Meeting the RFID Mandate: Options for Wal-Mart Suppliers and an Evaluation Methodology

Executive Summary

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Introduction:

Recently, Wal-Mart has announced its mandate asking its top suppliers to start tagging pallets and cases with RFID tags beginning Jan, 2005. Other retailers like Target and Albertsons have followed suit with their mandates. Consequently, the suppliers are under a lot of pressure from their customers to become RFID enabled. In addition, Wal-Mart is also not sharing the cost of implementation with its suppliers.

The objective of this thesis is to look for ways in which suppliers can meet the mandate as well as derive benefit for themselves, thus preventing the mandate from becoming a cost of doing business with Wal-Mart. The thesis explores the various options available to suppliers and develops the processes adopted, identifies the cost and benefit associated with each option and develops an evaluation methodology for the various options. The suppliers have been divided into two categories: those manufacturing big sized items (big sized item means the case contains only one item) and those manufacturing small sized items (when the case contains more than one item). This thesis has been confined to suppliers manufacturing big sized items.

A review of literature shows that most of the ROI studies are warehouse centric and look at the cost and benefit associated with the Distribution Center only. Consequently, this thesis assumes a holistic, integrated view and looks at the entire supply chain. Both the costs and benefits are sought to be calculated at the supplier level. It also takes into account that during the initial migration years, many of the channel partners will not be RFID enabled. This thesis recommends a Net Present Value approach for final evaluation.

Options and associated processes:
The following are the options from which a supplier of big sized item can choose while still complying with the mandate:

**Option 1** Tagging at the outbound dock of the supplier DC (also called the “slap and ship” approach): In this model, cases are tagged just before they leave the supplier DC. Due to a shortage of dual printers, for quite some time the tagging will have to be manual. Advanced shipment notices (ASN) will contain both barcode information and EPC information for each case. When the pallet crosses the outbound dock door, readers on the door will read the pallet and case tags and thus a proof will be generated. In this option, all Distribution Centers of a supplier will need to be RFID enabled. In addition, all outbound docks need to be RFID enabled otherwise the few enabled outbound docks will soon become a severe bottleneck slowing the entire shipment process.

**Option 2** Tagging at the inbound dock of the supplier DC: Two different approaches can be adopted within this option.

(A) **Reader at each location:** The trailer is unloaded at the inbound dock of the DC and pallets placed in the receiving section. Tags are applied to each case, read, and then cases are stored at various locations. Each location has a reader to be able to read the cases kept at that location.

(B) **Tag on each storage location and reader on forklift/pickup truck:** we tag each case after unloading as described earlier. However, we also tag each storage location. We have readers on each put-away/picking truck. When the put-away truck comes to place the case in the assigned location, the reader reads the location tag and the EPC of the case is linked to the location tag in the Warehouse Management System (WMS).

The objective of tagging at the inbound dock is to know the location of each and every case within the warehouse. Hence, **ALL** cases coming inside the warehouse need to be tagged and not just the cases destined for Wal-Mart.

**Option 3** Tagging the packaged case at the manufacturing plant: In this option too, we can visualize two different scenarios;

(A) **Non RFID enabled 3PL scenario:** cases will be tagged in the manufacturing plant just before shipping them to the supplier’s DC. The shipment will be handed to a 3PL services provider who will manage the shipment through ports and customs and then deliver it to the supplier DC. There will be readers at the inbound dock of the DC.
(B) **RFID enabled 3PL scenario:** The trucks of this 3PL service provider have readers on their doors. At the port the shipment is loaded in containers, each of which has a RFID tag acting as a license plate. This RFID enabled 3PL scenario is not far into the future. Due to heightened security concerns, it has now become necessary to provide full consignment data to customs 24 hours before the cargo is loaded aboard the vessel at the foreign port. Furthermore, customs authorities also want to quickly determine whether a container has been tampered with or not. Hence, The FCC has adopted a new rule allowing the use of more powerful RFID tags in U.S. commercial shipping containers.

**Option 4 Tagging the item itself at the manufacturing plant:** For larger sized items, a case is the same as each individual item. Hence Wal-Mart’s mandate for case level tagging can also be met by tagging the item itself at the end of production line in the manufacturing plant.

With source tagging the question crops up whether we need to tag only the cases bound for Wal-Mart or all cases. Under current processes, cases are not demarcated for a specific retailer at manufacturing plant. All cases shipped from manufacturing plant are same and indistinguishable. Hence all of them need to be tagged to make sure the mandate is met. Even if it were possible to demarcate specific cases for Wal-Mart at manufacturing plant itself, the reduction in inventory across the entire supply chain will not be achieved because only a part of total inventory will be tracked. Hence, **Source tagging requires tagging all cases.**

**Identification of Cost and Benefit Elements:**

The cost elements are the same for all options except that the magnitude is different as the costs are cumulative. The cost elements are:

a) Cost of tags: Total cost of tags depends upon the number of cases and pallets to be tagged, cost of each tag and tag mortality rate. In the slap and ship option, only the cases and pallets bound for Wal-Mart need to be tagged. In option 2, all cases entering the DC need to be tagged. In options 3 and 4, all cases and pallets being shipped out of the plant need to be tagged.

b) Hardware costs: This consists of the cost of readers, servers and cost of cabling needed to power the readers. In slap and ship, readers are needed on the outbound
docks of the DC only. In option 2A, readers are needed on each storage location as well as outbound docks. In option 2B, readers are needed on all fork-lift, picking and put-away trucks as well as outbound docks of the DC. In options 3 and 4, readers are needed on outbound docks of plant and all docks of the DC.

c) Software: Middleware is needed in all locations which are being RFID enabled.

d) Consulting and Integration costs: They will depend on the extent of deployment. In Options 1 and 2, only DCs are involved while in options 3 and 4, plants too are being RFID enabled. Hence these costs vary proportionately.

e) Internal project team: All companies will put some of their best guys in RFID implementation. This cost should not be underestimated and should be taken in account. It depends on the extent of deployment.

f) Annual maintenance cost: this again depends on the extent of hardware and software used and hence depends on the extent of deployment.

g) Labor cost of tagging: This will depend on the number of cases to be tagged. In addition, in options 3 & 4 cost of labor declines because tagging is likely to be done in a low cost economy.

Hardware, Software and integration costs all can be considered as one time upfront costs. Tag costs and annual maintenance are the recurring costs. Cost of an internal project team and labor costs for manual tagging may be assumed for initial 2/3 years.

**Benefit Elements:**

The benefit elements for each option are listed below. They are cumulative in nature i.e. the benefits of option 2 include benefits of option 1 and additional benefits.

**Option 1 Slap and ship:**

(a) Reduction in verification costs: Readers on the dock doors will be able to identify the items being taken out and will be able to compare it with the purchase order.

(b) Reduction in shrinkage during Transportation and wrong deliveries: Wrong deliveries will be reduced due to accurate and automated shipping and receiving processes. Increased accountability of the driver will reduce shrinkage. Fewer reshipments will mean fewer picking and shipping operations.
(c) Claims reduction: Automated shipping and receiving processes will significantly cut into claims. Reduction in claims will mean Days Sales Outstanding and chargeback will reduce significantly.

**Option 2 Tagging at inbound dock of DC:**

a) Productivity: Use of RFID tags on both case and location eliminates the time consuming task of scanning both location and case from put-away and picking operations.
b) Elimination of manual cycle count: Whenever a put-away/picking truck goes to a location, the reader on the truck will be able to read all the cases placed at that location and send the information to the WMS.
c) Inventory Accuracy and Picking Accuracy: The errors associated with manual scanning will be eliminated by mobile readers and hence the overall inventory accuracy as well as picking accuracy will improve.
d) Shrinkage from warehouse: Readers at all entry and exit points will help prevent shrinkage from the warehouse.
e) Other benefits: As all cases are being tagged, verification is actually eliminated. Increase in picking accuracy compared to the slap and ship model reduces the claims even further.

**Option 3 Tagging the packaged case at the manufacturing plant:**

**A) Non RFID enabled 3PL scenario:**

a) Verification: This process leads to elimination of verification at the manufacturer’s end before shipping as well as at the supplier’s DC while receiving.
b) Cross-Docking: RFID cuts down the complexity and time taken in the cross docking process and facilitates its much greater usage.

**B) RFID enabled 3PL scenario:**

a) Information-Inventory tradeoff: This process provides complete visibility of each case/pallet as it travels along the supply chain from manufacturer to supplier DC to Wal-Mart DC and then onto the backend of the store. Real-time information about the location of shipments can be used to keep inventory down.
b) Faster customs clearance: The complete visibility feature provided by RFID allows the entire path of a shipment to be traced from manufacturing plant onwards. This makes for faster customs clearance.
Option 4 Tagging the item itself at the manufacturing plant:

a) Recall: Having the item tagged and tracked across the entire supply chain and even in the customer’s home, enables recall irrespective of where the item is in the chain. As each item has its unique EPC number, the recall can be very specific, potentially saving huge amounts of money. Avoiding one big recall can repay the entire investment in RFID. This option also helps meet some of the regulatory requirements that are already in place regarding recall. An example is the TREAD act passed in the wake of recall of 14 million tires by Firestone in 2000.

b) Repair Management: Item level tagging (here same as case level) allows the maintenance record of an item to be kept. The repair database can be used to launch and maintain a quality improvement program.

The thesis goes on to identify the data points needed for quantification of the various costs and benefits associated with different options and recommends adoption of a net present value approach for evaluation.

Conclusion:

The thesis has explored the various options available to a Wal-Mart supplier which can be adopted while still complying with the mandate. We have followed a supplier centric, integrated approach. The attempt has been to identify the supply chain wide costs and benefits rather than focusing on only within a DC or on a specific process. Most of the benefits that have been discussed in this thesis are general benefits. Some of these may be more applicable to one company and others might be more applicable to someone else. During the course of the analysis it also became very clear that beyond the general benefits, different industries and specific suppliers have their own specific problems or so called pain points. These pain points specific to a company offer an excellent opportunity to utilize the potential of RFID. A creative use of RFID capabilities by the supplier is needed to solve these problems.

RFID is an enabling and a disruptive technology and hence has a lot of strategic importance attached to it. It would be unwise to allow cost benefit analysis to be the sole factor on deciding about RFID. It should be a strategic decision having cost benefit analysis as one of the important factors. RFID provides the opportunity to completely
reengineer the supply chain and allows us to ask the questions like “Do I actually need this DC” and can lead to initiatives like shipping direct to a retailer DC from the manufacturing plant. In conclusion, RFID should be looked as a strategic initiative and not just as compliance issue and a long term approach should be adopted.