

Models for Cost-Benefit Analysis of RFID Implementations in Retail Stores

This paper focuses on the models for analyzing passive RFID tag implementation in a supply chain comprised of the manufacturer, distributor, retailer and consumer by looking at costs of tag readers, communication network costs and other infrastructure costs.

Background:

- Various retailers and manufacturers have implemented RFID solutions with great success.
- For the analysis of this paper, the researchers are assuming the passive RFID tags are applied at the item, case, and pallet level.
- RFID infrastructure for tag reader networks can be classified in 3 groups: wired, wireless and mixed.
 - Wired networks can provide high speed networks for tag readers as well as power the reader. However the primary advantage for this is that store shelves have to be wired as well.
 - Wireless networks can provide high speed networks at a low initial cost but the operational cost can be higher over time when compared to a wired network. The main danger with wireless networks is they are more prone to hacks.
 - Mixed networks can provide benefits of wired network robustness and low maintenance costs.
- A formulation for each cost and benefit is provided in the paper and could be of great use for someone looking to quantify the impact of RFID.

Costs:

- Below are several costs associated with networks for tag readers:
 - Fixed initial cost of implementation per year.
 - Annual maintenance cost per reader multiplied by the number of readers.
 - Wiring costs varies between wired, wireless and mixed networks.
 - To compare which wiring method is most cost effective, compare the costs of various wiring methods as that will be the only significant difference when executing an RFID system.
 - It should be noted that if shelves are relocated or temporary shelves are created continually, then a wired network will never be economical compared to a wireless network.
- This paper assumed a fixed costs for enhancing enterprise systems per year.
- Below are operational costs of RFID for shelf replenishment:
 - Automated alerts are expected to decrease operational costs as employees stock more efficiently. Precise estimates for calculating the impact of this can be found in the body of the paper, but was too exhaustive to include.
 - Several other estimate such as how the number of RFID tags affect the restocking rate chain-wide can also be found on page 111.

Benefits

- The significant benefit of RFID is expected to come from the amount of shelf space that is saved due to the reduction in the quantity of an item that needs to be kept on the shelves.
 - Reduced item availability (but still properly stocked for customers) will also have an impact on the quantity of items shoplifters can obtain in one outing for a particular product.
 - Additionally, if RFID is integrated to the POS system, this can lead to faster checkout times as well as preventing forms of “sweethearting”.