

New Study Shows RFID Significantly Improves Item-Level Inventory Accuracy

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(PhysOrg.com) -- A new study on the use of radio-frequency identification tags on individual retail items shows that inventory accuracy decreases or diminishes over time with conventional systems that rely on barcodes and/or human counting to track inventory. The research, conducted by the RFID Research Center at the University of Arkansas, also demonstrated that the use of an RFID-enabled system could improve inventory accuracy by more than 27 percent over a 13-week period.

“This project was part of a larger research effort to demonstrate and quantify the business value of RFID item-level tagging for day-to-day operations in a retail environment,” said Bill Hardgrave, director of the research center and professor of information systems in the Sam M. Walton College of Business. “The results can guide companies as they investigate whether, and to what extent, to implement RFID. The findings provide insight on how RFID can help retailers increase efficiency and thus significantly reduce expenses, which is always important but even more so in this tight economy.”

The investigation included two Bloomingdale’s stores - a test store with an automated, RFID-enabled system and a control store with Bloomingdale’s inventory-management system - in a major northeastern metropolitan area. The 13-week project focused on two departments - men’s denim jeans and women’s denim jeans. To establish baseline information, physical inventory counts were taken three times per week for the first five weeks by workers using both RFID and barcode

readers. For the remaining eight weeks, physical counts by workers using both types of readers were conducted two times per week.

The baseline information was used to determine actual physical inventory counts - as opposed to what the Bloomingdale's inventory-management system stated - at both the test and control stores. For the final eight-week period, researchers compared inventory numbers from the test store's automated, RFID-enabled system to both the physical-inventory figures and Bloomingdale's inventory-management system. Using this information, researchers gathered metrics on inventory accuracy, out of stocks and cycle-counting time.

Comparing the actual inventory count to Bloomingdale's inventory management system over the 13-week period, the researchers found that inventory accuracy declined by 3.13 percent in the RFID-enabled test store and 4.24 percent in the control store. In other words, both systems lost inventory accuracy over the 13-week period. For both stores, inventory accuracy decreased due to an increase in understock, the term used to describe the situation in which a store's inventory-management system shows more inventory than is actually in the store.

To understand the potential effect of an RFID-enabled system, the researchers simulated Bloomingdale's inventory-management system to help them replicate changes that would have been made by using RFID to modify and update the retailer's system as the master record. In other words, inventory data obtained by using RFID were used to update the simulated Bloomingdale system. The simulation demonstrated that overall inventory accuracy improved by more than 27 percent. Specifically, understock decreased by 21 percent, and overstock, the term used to describe the situation in which a store's inventory-management system shows less inventory than is actually in the store, decreased by 6 percent.

Throughout the study, researchers also tracked how long it took to count items using RFID compared to a barcode reader. With RFID, inventory scanning of 10,000 items took two hours. Scanning with a barcode reader took 53 hours. This translated into an average of 4,767 counted items per hour with RFID and 209 items per hour using a barcode system, a 96-percent reduction in cycle-counting time.

The project was part of a broader effort to identify what retailers call “use cases” or “payback areas,” which are business processes upon which retailers expect item-level tagging to have the greatest impact. In this instance, the major use cases included inventory management and loss prevention. A previous study provided an objective evaluation of item-level tagging for apparel and footwear. The primary goal for all projects is to generate greater inventory efficiency for retailers and product availability for consumers. Taken further, the research could lead to consumers purchasing items without a cash register.

For this study, the researchers used passive, ultra-high frequency, generation 2 tags. Generation 2 refers to the highest-performing technical protocol for passive RFID tags, as approved by EPCglobal Inc., the organization that sets international RFID standards.

More information: The study is available for download at itri.uark.edu/research. Enter “rfid” as the keyword.

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