Chapter 2

RFID Costs, Benefits, and ROI

Abstract

Chapter 2 of Library Technology Reports *(vol. 48, no. 5) "RFID in Libraries: A Step toward Interoperability" discusses the costs and benefits associated with RFID, which can be a fairly expensive technology. RFID requires purchasing tags and placing them in every item in the library's collection. In addition, many hardware components need to be upgraded to work with RFID systems. However, there are also several benefits. This chapter spells out the specific costs and benefits and provides guidance for how to evaluate the return on investment.*

The return on investment for a library RFID system has thus far not been clearly established.[1] While some have argued that a library RFID system will pay for itself within two to three years because of the reductions in staff time,[2] this is likely true in very few library environments. Libraries facing significant reductions in staff have found they were able to handle many more circulation transactions per person with RFID than without. In many cases, the RFID implementation is also tied to a transition to more self-service, so it is often difficult to tie the savings specifically to RFID.

Jeff Narver of 3M suggests that libraries can expect a three- to seven-year investment payback ("dependent on some variables"),[3] and this is more consistent with my experience as a library RFID consultant. Determining payback period for RFID is more art than science because each library's situation is different (whether it had self-check systems before RFID was implemented or not, how much circulation it does and how that's changed, staffing levels before and after, etc.). In general, it is safe to say that fewer staff members can circulate the same amount of material with RFID or the same number of staff members can circulate more material.[4] However, being able to circulate more material with fewer staff members doesn't make a cogent return on investment argument, especially given the industry-wide transition to more and more digital content and fewer physical items.

The argument in favor of RFID for academic libraries is even more difficult because circulation is not a high-volume business. In fact, the academic library's traditional role "as a repository of physical books and periodicals is quickly fading."[5] Determining the return on investment will involve evaluating resource sharing, security, and perhaps new RFID applications to determine if the benefits justify the costs.

One of the reasons the ROI argument is challenging is because libraries are using RFID tags as barcodes on steroids.[6] And while RFID certainly "lubes" all self-service and materials handling workflows and provides security on the items at the same time, the improvements are relatively modest given the costs.

Based on how high-circulating libraries use RFID today, they are often much better off purchasing an AMH system (automated check-in system with three or more sorts) if their objective is to reduce operating expenses (e.g., reduce staff costs). RFID implementations typically cost hundreds of thousands of dollars by the time you buy the tags, do the tagging, and upgrade or replace all the security gates, staff workstations, and self-check machines. A small AMH system can be had for under $50,000. An automated check-in system moves the entire check-in workflow from staff to patron, and there's no better way to reduce the circulation staff workload than self-service.

However, RFID makes the workflow less labor-intensive not just for staff, but for patrons as well. So if improving the customer's experience and reducing

repetitive staff tasks are high priorities, RFID may make sense for you. In addition, libraries looking to implement a security solution are often better off choosing RFID than implementing an EM solution, which only gets you the security function without the other benefits of RFID.

As it stands today, RFID continues to be a very expensive solution to "too much circulation" and "too few staff." The compelling argument for RFID will come when vendor components are interoperable and new RFID applications are developed that completely change staff and materials handling workflows and result in new services for patrons.

Benefits of Library RFID

The NISO RFID Revision Working Group suggests that the benefits of adopting RFID technology may include the following:

a. Reduction of staff manual processes, errors, and repetitive motion
b. Enhanced customer experience through fast and private self check-outs
c. Reduction of staff and patron time spent on finding items
d. Integrated security functionality[7]

Reduction in Staff Manual Processes, Errors, and Repetitive Motion

The most significant tangible benefit of installing RFID is reducing the need to grasp, pick up, and manipulate items during the check-in and check-out process. In addition to speeding up the process (by allowing staff to check out several items at a time, rather than having to scan each item individually), RFID reduces the potential for repetitive stress injuries because of the reduction in "grasping" motions. Staff don't have to handle a barcode scanner or position the material in any particular way for the item to be read. Five or six items can be read at once simply by stacking them on the counter.

Enhanced Customer Experience through Fast and Private Self Check-outs

RFID-tagged material improves the self check-out process for customers. Not only are the tags more easily read by the self check-out machines, but multiple items can be read at once, making self check-out even faster and easier. Patrons can more easily check out material without having to distinguish barcodes from ISBNs and without having to open the covers when barcodes have been placed inside the books.

Another benefit of RFID self check-out is that it is completely private. Patrons can check out items without having to present them to library staff.

Reduction in Staff and Patron Time Spent on Finding Items

Both staff and patrons are frustrated when they go to the shelf to find an item listed as "on shelf" and it is nowhere to be found. However, few libraries inventory their entire collection regularly because it is so labor-intensive. But when libraries discontinue inventorying their collections, it is almost impossible to know how much material is lost due to theft and to ensure that material that is placed on hold is actually available and on the shelf.

Using the RFID mobile readers, regular inventories become manageable. By using handheld readers, inventorying and finding items to pull for holds, weeding, and shelf reading can be done in a fraction of the time previously needed. All the items on a shelf can be identified by passing a portable reader past each item without needing to handle them and also without requiring staff to read the labels on the spine. The portable readers can identify items that are misshelved or missing or that need to be pulled to fill a hold.

Integrated Security Functionality

RFID tags can be used for material identification as well as material security. Libraries no longer need an EM security strip for security. Instead of the additional step of sensitizing or desensitizing materials at check-in and check-out, security is enabled or disabled automatically as part of the check-in and check-out process. No additional handling and no EM equipment is necessary. Security is enabled or disabled as the items are stacked upon or slid over an RFID-enabled pad at each workstation.

Libraries report other reasons for choosing RFID. According to the 2012 Library RFID Survey, one of the most important reasons US libraries adopted RFID technology was to save costs. Of US respondents, 68 percent said this was a very important reason.[8] Based on some of the comments included in the survey, very often the incentive was to extend hours or handle more work with less staff. In other words, the cost savings were in staff that were not hired to handle the increased workload.

RFID Costs

Tag Costs

As of this writing, the cost of basic book tags has fallen to under 20 cents each. The full-coverage tags used on media are closer to 65 cents, but because of

all the consolidations in the marketplace, these prices may go even lower. However, the price of HF library tags will probably never reach the five-cent mark that many people had hoped to see. This expectation was based on the costs of UHF tags which are cheaper and used much more widely around the world. These tags are used in supply chain applications where they are essentially disposable. Billions of UHF tags are sold annually. This is, of course, not the case for library RFID tags. Many fewer library tags are sold, and the tags must endure numerous circulations (several read/write transactions) and a lot of handling by people using the books, as well as people (and machines) sorting the books. They must be designed to handle the hard work of being a circulating library item.

Tagging Costs

Applying RFID tags to every item in the collection can be done with in-house staff, or it can be outsourced. The benefit of outsourcing is that the work can generally be done more quickly. The benefit of doing it in-house is that it is generally cheaper.

Libraries that do their own tagging report tagging speeds of 350 to 400 items per hour.[9] The most efficient way to do the tagging is to have a two-person team use a mobile cart with a laptop and RFID reader, a roll of tags, and a barcode scanner. Many RFID vendors sell or lease mobile carts that can be used for RFID conversions. Programming the tags involves scanning the barcode to encode the barcode number on the tag and then placing the tag inside the book. Many libraries mark the book so they know which ones have been tagged before reshelving them.

Tagging can also be outsourced[10] for a set amount per tag applied (around 30 cents each).

Equipment Costs

One of the biggest costs associated with implementing RFID is the cost of purchasing or upgrading equipment to work with the RFID tags. For example, every workstation that now has a barcode scanner will need an RFID reader, and often the security gates will need to be replaced with RFID-based security gates. Security gates can cost upwards of $10,000, so depending on the number of exits that require new gates, the cost of replacing them can increase the cost of the RFID conversion project dramatically.

Automated check-in systems, sorters, and self check-out machines will also need to be converted to support RFID. In some cases, the units have to be replaced, but in many cases, the self-check vendor can modify existing barcode-based units to work with RFID tags as well. Expect to spend $2,000 to $5,000 per self-service check-in and check-out, plus each sorter induction that needs to be upgraded from barcode to RFID.

To perform inventory, most vendors offer some kind of portable device. These devices are optional insofar as they are not required to perform basic check-in and check-out functions. However, one of the primary benefits is the relative ease with which inventory can be performed with one. Ideally, each library outlet should have its own portable RFID reader to use for weeding, shelf reading, pulling items to fill holds, and performing inventory. These units can cost between $5,000 and $10,000 each.

Notes

1. Karen Coyle and Elena Engel studied California RFID implementations and developed a protocol for establishing ROI but recommended doing so with ten years' worth of data, which was unavailable at that time (2006). More information available at Karen Coyle, "California State Library Study on RFID and Return on Investment," Karen Coyle's Home Page, http://kcoyle.net/rfid_roi.html.
2. Connie K. Haley, Kathleen Degnan, and Kathleen Haefliger, "Library RFID Technology Update," December 9, 2008, https://sites.google.com/site/chaley102/Home/library-rfid-technology-update.
3. Jeff Narver, "Top 10 Reasons Why Canadian Public Libraries Implement RFID," 3M website, February 2007, http://multimedia.3m.com/mws/mediawebserver?mwsId=SSSSSu7zK1fslxtUN8t1NY_eev7qe17zHvTSevTSeSSSSSS--&fn=WhyPublicLibrariesImplRFID.pdf.
4. Elena Engel, "RFID Implementations in California Libraries: Costs and Benefits," July 2006, Karen Coyle's Home Page, http://kcoyle.net/RFIDCostsBenefits.pdf.
5. University Leadership Council, *Redefining the Academic Library: Managing the Migration to Digital Information Services* (Washington, DC: University Leadership Council, 2011), viii, www.educationadvisoryboard.com/pdf/23634-EAB-Redefining-the-Academic-Library.pdf.
6. "Juiced" barcodes in the current vernacular.
7. NISO RFID Revision Working Group, *RFID in U.S. Libraries,* Recommended Practice of the National Information Standards Organization, NISO RP-6-2012 (Baltimore, MD: NISO, March 2012), 1, www.niso.org/apps/group_public/download.php/8269/RP-6-2012_RFID-in_US_Libraries.pdf.
8. Mick Fortune, "Why Do Libraries Invest in RFID?—Part Two of This Year's Survey," *RFID—Changing Libraries for Good?* (blog), March 5, 2012, www.mickfortune.com/Wordpress/?p=739.
9. The US Data Profile document (see note 7 above) reports tagging speeds "approaching 500 items per hour with two-person teams." A 3M study found customers using their conversion stations tagged 400 items per hour (per team). See "3M RFID Systems Deliver ROI for Libraries," www.3m.com/library.
10. The companies providing tagging services at this time include Backstage Library Works (www.bslw.com), RFID Library Solutions (http://rfidlibrarysolutions.com), and AMH & RFID Consultants (http://amhrfid.com).