RFID: ROI Opportunities after the Sunk Cost

By

Teodor D. Simeonov

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Executive Summary

1. Introduction to the problem
Currently many alternative options exist to satisfy the RFID mandate by Wal-Mart – tag cases at the exit doors, tag all cases at the supplier’s warehouse docks, tag a certain section of the warehouse, etc. The big question is how to prevent Wal-Mart suppliers from treating the cost of EPC standard - adoption from just becoming another one of those nagging costs of doing business with Wal-Mart and how the cost of RFID adoption can be leveraged to differentiate the company's products and service levels from that of the non-RFID-adopting/non-RFID-cost-incurring competition, and how can all of that translate into long-term comparative advantage for a consumer electronics manufacturer? The problem with Wal-Mart’s RFID mandate is that the suppliers will incur significant costs in setting up the necessary RFID – enabled infrastructure, yet the benefits will stay mainly with the retailer. In fact, since there will be no cost-sharing, those suppliers will have to explore for themselves the return on investment (ROI) opportunities after the sunk cost of investing in the necessary technology and RFID infrastructure has been incurred. The idea is to generate some type of incremental financial benefits to recoup the cost of the capital investment in addition to keeping Wal-Mart happy.
Wal-Mart is determined to implement RFID within its organization, to benefit from automation of the receiving process in the store, better management of the replenishment process from the back end of the store to the front of store, and efficiencies in the cross-docking process. Industry experts estimate the expected benefits for Wal-Mart to be in the range of $4-10 billion, with the store RFID infrastructure being its only capital investment. In this context, one can easily understand the anxiety that Wal-Mart’s suppliers are feeling in respect to RFID implementation since they will bear the brunt of the cost of introducing RFID tags in the supply chain as they will have to provide out of their own pockets for the cost of tagging each pallet and case.

2. Subject of this study
The subject of this study is a consumer electronics manufacturer (CEM) that produces a variety of products and supplies Wal-Mart as well as hundreds of other retailers who may or may not also be looking at adopting RFID technology in their own stores. As such, a CEM faces a dilemma whether to RFID-tag only items going out to retailers that mandate it or to tag all of its products and pass the benefits to all of its customers and hopefully recover the costs through less out-of-stocks situations on the retailers’ floor which would correspond to overall product sales gains. More specifically, the CEM would be interested in tagging small-ticket items, which are defined as break-bulk products – cases of individual products that will get broken down sometime before they reach the retailer’s store.

3. The premise of RFID
The premise of RFID for a CEM supplier of Wal-Mart can be summarized as increasing service levels which will eventually translate into demand creation while decreasing costs
through better resource allocation and financial control. Unfortunately, it is very difficult to measure what is technically called the Service Elasticity of Demand (aka response of demand to services changes.) and that’s something that will be specific and unique to each enterprise that decides to employ RFID whether voluntarily or as a result of having to comply with the Wal-Mart mandate.

4. Literature review
Previous research discuss how businesses that deploy RFID technology in their supply chain can expect a number of major benefits, such as increased revenues of up to 1 percent from improved quality and customer service, decreased Cost Of Goods Sold (COGS) of 1 to 5 percent from improved overall equipment effectiveness, reduced working capital of 2 to 8 percent and reduced fixed assets of 1 to 5 percent from better maintenance and utilization of plant equipment. In addition to those “hard benefits”, a number of “soft” benefits can be expected in the demand planning process such as improvements in demand planning forecast accuracy by 10–20%, which can lead to unprecedented production-to-consumption manufacturing and distributions systems that will reduce overall levels of inventory in the supply chain pipeline.

5. Potential benefits of the different levels of RFID deployment
Benefits for a CEM tagging items on a case level will differ based on the desired level of deployment of RFID within the organization. On an individual process level, RFID will bring along benefits by replacing existing technology that is used for complicated sequential processes, and automating processes that are extremely labor-intensive. In the case of the warehouse, for example, benefits like labor-savings, better space utilization and reduction in the overall size of the warehouse will result while throughput will
increase. On an **intra-company level**, RFID can be used to help generate efficiencies in the execution of business processes within the four walls of the organization such as x-docking and demand-pricing. On an **inter-company** level, synchronization and coordination of businesses based on real-time data will allow for better business management both upstream and downstream far beyond the company’s borders. Upstream benefits include the automation of business processes and notifications amongst business partners and scheduling opportunities. Downstream visibility is also important in terms of the electronic verification process, and improved opportunities for Collaborative Planning Forecasting and Replenishment (CPFR) & Vendor Managed Inventory (VMI). Ultimately the idea would be to use RFID to **synchronize the whole supply chain** from sourcing of raw materials to the final consumer, which would result in a more efficient supply chain based on production-to-consumption manufacturing and distribution systems.

6. **Overview of the implementation scenarios**
CEMs have various alternatives regarding where to apply tags on both pallets and cases in the supply chain. Those alternatives are defined as the intersection of choice of tags to be applied and technical capabilities to physically apply the tags at different points of the supply chain. There is no ideal point in the supply chain to apply the tags since each CEM’s supply chain differs. Some potential points would be as follows: **Slap and Ship model** - tagging at the outbound dock of a DC, **Tagging at Receiving** dock of a DC and **Tagging at the End of Manufacturing** just before shipping to a DC
7. Benefits and costs of the implementation scenarios
Each of those scenarios has a certain set of benefits that an organization needs to take into account when deciding on a level of deployment for RFID, based on its short-term and long-term corporate strategy and objectives. Basically, those can be broken down by Income Statement and Balance Sheet account benefits so that the ultimate decision makers will be able to determine at a glance the different ways in which RFID could affect their organization in terms of improved operating efficiency versus better asset utilization. In a consistent manner RFID deployment costs have been divided into Fixed (one-time) and Variable (per annum) costs. The task of actually quantifying the cost of deployment of RFID technology in an organization is however, beyond the scope of this thesis paper.

8. Proposed ROI/ROA Model
Though quantifying the cost of deployment was not one of the objectives of this study, we did however look for ways to quantify the value proposition of RFID adoption. A recent MIT research paper proposed a ten-step methodology to assess the impact of RFID in business process performance metrics. Based on business process analysis, the paper employed a calculation of Net Present Value (NPV) based on a discounted cash flow (DCF) of the savings value streams to calculate ROI in the warehouse receiving process. We believe the above-mentioned ROI model is an excellent attempt to determine the value proposition of RFID in a specific process, and we recommend it as a blue-print for any organization that attempts to quantify the annual savings that RFID can bring to a specific process. The model however was not designed and should not be used to appropriately quantify the value of RFID deployment across the entire organization of a Wal-Mart supplier. Instead, we propose the use of the DuPont financial model as a better
way to visualize the impact of RFID deployment as ROI is best illustrated in monetary terms on a company-wide scale, since RFID would affect all components of ROI.

9. Example of ROI/ROA calculation for a CEM supplier of Wal-Mart
Assuming AMR’s cost calculations that state the cost of RFID compliance for a CPG manufacturer shipping 50 million cases to be between $13MM and $23MM per year are correct, we used the 2002 Financial Statements for a CEM supplier of Wal-Mart to quantify our model. All of our assumptions were based on a downstream RFID-enabled supply chain (simple RFID compliance) and approximately 20% of all outbound shipments going to RFID-enabled customers such as Wal-Mart and Target, which is the actual case for this particular CEM. Our calculation produced a post-RFID ROA of 12.47% compared to pre-RFID ROA level of 10.94% and improved capital turnover ratio of 1.78 compared to 1.74 before. While this example is strictly hypothetical and based on a number of assumptions, it illustrates how to apply the model and highlights potential benefits of RFID deployment within a CEM, even at the simplest compliance level.

10. Conclusion
By examining the different scenarios to satisfy the Wal-Mart mandate for a CEM supplier that will be RFID tagging small-ticket items on a case level, this study proposes an ROI/ROA framework within which investments in RFID can be evaluated. It also demonstrates through an illustrative financial model that value may exist for early adopters of RFID in the consumer electronics industry. In the end, we conclude that only through full “cradle-to-the-grave” adoption can businesses translate the flood of newly-available information into meaningful business logic that will generate maximum ROI for all parties in the supply chain.