

Wal-Mart-Commissioned Study Shows RFID Improves Store Inventory Accuracy

University of Arkansas researchers found that RFID can reduce the degree of understated perpetual inventory by 13 percent, thereby helping retailers to lower their costs.

By Beth Bacheldor

March 13, 2008—A new research study commissioned by [Wal-Mart](#) underscores RFID's positive role in improving inventory accuracy at retail stores. The goal of the study was to examine the store-level influence of RFID on perpetual inventory (PI). PI is an inventory management system's continuously updated calculation of on-hand inventory (which is typically determined by manually counting the items).

The research study was first announced in October 2007 by Carolyn Walton, Wal-Mart's VP of information technology, as one of three initiatives the retailer was carrying out as part of a "change of focus" in its RFID program (see [Wal-Mart, Sam's Club Push RFID Further Along](#)). The research was conducted by the [RFID Research Center](#), part of the [University of Arkansas' Information Technology Research Institute \(ITRI\)](#). The RFID Research Center was created to provide research designed to investigate the business value of RF technologies (see [University Opens RFID Research Center](#)). A resulting white paper, entitled "Does RFID Improve Inventory Accuracy? A Preliminary Analysis," is available from ITRI's Web site ([click here](#) and enter the term RFID in the keyword field.)

The study involved RFID systems, including a new PI inventory adjustment tool, in eight Wal-Mart stores, and was conducted to investigate the impact of RFID on inventory accuracy. The eight test stores have RFID interrogators and antennas installed at various backroom locations, such as receiving docks, doors between stockrooms and sales floors, and box crushers where empty cases are discarded. The PI inventory adjustment tool was basically a software system that used business rules to adjust PI by analyzing the automated inventory counts collected by the RFID readers and antennas, as well as from point-of-sale terminals.

Eight Wal-Mart stores without RFID systems served as a control group during the study. To establish a baseline for PI accuracy, inventory was counted for 10 weeks before the PI inventory adjustment tool was activated in the test stores.

There are two types of PI errors: Overstated PI occurs when the system indicates more inventory is on hand than is actually in the store; understated PI occurs when PI levels recorded in the system are less than the actual quantity on site. Overstated PI is typically caused by such scenarios as theft and cashier errors, while understated PI is often the result of such things as manual adjustments, errors when processing returns or sales, and incorrect shipments from a distribution center (DC) or vendor.

For this study, only understated PI was investigated. For the purpose of analysis, researchers divided PI accuracy into three categories: perfect, meaning the PI matches the actual inventory on hand; close, defined as the PI being within two units (cases) of on-hand inventory; and inaccurate, i.e., the PI is off by more than two units.

The study focused on only one product category—air fresheners—though that included about 300 products from a variety of manufacturers, says Bill Hardgrave, executive director of the ITRI and director of its RFID Research Center. The study lasted approximately 23 weeks, from May to October 2007, during which time a national inventory-auditing group determined each day's on-hand air-freshener inventory by manually counting every item in all 16 stores.

"Right now, the only way you can know if inventory is accurate is if you manually count all the items regularly," Hardgrave says. But manually counting items on a daily or even weekly basis is not feasible for retailers, especially Wal-Mart and others with hundreds of thousands of items in a single store. "This study had 300 [types of] items, and it took hours to count that, and we did it every day," Hardgrave says. "Multiply that by 100,000 or more [types of] items, such as in a Wal-Mart supercenter, and there is no way to do it."

Retailers typically determine PI by less frequent inventory counts, records of orders shipped and received, and point-of-sale data. According to the white paper's authors, previous studies have found that retailers have accurate inventory information only for about 35 percent of their items. "When PI is wrong—in particular with understated PI—retailers will order more than they need," Hardgrave says, adding that excess inventory can ultimately lead to extra holding costs, excessive markdowns that impact the bottom line, reduced inventory turns and other problems. Improving PI accuracy using RFID, he states, "really reflects the opportunity to reduce holding costs that turn into millions of dollars."

RELATED_ARTICLES The study determined that RFID reduced the degree of "inaccurate" (incorrect by an amount exceeding two cases of product) understated PI by 13 percent, relative to the control stores.

"Unfortunately, we can't report a lot of the details," Hardgrave says, because Wal-Mart has requested that such information remain confidential. "But 13 percent, when only looking at one side—understated PI—is really remarkable. Personally, I didn't expect that much of an improvement." Hardgrave says he thinks retailers will be "pleasantly surprised" by the study's results. "Improving PI is one of those silver bullets of ROI," he says. "If we can fix PI, we can fix many problems plaguing retailers."

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