



Warehouse Mobile Decision Support White Paper

Keeping the Physical World and the Virtual World in Sync:
Improving Efficiency with Barcode Technology

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Mobile WMS



Data Management

Today it's hard to imagine an organization functioning properly without some sort of data management system. Data management has become an integral part of doing business, and can take the form of a simple spreadsheet program or a complex ERP system.

Data streams come from a variety of sources, including inventory management, purchase orders, shipping documents, invoices, payroll data, supply chain contacts, and so on. When timely and accurate, the data that companies collect can give them a competitive advantage, but data mismanagement can also have negative consequences for the bottom line.

Bad data management may result in:

- Inventory Overstock
- Expedited Purchases
- Lower than Expected Margins or Lost Receivables
- Decreased Shop Productivity
- Increased Office Overhead
- Poor Customer Service



Physical Transactions

Even at organization with electronic data management systems, many physical transactions are still recorded on paper.

Examples of physical interactions include: handwritten receipt confirmations, parts issued to jobs, completion of finished goods, manual time cards, inventory counts, etc. Eventually these physical transactions must be converted to electronic form, which requires employee time and increases the likelihood of operator error. These errors can add significant costs to the organization. Typical errors include:

- Lost Transactions (*"I lost the paper"*)
- Delayed Transactions (*"I found it"*)
- Improperly Recorded Information

Data mismanagement can lead to a chain reaction of negative effects. For example, if a picker improperly removes an item from inventory, the current inventory levels will show more stock than is physically there. Once the problem is recognized, staff must then spend time diagnosing it and changing the inventory to reflect current levels. This analysis pulls employees away from their regular job, which has a negative effect on productivity and increases overhead costs while decreasing margins. If the problem is not recognized in time, delivery quotes for customers will be based on false information, which could result in missed delivery dates and poor customer service. As a general rule of thumb, 10% degradation in on-time delivery results in a 1% loss in market share. As you can see, recording physical transactions to paper is highly volatile, and one mistake early in the process can have harmful effects down the line.



RFID

RFID, or Radio-Frequency Identification is one possible way to completely automate the data collection process.

RFID tags contain unique information that describes whatever they are attached to, and can share that information wirelessly with computer databases and networks to track items efficiently. Multiple tags can be read simultaneously, which can significantly reduce processing time.

RFID tags are beneficial in dealing with high volume or high value assets, harsh environments where barcode are impractical, or where processing speed and real-time supply chain visibility are paramount. There are, however, limitations and considerations to take into account when evaluating RFID as a possible option.

As of now, RFID tags are still a relatively expensive alternative to track inventory and other processes. There are also concerns over the amount of data generated simultaneously by multiple RFID tags and how users can translate that data into succinct, meaningful information.



Barcoding

Barcode technology is currently the most accessible in terms of cost, complexity, and universal acceptance. Recently, barcodes have also become more capital, with variations that build on the amount of data that can be stored in a single barcode.

In terms of software, most Enterprise Resources Planning (ERP) software has barcoding capabilities built-in, or available as an add-on. Organizations also have their choice of hardware options, including multiple hand-held and hands-free devices.

Barcode stickers are traditionally less suited to heavy industrial applications, as economical versions are less likely to adhere to maintain readability in harsh environments. This problem is rectifiable thanks to technologies such as barcode stamping, metal barcode tags, Teflon-coated barcodes (to resist dirt), high temperature barcodes, and polyester barcodes, to name a few. Being a universally accepted method, there is incentive for producers to come up with new methods of alleviating the environmental pressures on barcode technology.



The above barcodes are examples of commonly used barcodes for industrial/warehousing purposes. A Data Matrix code (center) this size contains far more information than a standard barcode.

RFID vs Barcode

In an effort to clarify the perceived benefits of both technologies, multiple studies have been performed on each individual technology and of the two in comparison.

A study performed by researchers at the University of Western England (UWE) concluded, "...while RFID can deliver improved operational performance over traditional barcode systems, it is found to be less reliable in implementation."

Naturally, processing times for RFID technology were quicker than those for barcode technology, but those times were less consistent and errors were actually higher for RFID processing. Given the technological and financial requirements for RFID technology, barcoding is still the most practical and accessible way to automate warehouse and industrial processes.

Of course, even in the time since that study was published, there have been gains in the practical usage of both technologies, but barcode technology remains the ubiquitous international standard for product tracking. Deciding between the two is a process in itself, but what is clear is that, whatever the technology you choose, you will realize significant benefits in the areas of:

- Rejection and Rework
- Processing Times
- Entry Errors
- Manufacturing Costs
- Sales per Employee

Inventory Management

To illustrate the benefits of an automated system in the area of inventory management, let's consider a manufacturer/distributor with several thousand SKUs (stock-keeping units). This organization conducted annual inventory counts and used a manual/paper based method to track inventory and other processes.

Inventory counts were a major event at this organization. To avoid a disruption of service, inventory counts typically took place on a weekend, with employees paid overtime to compensate for their time. Pre-counting and preparation began 10 days before, with the weekend (Fri-Sun) consisting of three full days of actual counting. After the inventory weekend, four full-time staff took approximately five days to enter and reconcile all the data.

Recognizing a need to cut inventory counting costs, management decided to implement a barcode based system. The solution consisted of 2D barcode labels for product and inventory bins, with employees using hand-held barcode readers to receive, put away, and pick product.

As a result of the implementation, inventory counts were carried out more frequently, and completed in 4-5 days. Real-time management reduced the number of manual entry errors, and therefore reduced the number of inventory adjustments. Faster cycle counts improved data accuracy, which also improved productivity and order fill rates. Customer satisfaction also increased due to accurate inventory quotes and delivery dates. With only a reduction in the necessary labor, the barcode system paid for itself after the first annual count.



Time Collection

One often overlooked area where automated systems can improve operations is in the area of time collection. Let's again consider an organization with four distributed plants and 300 employees using manual (paper) time cards. Each employee works on four to five jobs per day, with two full-time employees needed to input and manage all of the time card data.

Switching to an automated system was justified simply on the amount of full-time labour needed to manually input all the time card data into job costing and payroll systems. Further examination of tangible and intangible benefits shows how simple and effective a switch can be.

Management decided to implement a barcode system to track employee labour and job costing. Wireless thin client terminals were installed throughout the warehouse, which minimized the hardware necessary to provide to employees with quick access to scanners at the point of transaction. Time capture was integrated with existing ERP and payroll systems to give management a real-time view of manufacturing processes.

Benefits of switching to an automated system were felt immediately in the payroll department. What previously required two full-time employees (FTEs) is now easily accomplished by less than one FTE. Time card errors were largely eliminated, and management benefited from increased visibility into labour usage and material requisition. Not only was rework significantly reduced, but visibility into the defective product allowed management to pinpoint how manufacturing processes affected quality control.

Will These Technologies Work For Me?

Obviously there are situations where mobile barcodes/RFID solutions may not be worth expenditure, but those situations are few and far between. Still, there are many factors to consider when choosing which system is best for your operations.

For example, a metal fabrication shop may have little use for inventory tracking, but could benefit from better labour tracking, which a distributor may not need labour tracking, but would need better inventory management. A manufacturer with high usage of stocked parts and high labour usage per job could have a use for both. Below are some questions you should ask in evaluating automated tracking systems.

Where is data entry required?

Common points for data entry include:

- Shipping
- Receiving
- Time Entry
- Parts Picking
- Inventory Counting
- Invoicing, etc.

Breaking your processes down to the most basic components will help to evaluate exactly where automated data collection will have a positive effect on your business.

What are the costs and risks of inaccurate data at these points?

Some processes are more important than others, or carry a high cost of inaccurate data.

Once you know where data entry is required, attaching significance to that function will help you make a decision regarding automated data collection.



What is the cost to streamline these areas with electronic data collection?

Most out-of-the-box solutions are reasonably priced, with high payback and short return on investment.

However, getting a system that matches your unique requirements may cost more. Outside consultants with implementation experience can help determine ROI and help with technical decisions such as linear bar codes vs 2D bar codes vs RFID, mobile devices vs fixed terminals, and potential hardware and software providers.



What is the expected ROI/Payback Period?

Introducing barcode technology to your operations can have instant positive effects on your bottom line.

Reduced picking errors, inventory levels, carrying costs, and data entry errors are just a few of the examples of where a barcode system can help you achieve significant gains from a relatively small investment. Ultimately though, benefits have to outweigh costs and there's no use in buying a system only to realize later that further investment is needed to match it to your requirements. Discover your unique needs, find a solutions that matches those needs, and select accordingly. Sacrificing on quality for short term gains will not address all efficiency issues down the road.

Payback on automated systems varies, but can be as short as one inventory count, as stated earlier. Payback on a basic system should range between 6-12 months, and that's when only considering the tangible benefits of an automated data collection system. In addition to hard benefits, automated data systems provide many soft benefits such as customer goodwill, brand image, and employee satisfaction.

The following tables illustrate how much of an impact a simple barcode system could have on your operations.

	Savings from Reduced Data Entry Errors	
Data Entry Transactions Per Day	100	500
Keystrokes Per Transaction	30	30
Keystrokes Per Day	3,000	15,000
% Critical Keystrokes	10%	10%
Critical Keystrokes Per Day	300	1,500
Errors Per Day	1	5
Cost to Correct Errors	\$25	\$25
Cost Per Day to Correct Errors	\$25	\$125
Work Days Per Year	250	250
Annual Cost Savings	\$6,250	\$31,250

By identifying and reducing data entry errors at the most critical points, you can eliminate costly data entry errors.

	Savings from Reduced Picking Errors	
Lines Picked Per Day	500	1,000
Error Rate	1%	1%
Errors Per Day	5	10
Error Reduction Rate	50%	50%
Error Reduction Per Day	2.5	5
Cost to Correct Error	\$25	\$25
Daily Cost to Correct Errors	\$62.50	\$125
Work Days Per Year	250	250
Annual Cost Savings	\$15,625	\$31,250

“Cost to Correct Error” is a blended average, considering both internal and external error identification costs. If recognized quickly, the cost could be as low as \$5, whereas a mistake found later in the sales/delivery process could cost up to \$75.

	Savings from Reduced Inventory	
Assumed Reduction Rate	5%	7.5%
Inventory Value	\$5,000,000	\$5,000,000
Annual Value of Reduction	\$250,000	\$375,000
Assumed Carrying Cost %	15%	15%
Annual Cost Savings	\$37,500	\$56,250

*Calculations based on ROI calculator from <http://www.asapla.com/resources.htm>.

Inventory barcode systems provide real-time, accurate inventory information, that can be used to run at leaner inventory levels.

Conclusion

Adopting a barcoding system will certainly provide operational benefits to any company.

Even when considering the financial outlay necessary to adopt such a system, the tangible benefits provide a high enough ROI in a short enough payback period to make the decision more about “when” than “if”. Most importantly, if you’re considering adopting a barcoding system, make sure you know where and why it will make a difference to your operations. Selecting a system that accurately reflects your business processes will ensure that you receive the most from your productivity investment.

About Insight Works

Founded in 2008, Insight Works began as a collection of professionals with decades of combined experience developing and implementing productivity solutions. With a well rounded collective skill set, Insight Works has quickly become one of Canada's fastest growing companies by putting our customers' success above all else.

Put Our Domain Expertise To Work For You

Insight Works has extensive experience developing productivity solutions for clients in the manufacturing and distribution industries. It's what we know and what we do well. Based on our experience and industry feedback, we have developed a collection of add-ons for Microsoft Dynamics NAV that promote operational efficiency from the shop floor to the boardroom.

We've Been There

Because we've been on both sides of the implementation experience, we understand the unique needs of all users. At Insight Works, our "shop floor to the top floor" approach is what makes our employees and our products so responsive.



Gold Certified

We're proud to uphold the strict standards that the Microsoft Gold ERP Certification requires as it speaks to our ability to develop world-class products that make a positive impact for our clients.

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As Microsoft NAV evolves, so do our products. You and your clients can be sure that you're working with up-to-the-minute tools that reflect the most current ERP technology.



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