from the rail wagons available on the internet for the users.

Location (RFID reading station)	Date/time	Direction	Wagon ID
Olofström (Volvo body components factory)	2014-11-05, 12:40	North	15689
Halmstad	2014-11-05, 15:30	South	25689
Varberg	2014-11-08, 9:25	North	19856
Gothenburg (Volvo Cars assembly factory)	2014-11-08, 10:30	South	27854

CASE STUDY

Advantages and issues of the collaborative T&T system

This case is an example of the inter-organizational information systems projects based on data sharing between the partners of a supply chain. There are many such projects in different industries. A shared aspect among all of these projects is that they can have many advantages for the business of the supply chain partners but there are some significant obstacles and issues that make implementing them difficult. As a result, many of these projects stay at pilot stage, without being implemented on a large scale basis and utilized to maximize commercial returns for the companies.

The Volvo Cars T&T project is currently at the pilot stage where the organizations are studying the potential advantages that the system can bring to their business, before investing further time and money on developing it.

Assume that as a project manager from one of the organizations involved in this supply chain, or as a consultant, you are asked to provide an analysis of the solutions and methods that can help to bring the potential advantages of the system into practice and can help to overcome the obstacles of developing the project further. The advantages and issues will be questioned in the next section.

You need to balance your solutions by considering the perspective and the interests of the individual organizations involved in the supply chain, and also by bearing in mind the general goal of the supply chain, which is on-time and accurate delivery of Volvo car-body components to the Volvo car assembly factory. Your solutions and suggestions should be feasible, so feel free to get help from other information including interviewing experts, reading academic/industrial articles and project reports, and reviewing the information available on company websites regarding the success and failures they may have add when dealing with similar projects. Make reasonable assumptions when necessary to provide your answers.

Questions

- 1 Within such a logistics network, which moving objects (wagons, containers, racks, pallets and products) are each actors interested in tracking and tracing?
- 2 If the Swedish Transport Administration decides to commercialize the data stored in its central database and indicates prices to the other partners of the supply chain, how can the value of this T&T data be measured by Volvo Cars and GreenFreight? What are the reasons for this level of value? How much do you think the companies are willing to spend to have access to the T&T data? As a manager, propose a method for cost/revenue analysis to identify the value of T&T data of this system. Compare the level of value of T&T data for different organizations.
- 3 When initiating the project, the Swedish Transport Administration expected the system to be of help in making savings for transport operators by enabling them to reduce the cost of their maintenance operations. The idea was that by doing some software engineering an individual profile for each wagon could be established, identified by its unique RFID code, which would enable the measurement of the accurate number of kilometres it has been running and provide data regarding the temperature of its wheels and axles. This would thus enable GreenFreight to carry out condition-based wagon maintenance instead of periodic maintenance. As a project manager, what type of changes will this bring to GreenFreight and also to its relationships with other companies that are involved in the maintenance operations?
- 4 GreenFreight believes that this system provides the fundamentals necessary in making transport administration and transport documentation automatic. Do you have any suggestions on how this system can be used to enable automatic transport administrative processes? Suggest two examples of transportation documents that can be produced using the RFID readings?
- 5 In this case Volvo Cars needs to install RFID readers inside its facilities and the transport companies should install RFID tags on their wagons, which are costly. There are costs associated with the integration of their information systems into the new shared system, educating users as well as other relevant expenses which are involved in making the system work. In such inter-organizational projects, one issue is that the level of cost each partner bears for making the system run is not correlated with the level of benefits they receive from the shared system. What solution can overcome this issue?
- 6 An important issue regarding the projects that necessitate the sharing of some levels of data is trust, ie the willingness of the companies to share their commercial information which is directly or indirectly released through sharing RFID event data. How can this problem be resolved? What can companies do to mitigate the potential risks involved in releasing their confidential data?

Answers

1 Within such a logistics network, which moving objects (wagons, containers, racks, pallets and products) are each actors interested in tracking and tracing?

In this case the wagons are owned by GreenFreight, therefore they are interested in knowing where the wagons are located and if they are in a good mechanical condition. Volvo Cars, which includes the body components factory and the car assembly factory, are interested in knowing the location of their products. Therefore, Volvo Cars are interested in tracking and tracing the cargo including the containers containing the pallets and racks of the body components.

2 If the Swedish Transport Administration decides to commercialize the data stored in its central database and indicates prices to the other partners of the supply chain, how can the value of this T&T data be measured by Volvo Cars and GreenFreight? What are the reasons for this level of value? How much do you think the companies are willing to spend to have access to the T&T data? As a manager, propose a method for cost/revenue analysis to identify the value of T&T data of this system. Compare the level of value of T&T data for different organizations.

The value of the information is measured by identifying the functionality or usefulness of it for the companies. The advantages that the data produced by the system can bring to the companies should be considered.

In this case, GreenFreight can offer better service levels to their customers by providing RFID T&T data which is much more accurate compared to their traditional T&T methods. Therefore, managers of GreenFreight should analyse how much their customers are willing to pay for such information. The cost of buying this data from Swedish Transport Administration should be compatible with the revenue that selling the data to their customers will bring to them. For Volvo Cars the RFID T&T data can help them make the process of receiving the products at the car assembly factory more efficient, eg by saving the waiting time of the unloading equipment and personnel when receiving the cargo at the car assembly factory. Also it might help their risk management, eg when their cargo has been delayed because of an accident somewhere on the railway. By identifying the benefits of the system for their company, they can estimate the price that they are willing to pay to Swedish Transport Administration for the RFID T&T data. The data has more value for the company that benefits the most from it and therefore this company should be willing to pay more to have access to this data.

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Considering the high cost of maintenance of rail wagons this might be a huge financial benefit for GreenFreight, but it should always be remembered that the feasibility of bringing technical solutions to the companies does not necessarily guarantee their fast adoption. In this case, the perspective of GreenFreight and also the companies who are involved in their maintenance operations should be considered. Careful thought should be given to how this new solution intended to enable condition-based maintenance can guarantee the safety of rail wagons, taking into account the regulations for standards of wagons and their spare parts. In this case, GreenFreight probably needs more time to analyse and coordinate such issues with their maintenance service providers.

4 GreenFreight believes that this system provides the fundamentals necessary in making transport administration and transport documentation automatic. Do you have any suggestions on how this system can be used to enable automatic transport administrative processes? Suggest two examples of transportation documents that can be produced using the RFID readings?

In order to come up with accurate answers to this question the process of administration and documentation of the cargo should be mapped carefully. When setting up the train departure, documents designed to marshal the train, including information about the sequence of wagons, their identification and their contents, can be generated automatically without lots of manual data entry into the information system which is time-consuming. Proof-of-delivery documents can also be generated automatically by the system when the cargo passes the last RFID reading station inside the car assembly factory.

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Cost sharing is a common issue in many logistics networks that demand collaboration of multiple-organizations for implementing a shared information system. In this example the cost of installing RFID readers and other hardware and software settings is not that high for the companies, considering their financial strengths. But the existence of a governmental umbrella organization – the Swedish Transport Administration – which has made the huge investment on installing RFID sensor-reading stations is very important as a facilitator of running the project.

6 An important issue regarding the projects that necessitate the sharing of some levels of data is trust, ie the willingness of the companies to share their commercial information which is directly or indirectly released through sharing RFID event data. How can this problem be resolved? What can companies do to mitigate the potential risks involved in releasing their confidential data?

In this case trust is not mentioned by the managers as an issue, considering the non-competitive nature of the supply chain partners, aiming to deliver the products on time to the car assembly factory in a collaborative manner. However, in many other industries especially when competitor organizations have to share data, this issue becomes very sensitive since some sales volumes (and therefore indication of financial performances) can be deduced from the analysis of the RFID data. It is a barrier for implementing many such inter-organizational information systems. In some cases the companies revise the data before sharing it or exchanging it with their competitor companies, to make sure that their confidential data is protected.